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CONTENT

WCQMV : Design of A Wavelet Compression Based Quadratic Model for EEG Classification Using Multivariate Analysis

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ABSTRACT

Electroencephalogram (EEG) signals represent functioning of the brain, and assist in identification of multiple brain-related disorders including Epilepsy, Alzheimer's disease, emotional states, Parkinson's disease, strokes, etc. To design such models, a wide variety of machine learning & deep learning approaches are proposed by researchers. But these approaches use a black-box generic model for EEG classification, due to which their scalability is limited. To enhance this scalability, a novel feature augmented extraction model is proposed in this text. The model uses wavelet compression on input EEG data, and processes the compressed signal using a variance-based selection approach. Due to which, the model is capable of low-delay, and high accuracy classification for different brain-diseases. It evaluates wavelet-based features from input EEG data, and performs ensemble feature selection for improving feature variance. The wavelet features are able to convert input EEG data into different directional components, which assists in improving efficiency of feature representation & model training for different signal types. The proposed model uses a quadratic Neural Network (QNN) classification engine, and is capable of achieving an accuracy of 96.5% for different EEG classes. These classes include 3 types of Epilepsy, presence of Alzheimer's disease, & evaluation of brain strokes. Due to use of feature variance-based classification, the proposed WCQMV model outperforms existing feature selection & classification models by 4% in terms of accuracy when averaged over multiple datasets. Moreover, the proposed model also improves speed of classification by 4.9% when compared with these models, thus making it useful for high-speed EEG processing applications. This performance improvement is possible due to effective feature reduction, which assists in identification of different EEG signal types. The model was tested on various EEG datasets including, IEEE Port Epileptic dataset, and BNCI dataset for Alzheimer & brain strokes. It was observed that the proposed model was capable of high-performance

classification on each dataset, thereby indicating high-scalability across multiple EEG applications.

Keywords: EEG, quadratic, variance, Neural, Network, ensemble, augmented, classification, features

I. INTRODUCTION

EEG classification is a multidomain task which involves design of design of data pre-processing, segmentation, feature extraction, feature reduction, classification & post-processing operations. To design a highly effective EEG classifier, Models for these operations must be developed with high-efficiency & reduced delays. An instance of such a classification model is described in figure 1, wherein classification of EEG for emotion recognition is observed [1]. The model captures EEG signals from headset-based interface, and pre-processes it using denoising & filtering techniques. The pre-processed signal is given to a feature-extraction model, wherein different angular features are extracted. These features represent time-domain interpretations of brain state, and thus can be used for categorization into different classes.
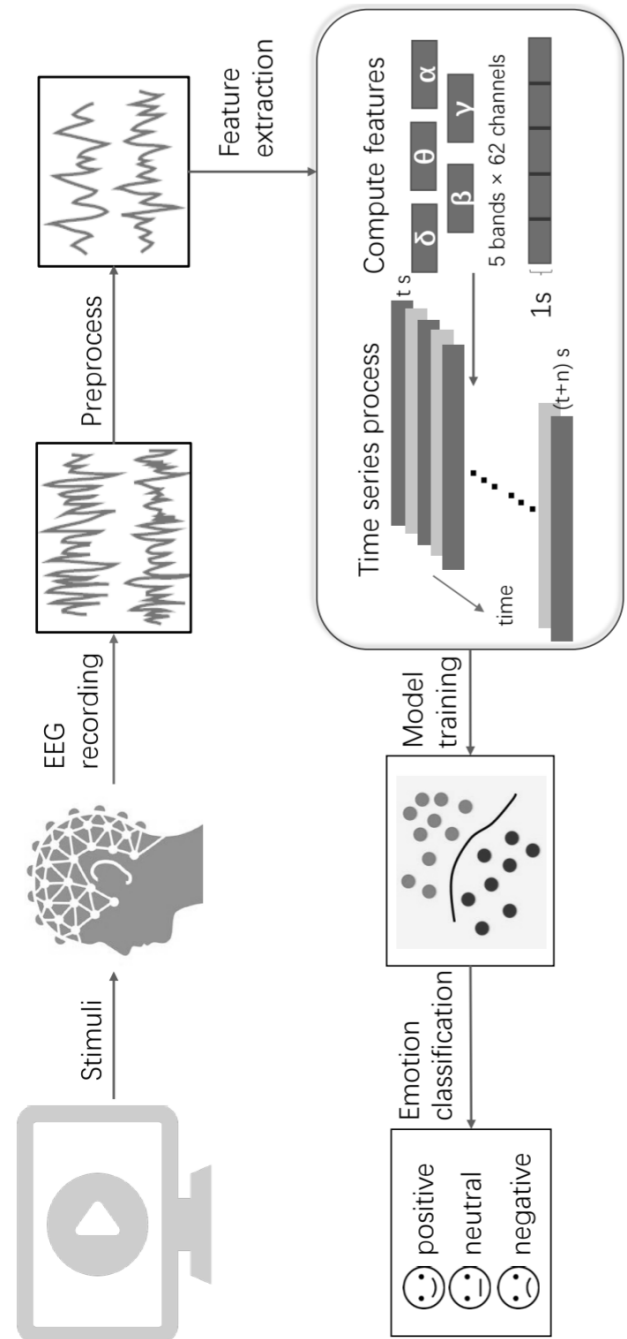
Figure 1. A typical brain emotion classification model using EEG signals

The extracted features are given to a classification model, which uses support vectors to identify positive, negative and neural emotion types. These emotions can be used by cascaded systems to identify application-specific information depending upon varying model designs. It can be observed that accuracy of these models is highly dependent on feature extraction, feature selection, and classification blocks. Design of these blocks along with performance characteristics from various state-of-the-art classification models is discussed in the next section of this text. Based on this discussion, it is observed that these approaches use a black-box model or are very generic, which limits their scalability in terms of delay & accuracy performance. To improve this performance, section 3 discusses design of the proposed augmented feature selection engine for EEG classification using multivariate analysis. Performance of this model is evaluated in section 4, and is compared with various state-of-the-art approaches. Finally, this text concludes with some interesting observations about the proposed model, and recommends methods to further improve its performance.

II. LITERATURE REVIEW

A wide variety of EEG classification models are proposed by researchers over the years, and each of them vary in terms of applicability, precision, recall, accuracy & delay performance. For instance, work in [2, 3, 4] discusses design of reduced instruction set (RISC)-V convolutional Neural Network (CNN) Coprocessor, combination of linear discriminant analysis (LDA), k-nearest neighbour (KNN), support vector machine (SVM), & artificial neural network (ANN) with common spatial pattern (CSP), and Transfer TSK Fuzzy Classifier (TTFC) for achieving better classification results. These models have good accuracy, but lack in terms of precision performance due to their application-specific classification characteristics. Extensions to this model are discussed in [5, 6], wherein Neuroglial Network Model (NNM),

and low-intensity focused ultrasound stimulation (LIFUS) are used for multidomain EEG classifications. These models have good precision, but cannot be scaled for multiple applications due to high computational complexity. To improve scalability, work in [7] proposes design of Multiple frequency Multilayer brain Network (MFMBN) that assists in achieving higher accuracy and better scalability than previously proposed models. Similar models that utilize CNN with cross wavelet transform (XWT) [8], Local Binary Pattern Transition Histogram (LBP TH) [9], and Multivariate Scale Mixture Model (MSMM) [10] are proposed by researchers. These models utilize augmented feature extraction methods for improving overall classification performance during epilepsy detection.

Based on these feature extraction models work in [11, 12, 13] propose fusion of Hand-Crafted Deep Learning EEG model (HC DL), quadratic classifier with wavelet features, and Multiple scaled NN with Dilated Convolutions (MSNN DC) is discussed. These models perform large-scale feature extractions to represent input EEG waveforms via multiple spectrums for better classification performance. But these models showcase moderate accuracy performance, which can be improved via the work in [14, 15, 16], wherein hierarchical discriminative sparse representation classifier, time domain sequential features classification using long short-term memory (LSTM) neural network, and Deep Convolutional Neural Network (DCNN) are discussed. These models assist in augmentation of EEG features in order to improve classification accuracy for different clinical applications. Similar models are discussed in [17, 18], wherein Extended K Nearest Neighbours, and Joint blind source separation methods are proposed by researchers for better scalability performance. These models utilize low complexity feature extraction methods, but cannot be applied to large-scale EEG datasets. Thus, it can be observed that models that have high accuracy are not applicable for large scale

deployments, while models that have high scalability cannot be used for highly accurate classification applications. To overcome these issues, next section proposes design of wavelet compression based quadratic model for EEG classification using multivariate analysis, that assists in high-efficiency and high scalability EEG classification for different clinical scenarios.

III. Proposed wavelet compression based quadratic model for EEG classification using multivariate analysis

Based on the literature review, it was observed that most of the recently proposed EEG classification models are general purpose in nature, which limits their scalability when applied to real-time classification applications. To improve this scalability, a novel wavelet compression based quadratic model for EEG classification using multivariate analysis model is discussed in this section. Overall flow of the proposed model is depicted in figure 2, wherein it is observed that input EEG data is initially compressed via a wavelet transform block. The compressed signal is given to a feature extraction block, which assists in extraction of spectral & spatial features. These features are processed via a Quadratic Neural Network (QNN) based classification model, which assists in obtaining final epilepsy classification. The input EEG waves are initially processed via a wavelet compression block, which assists in feature reduction. Extraction of wavelet components is evaluated via equation 1 & 2 as follows,

$$W_a = \frac{x_i + x_{i+1}}{2} \ldots (1)$$

$$W_d = \frac{x_i - x_{i+1}}{2} \ldots (2)$$

Where, W_a, and W_d represents approximate & diagonal wavelet components, while x_i and x_{i+1} represents current and next EEG signal value. Both these components are processed via a feature

extraction layer, which assists in evaluation of statistical & spectral features. These features are evaluated via equations 3 to 13 as follows,

$$Mean = \sum_{i=1}^{N} \frac{c_i}{N} \ldots (3)$$

$$Max = Maximum\left(\bigcup_{i=1}^{N} c_i\right) \ldots (4)$$

$$Min = Minimum\left(\bigcup_{i=1}^{N} c_i\right) \ldots (5)$$
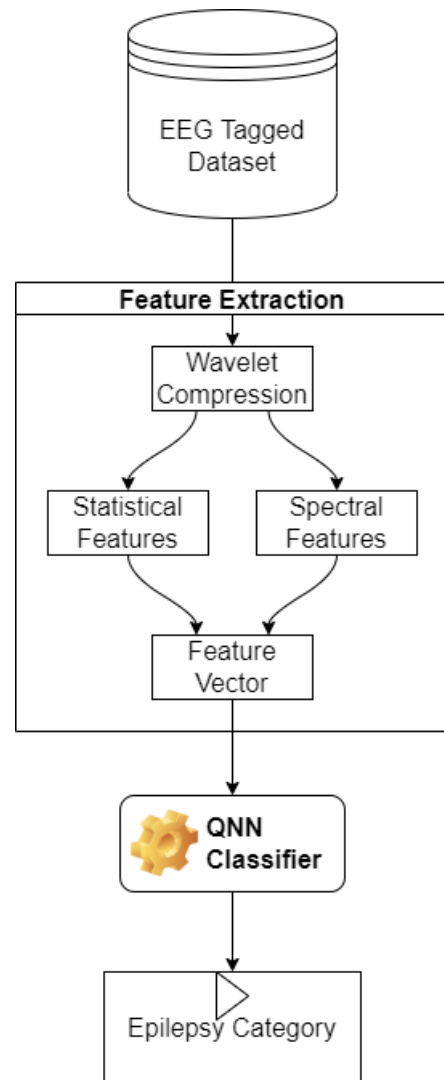
Figure 2. Overall flow of the proposed model

$$STD = \sqrt{\sum_{i=1}^{N} \frac{\left(c_i - \sum_{j=1}^{N} \frac{c_j}{N}\right)^2}{N}} \quad \ldots (6)$$

$$Var = \sum_{i=1}^{N} \frac{\left(c_i - \sum_{j=1}^{N} \frac{c_j}{N}\right)^2}{N-1} \quad \ldots (7)$$

$$CC = \frac{\sum_{i=1}^{N} \left(c_i - \sum_{j=1}^{N} \frac{c_j}{N}\right)}{\sqrt{\sum_{i=1}^{N} \left(c_i - \sum_{j=1}^{N} \frac{c_j}{N}\right)^2}} \quad \ldots (8)$$

$$Cov = \frac{\sum_{i=1}^{N} \left(c_i - \sum_{j=1}^{N} \frac{c_j}{N}\right)}{N} \quad \ldots (9)$$

$$Median = C\left[\frac{N}{2}\right], when\ N\ is\ even,$$

$$else\ \frac{\left[C\left[\frac{N-1}{2}\right] + C\left[\frac{N+1}{2}\right]\right]}{2}, when\ N\ is\ odd \ldots (10)$$

$$Kurtosis = \sum_{i=1}^{N} \frac{\left(c_i - \sum_{j=1}^{N} \frac{c_j}{N}\right)^4}{\left(c_i - \sum_{j=1}^{N} \frac{c_j}{N}\right)^2} * N \ldots (11)$$

$$Sum\ Square = \sum_{i=1}^{N} \frac{c_i^2}{N} \ldots (12)$$

$$ZCR = \sum_{i=1}^{N-1} |sgn(c_i)\ != sgn(c_{i+1})| \ldots (13)$$

Where, $Mean$ represents average value of signal, Max represents maximum value of signal, Min represents minimum value of signal, STD represents standard deviation value of signal, Var represents variance value of signal, CC represents correlation coefficient value of signal, Cov represents covariance value of signal, $Median$ represents Median value of signal, $Kurtosis$ represents kurtosis of signal, $Sum\ Square$ represents sum squared average value

of signal, ZCR represents zero crossing rate value of signal, c_i represents instantaneous value of signal, and N represents total number of samples in the signal. All these features are evaluated for approximate & diagonal EEG components, and are combined to form a super feature vector. This feature vector is given to a quadratic Neural Network (QNN) model for final classification. Overall flow of the QNN model is depicted in figure 3, wherein multiple layers are connected via neuron connections to produce 3 different output classes.
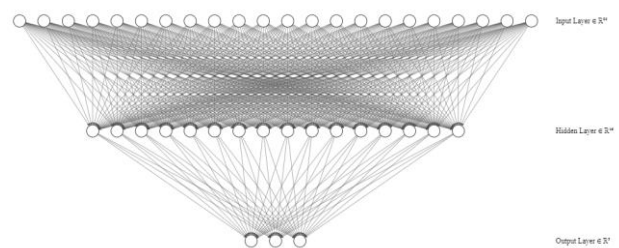
Figure 3. Overall flow of the QNN model

It can be observed that input layer consists of 22 different neurons, one for each extracted feature. These neurons are modified in multiples of 2, for achieving network sizes of 44, 66, and 132 input layer neurons. These neurons connected together to obtain 3 output classes, that include Normal, Interictal, and Ictal EEG types. The final class is evaluated by combining results from these classifiers via quadratic equation 14 as follows,

$$C_{out} = -\frac{1}{2}\left(x - \sum_{i=1}^{N} x_i\right)^T \sum_{j=1}^{N} (x_j - \sum_{l=1}^{N} x_l) + \log\left(\sum_{i=1}^{N} x_i\right) \ldots$$

Where, $x,\ \&\ N$ represents input feature vectors, and number of Neural Network configurations used to obtain the final classification result. Based on this equation, classification of input data into different epilepsy classes is performed. Results of this classification can be observed from the next section of this text.

IV. RESULT ANALYSIS AND COMPARISON

The proposed WCQMV model was tested on different EEG datasets for classification of input waveforms into Normal, Interictal, and Ictal EEG types. These waveforms were extracted from Seizure Prediction Project Freiburg, which can be accessed from https://epilepsy.uni-freiburg.de/freiburg-seizure-prediction-project/eeg-database via open-source licensing for research purposes. The dataset consisted of 22 different EEG leads, and 200+ patients. A total of 2200 samples were extracted from this dataset, and divided into 70:30 ratio for training & validation respectively. Results were valuated in terms of accuracy, precision, recall & delay, and were compared with CSP [3], CNN XWT [8], and MSNN DC [13] for validation purposes. The results for accuracy can be observed from table 1 as follows,

Number of EEGs	A (%) CSP [3]	A (%) CNN XWT [8]	A (%) MSNN DC [13]	A (%) WCQ MV
100	75.60	77.50	76.29	80.49
200	79.40	80.30	78.65	83.63
300	81.20	81.55	79.83	85.12
400	81.90	82.65	81.09	86.19
500	83.40	84.50	82.74	87.95
600	85.60	85.75	83.73	89.50
700	85.90	86.05	84.02	89.82
800	86.20	86.35	84.47	90.18
900	86.50	87.29	85.47	90.97
1000	88.09	88.54	86.60	92.36
1200	88.99	89.45	87.48	93.31
1400	89.90	90.35	88.37	94.25
1600	90.80	91.26	89.25	95.20
1800	91.71	92.16	90.14	96.14
2000	92.62	93.07	91.02	97.09
2200	93.52	93.97	91.90	98.03

Table 1. Accuracy of different EEG classification models

Based on this evaluation, it can be observed that the proposed model is 4.5% accurate than CSP [3], 3.9% accurate than CNN XWT [8], and 6.8% accurate than MSNN DC [13] for different EEG signal types. The reason for this performance improvement in use of QNN, which assists in augmenting feature classification process. Similarly, precision performance of these models is tabulated in table 2 as follows,

Number of EEGs	P (%) CSP [3]	P (%) CNN XWT [8]	P (%) MSNN DC [13]	P (%) WCQ MV
100	72.90	73.23	74.66	76.70
200	76.05	75.69	77.27	79.84
300	77.50	76.85	78.55	81.31

400	78.36	77.97	79.65	82.27
500	79.95	79.64	81.28	83.95
600	81.60	80.71	82.49	85.55
700	81.88	80.99	82.78	85.85
800	82.17	81.34	83.17	86.18
900	82.76	82.27	84.02	86.86
1000	84.11	83.40	85.22	88.23
1200	84.97	84.25	86.09	89.14
1400	85.83	85.10	86.96	90.04
1600	86.70	85.96	87.83	90.95
1800	87.56	86.81	88.70	91.85
2000	88.42	87.66	89.58	92.75
2200	89.28	88.51	90.45	93.66

Table 2. Precision of different EEG classification models

Based on this evaluation, it can be observed that the proposed model is 4% precise than CSP [3], 5.2% precise than CNN XWT [8], and 3.1% precise than MSNN DC [13] for different EEG signal types. The reason for this performance improvement in use of QNN, which assists in augmenting feature classification process. Similarly, recall performance of these models is tabulated in table 3 as follows.

Number of EEGs	R (%) CSP [3]	R (%) CNN XWT [8]	R (%) MSNN DC [13]	R (%) WCQ MV
100	74.25	75.37	75.48	78.59
200	77.72	77.99	77.96	81.73
300	79.35	79.20	79.19	83.21
400	80.13	80.31	80.37	84.23
500	81.68	82.07	82.01	85.95
600	83.60	83.23	83.11	87.53
700	83.89	83.52	83.40	87.83
800	84.18	83.85	83.82	88.18
900	84.63	84.78	84.74	88.92
1000	86.10	85.97	85.91	90.30
1200	86.98	86.85	86.79	91.22
1400	87.87	87.73	87.67	92.15
1600	88.75	88.61	88.54	93.07
1800	89.63	89.49	89.42	94.00
2000	90.52	90.36	90.30	94.92
2200	91.40	91.24	91.17	95.85

Table 3. Recall of different EEG classification models

Based on this evaluation, it can be observed that the proposed model has 4.5% more recall than CSP [3], 4.6% more recall than CNN XWT [8], and 4.8% more recall than MSNN DC [13] for different EEG signal types. The reason for this performance improvement in use of QNN, which assists in augmenting feature classification process. Similarly, delay performance of these models is tabulated in table 4 as follows,

Number of EEGs	D (ms) CSP [3]	D (ms) CNN XWT [8]	D (ms) MSNN DC [13]	D (ms) WCQ MV
100	0.45	0.44	0.44	0.42
200	0.86	0.85	0.86	0.82
300	1.26	1.26	1.26	1.20
400	1.66	1.66	1.66	1.58
500	2.04	2.03	2.03	1.94
600	2.39	2.40	2.41	2.29
700	2.78	2.79	2.80	2.66
800	3.17	3.18	3.18	3.02
900	3.54	3.54	3.54	3.37
1000	3.87	3.88	3.88	3.69
1200	4.60	4.61	4.61	4.38
1400	5.31	5.32	5.32	5.06
1600	6.01	6.02	6.02	5.73
1800	6.69	6.71	6.71	6.38
2000	7.37	7.38	7.38	7.02
2200	8.02	8.04	8.04	7.65

Table 4. Delay of different EEG classification models

Based on this evaluation, it can be observed that the proposed model is 5.6% faster than CSP [3], 5.5% faster than CNN XWT [8], and 5.8% faster than MSNN DC [13] for different EEG signal types. The reason for this performance improvement in use of wavelet compression, which assists in augmenting feature selection process. Due to this performance improvement, the proposed model is capable of being deployed for a large number of real-time clinical applications.

V. CONCLUSION AND FUTURE SCOPE

The proposed EEG classification model uses a combination of wavelet compression with spatial & spectral features to train a QNN classifier. Due to use of spatial features, the proposed model is capable of achieving better accuracy, while due to use of spectral features the model is able to achieve better precision & recall performance under different EEG datasets. It is observed that the proposed model is able to achieve an average accuracy of 96.5% on different EEG datasets, which is 4.5% higher than CSP [3], 3.9% higher than CNN XWT [8], and 6.8% higher than MSNN DC [13], thereby making it useful for a wide variety of clinical EEG classification applications. Furthermore, the proposed model is observed to achieve a precision of 90.2% & recall of 91.6%, which is 4% better than CSP [3], 5.2% better than CNN XWT [8], and 3.1% better than MSNN DC [13] for different EEG class types. Due to which, the proposed model is applicable for a wide variety of clinical EEG classification applications. Moreover, due to use of wavelet features, the proposed model is capable of

achieving faster classification results when compared with state-of-the-art approaches. Thus, making the proposed model useful for high-speed and high-performance classification applications. In future, researchers can integrate deep learning models like convolutional Neural Networks (CNNs), recurrent NNs (RNNs), and Q-learning for further enhancing accuracy & precision performance of the model. Furthermore, researchers can add a greater number of EEG based brain disease classes, which will assist in improving applicability of the system for a wide number of clinical scenarios.

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Comparative Study of Physico-Chemical Parameters in Saroornagar Lake and Ramanthapur Pedda Cheruvu

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ABSTRACT

The present paper deals with the comparison of physico-chemical parameters in Saroornagar lake and Ramanthapur Pedda Cheruvu. Various physico-chemical parameters Were analyzed in both lakes. Chlorides, Total hardness, biological oxygen demand, chemical oxygen demand and total solids were recorded in high concentration and very low concentration of dissolved oxygen was recorded in both lakes. On the basis of physico-chemical parameters the Saroonagar lake is highly polluted and severe water quality deterioration whereas Ramanthapur Pedda Cheruvu is mildly polluted.

Keywords - Physico-Chemical Parameters, Water Quality, Eutrophication

I. INTRODUCTION

Water is the most valuable blessing to humankind. Life on earth is not conceivable without water. Water the most imperative abiotic segment is one of a kind in numerous regards such as domestic utilities, industrial practices, irrigation and power generation. Water covers 70% of our earth in which 97% is marine water, 3% is freshwater and approximately 1% of which is readily available for mankind in various forms. Lakes, rivers, waterways, streams and wetlands go under classification of surface water. These water bodies get their water supply from precipitation, overflow from snow liquefying and as base spill out of ground water frameworks. Surface water assets have assumed a critical job in the advancement of human development. Lakes have environmental significance as sources of surface and ground water recharge, in maintaining energy exchange, nutrient cycling, watersheds and also support diversified aquatic life. Urbanization, industrialization, population growth, unsustainable water management, exploitation of catchment and command areas have led to impairment of water quality. High organic load, surface runoffs and industrial effluents leads to deterioration of water quality and eutrophication of lakes. The present investigation is a comparison of Saroornagar lake and Ramanthapur Pedda Cheruvu which are the two prominent lakes of Hyderabad. Both the lakes are under the stress. Hence it is important to access physico-chemical parameters of these lakes to counter the water quality impairment.

II. MATERIALS AND METHODS

The water samples were collected monthly intervals for a period of one year (September 2019 to August 2021) in Saroornagar Lake and Ramanthapur Pedda Cheruvu. Water samples were collected from four sampling stations in the Saroornagar lake and three sampling stations from the Ramanthapur Pedda Cheruvu.The samples were analyzed for pH, Temperature, Carbonates, Bicarbonates, Chlorides, Dissolved Oxygen (DO), Biological Oxygen Demand (BOD), Organic matter (OM), Chemical oxygen demand (COD), Total hardness, Calcium, Magnesium, Phosphates, Sulphates, Nitrates, Nitrites, Total solids (TS) and Total dissolved solids (TDS) as per the standard procedures of APHA (2005). The average values of the important physico-chemical variables of the water body studied along with the standards stipulated by WHO (1971), ISI (1982) and BIS (1998) standards were compared. To define the interrelationships between two or more variables through The Pearson's correlation matrix was carried out using SPSS 17.0 version.

III. Results and Discussion

Physico-chemical characteristics of Saroornagar Lake and Ramanthapur Pedda Cheruvu:

The samples were collected and analyzed from different sampling stations in Saroornagar Lake and Ramanthapur Pedda Cheruvu on monthly intervals for a period of one year (September 2019 to August 2021). The average, analytic results of each parameter during the period of investigation are summarized in Table 1.

TABLE 1: Average values of Physico-chemical parameters

All vales are expressed in mg/L except pH and Temp ($^\circ$C)

S.No	Physico - chemical Factors	Saroornagar Lake	Ramanthapur Pedda Cheruvu
1.	Temperature	25.55	24.2
2.	pH	8.36	8.58
3.	Carbonates	21.1	15.8
4.	Bicarbonates	756.7	245.3
5.	Chlorides	764.1	375.2
6.	Dissolved Oxygen	0.47	2.67
7.	Biological Oxygen Demand	218.9	88.0
8.	Organic Matter	83.6	19.3
9.	Chemical Oxygen Demand	231.75	95.1
10.	Total Hardness	617.9	564.3
11.	Calcium	142.5	85.1
12.	Magnesium	55.8	72.0
13.	Phosphates	18.7	5.62
14.	Sulphates	253.5	44.3
15.	Nitrates	18.3	9.2
16.	Nitrites	1.2825	0.32
17.	Total Solids	2772	790.3
18.	Total Dissolved Solids	2615	493.2

It is evident from the Table.1 that the physico-chemical parameters such as chlorides, total hardness, calcium, magnesium, phosphates, sulphates, BOD, total solids and total dissolved solids were higher than permissible limits in Saroornagar lake and Chlorides, total hardness, biological oxygen demand, Chemical oxygen demand, Total solids were recorded higher than prescribed limits in Ramanthapur Pedda Cheruvu. Dissolved oxygen is in very low concentration in both the Lakes.

Temperature is one of the significant factors that affect the aquatic environment (Sedamkar and Angadi, 2003) and can influence on the biological activities and growth. The pH is an important factor for plankton growth (Chisty, 2002) and also influence survival and nourishment of biological life. Saroornagar lake and Ramanthapur Pedda Cheruvu were recorded with pH 8.36 and 8.58 respectively representing alkaline nature of the lakes. Alkaline nature of the lakes in India was reported by John Mohammad (2015), and Ratna V Airsang (2015).

The high values of bicarbonates in saroornagar lake can be attributed to increase in organic decomposition during which CO_2 is released which reacts to form bicarbonates. Similar observation was made by Airsang (2013). The concentration of bicarbonates showed variation between the stations in Ramanthapur Pedda Cheruvu probably due to the fluctuations in the inflow of domestic and industrial wastes. High Chloride values in both lakes indicates the presence of high organic matter. Higher chloride concentration represents high degree of pollution (Ameetha Sinha, 2014 and John Mohammad, 2015) and is considered as very important parameter in determination of the water quality.

The present investigation revealed very low values of dissolved oxygen and very high values of biological oxygen demand (BOD) in Saroornagar lake and Ramanthapur Pedda Cheruvu. A high pollution load may also decrease the DO values considerably (Yeole and Patil, 2005). Higher BOD values indicate the decomposition and mineralization of organic matter, high nutrient loading and organic pollution. Similar observation was made by (Siraj, 2010, Suresh 2015). Chemical oxygen demand (COD) is an important parameter for judging the extent of pollution in water (Amirkolaie, 2008). COD is recorded high in both lakes. High COD values indicate pollution due to oxidizable organic matter (Syeda, 2003). The major sources leading to COD are discharges of domestic

wastewater from nearby settlements, surface and the other possible sources could be sewage, dumping of garbage, surface runoff and discharges of slaughter house waste (Purushottam J puri, 2010) and also the presence of carbonaceous matter.

The total hardness (TH) of the Ramanthapur Pedda Cheruvu and Saroornagar lake is higher than permissible limit of BIS (1998). Comparatively Saroornagar lake has recorded with very high total hardness. High hardness may be due to addition of sewage contamination or detergents. In the present investigation Calcium content is more in both lakes. This may be due to inflow of water from surface runoff and watershed (Rachana Bhateria and Disha Jain, 2016). In Ramanthapur Pedda Cheruvu the sulphates, nitrates are within permissible limits and phosphates are slightly more than permissible limits whereas Saroornagar lake exhibited high values of phosphates,sulphates and nitrates.It confirms the lake receiving sewage influx (Langmuir 1971, Sudha Rani 2004 and Amin Hossaini, 2013). High Nitrate concentration is the result of agricultural runoff or contamination with human or animal wastes (Nas and Berktay 2006). It indicates indicates organic pollution which triggers eutrophication (Dinesh K. Uchchariya 2012).

The Physico-chemical parameters exhibited certain interrelationships in Saroornagar Lake and Ramanthapur Pedda Cheurvu. The pH values are positively correlated to carbonates in both the lakes. The present findings clearly indicate negative relationship of dissolved oxygen with organic matter, BOD and COD in both the lakes. Phosphates showed positive correlation with COD, sulphates, nitrates and total solids and they also showed direct relationship with BOD, OM, total hardness and total dissolved solids and exhibited indirect relationship with DO in Saroornagar lake whereas phosphates showed positive correlation with chlorides in Ramanthapur Pedda Cheurvu. Sulphates are directly proportional to BOD,

COD, phosphates and nitrates and also maintained indirectly proportional to DO and nitrites in Saroornagar lake whereas in Ramanthapur Pedda Cheurvu sulphates showed positive correlation with chlorides. Nitrates in the lake showed significant positive correlation with BOD, phosphates, sulphates, total solids and total dissolved solids and showed negative correlation with nitrites in Saroornagar lake whereas nitrates are negatively correlated with Total dissolved solids and exhibited positive correlation with carbonates, bicarbonates and calcium in Ramanthapur Pedda Cheurvu. In both the lakes a positive correlation of COD with BOD, OM, phosphates, sulphates, total solids and total dissolved solids was observed. Total dissolved solids and exhibited positive correlation with carbonates, bicarbonates and calcium and negatively correlated with silicates and nitrites in Saroornagar Lake whereas total dissolved solids are negatively correlated with nitrates in Ramanthapur Pedda Cheruvu.

In Saroornagar lake nitrites are indirectly proportional to BOD, OM, COD, phosphates, sulphates, total solids and total dissolved solids at all stations. Total solids and total dissolved solids both showed positive correlation with BOD, COD, phosphates and nitrates. Total solids exhibited direct relationship with chlorides and showed negative correlation with silicates and nitrites. In Ramanthapur Pedda Cheurvu pH and carbonates are in negative correlation with bicarbonates. Carbonates showed an inverse correlation with Chlorides and total hardness.

The average values of the important physico-chemical variables of the water body studied along with the standards stipulated by WHO (1971), ISI (1982) and BIS (1998) standards were compared. Saroornagar lake and Ramanthapur Pedda Cheurvu both exhibited higher values of chlorides, total hardness, BOD, COD and total solids than permissible limits and very low values of dissolved oxygen were recorded representing polluted status of both the lakes. Comparatively Saroornagar lake is highly polluted than Ramanthapur Pedda Cheurvu.

IV. CONCLUSION

In Saroornagar Lake and and Ramanthapur Pedda Cheurvu chlorides, total hardness, BOD, COD and total solids were higher than permissible limits and dissolved oxygen is in very low concentration compared to the prescribed values by various national and international organizations.Very high average values of physico-chemical parameters and low dissolved oxygen concentration in Saroornagar lake clearly indicates that the lake water quality is severely deteriorated and representing eutrophic condition. Hence, it is unsuitable for drinking purposes, domestic utilities and recreational Purposes. Whereas on the basis of physico-chemical parmeters Ramanthapur Pedda Cheruvu is mildly polluted.

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Impact of Physico-Chemical Parameters on distribution and diversity of Euglenophyceae in Saroornagar Lake, Hyderabad

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ABSTRACT

Saroornagar Lake is one of the major fresh water-bodies of Hyderabad. The study deals with the influence of physico-chemical parameters on the distribution and diversity of Euglenophyceae. Samples were collected from four sampling stations for a period of two years and comprehensive physico-chemical analysis was carried out. Linear multiple regression analysis (MRA) has been carried out with SPSS software to evaluate the importance of various physico-chemical variables on the growth and development of Euglenophyceae. The physico-chemical parameters played an important role in distribution and diversity of algae. The growth of Euglenophyceae was positively influenced by sulphates, Free CO_2, calcium, total hardness, COD and bicarbonates. Negative influence on euglenoids was exerted by temperature, organic matter, total solids, total dissolved solids, magnesium and chlorides. Euglenoid flagellates exhibited higher peaks in winter and found very low in summer. Diversified species of Euglena, Lipocinclis, Phacus and Trachelomonas were reported. Euglena acus, E. gracillis, E. oxyuris, Lipocinclis ovum and Trachelomonas volvocina represent high organic pollution of the lake and indicate high degree of organic pollution.

Keywords : Euglenophyceae, diversity, physico-chemical parameters, pollution.

I. INTRODUCTION

Fresh water lakes are vital resources for any country. They are linked to human welfare and have greater prominence. Lakes have environmental significance as sources of surface with watersheds and air sheds. Lakes are highly polluted by anthropogenic sources such as urbanization, industrialization, various human developmental activities and improper management of water resources and to a lesser extent by natural sources. Sewage discharge, inappropriate agricultural practices and urban run offs disrupt aquatic ecosystems (Suresh, 2015) and lead to eutrophication of the inland water bodies. The deterioration and undesirable changes in physico-chemical characteristics of water body causes water pollution and show the considerable effect on planktonic flora (Mishra, 1992). Chlorophyceaea, Cyanophyceaea,

Euglenophyceae, diatoms and desmids are the basic link in the entire aquatic flora with ecological significance (Airsang, 2013). The present study involves assessment of varipos factors influencing the distribution and diversity of Euglenoid flagellates in Saroornagar Lake, which is one of the bigger lakes of Hyderabad and lies in the coordinates of 17.35584° N latitude and 78.52714° E longitudes.

II. MATERIALS AND METHODS

The water samples were collected at monthly intervals for a period of two years (September 2019 to August 2021) at four sampling stations in the lake. Priyadarshini Park, Pochamma temple, Singareni colony and Green park colony represent station I, II, III and IV respectively. The samples were analyzed as per the standard procedures of APHA (1995). The samples were analyzed for pH, temperature, carbonates, Free CO2, bicarbonates (HCO_3^-), chlorides (Cl^-), DO, BOD, organic matter (OM), chemical oxygen demand (COD), total hardness, calcium, magnesium, phosphates, silicates, sulphates, nitrates, nitrites, total solids (TS) and total dissolved solids (TDS) as per the standard procedures of APHA (1995).

For Planktonic study one litre of surface water samples were collected from four different stations of the lake and were kept in the sedimentation column after adding 2-3 ml of 4% formaldehyde solution. The samples were kept undisturbed for complete settling of the organisms for about a period of one month. The samples were concentrated to 100 ml. In the final step, the concentrated material was used for identification of species and frequency measurements. For planktonic study the drop method of Pearsal (1946) was followed.

Linear MRA was employed to establish the interaction of physico-chemical parameters and Euglenophyceae. The proposed models contain the minimum number of variables, required to explain the variation of algal number to maximum extent in a statistically significant way. Percentage of variability is evaluated following the F-test to determine the good fit model. The regression equation is constructed with beta values and variables are excluded with backward regression. The most significant predictors will be elevated by forward step ward regression.

III. RESULTS AND DISCUSSION

The average analytic results of each parameter during the period of investigation are summarized in Table 1.

TABLE 1 : Average values of Physico-chemical parameters

All values are expressed in mg/L except pH and Temp (OC)

S.No	Physico - chemical Factors	Station - I	Station - II	Station - III	Station - IV
1.	Temperature	25.6	25.3	25.6	25.7
2.	pH	8.37	8.37	8.37	8.36
3.	Carbonates	22.3	20.8	23.2	18.3
4.	Free CO_2	0.86	0.91	0.91	1.46
5.	Bicarbonates	738.9	736.7	792.4	758.8
6.	Chlorides	781.1	759.5	756.3	759.8
7.	Dissolved Oxygen	0.6	0.5	0.5	0.3
8.	Biological Oxygen Demand	238.7	192.0	218.3	226.6
9.	Organic Matter	63.7	80.8	88.3	101.6

10.	Chemical Oxygen Demand	141.0	153.8	288.3	343.9
11.	Total Hardness	648.0	602.4	605.5	615.8
12.	Calcium	145.2	154.3	136.9	133.6
13.	Magnesium	51.7	53.2	57.8	60.8
14.	Phosphates	16.9	20.3	20.1	17.8
15.	Silicates	1.37	1.22	1.88	1.99
16.	Sulphates	247.7	257.7	255.7	252.9
17.	Nitrates	16.5	19.8	19.6	17.4
18.	Nitrites	1.07	1.54	1.09	1.43
19.	Total Solids	2814	2715	2755	2804
20.	Total Dissolved Solids	2615	2521	2556	2606

Temperature is considered as one of the most important factors in the aquatic ecosystem and also in survival and existence of biological life. In the present investigation the average temperature ranged from 25.3 °C -25.7°C. The pH influence survival and nourishment of biological life and is an important factor for plankton growth (Chisty, 2002). The pH of the lake is 8.37. The value represents alkaline nature of the lake. Alkaline nature of lakes in India was reported by Amin Hossaini (2013) and John Mohammad (2015).High values of bicarbonates (HCO_3^-) were recorded at all stations, average values ranged from 736.7mg/L and 792.4mg/L and can be due to increase in organic decomposition during which CO_2 is released which reacts to form bicarbonates. Similar observation was made by Mahadev and Hosamani (2010) and Airsang (2013).

Chlorides play a very important role to determine the quality of water. The average values of chlorides were 781.1 mg/L at station I, 759.5 mg/L at station II, 756.3 mg/L at station III and 759.8 mg/L at station IV respectively, representing very high concentration of chlorides. Higher chloride concentration represents high degree of pollution (Ameetha Sinha 2014, John Mohammad, 2015).Very low DO values were recorded in the lake. The minimum and maximum DO values observed were 0.3 mg/L at station IV and 0.6 mg/L at station I. Very high BOD values were recorded at all stations with average values ranged from192 mg/L at station II to 238.7 mg/L at station I. Higher BOD values indicate organic contamination, high nutrient loading, decomposition and mineralization of organic matter (Siraj, 2010, Suresh, 2015). Chemical oxygen demand (COD) is a reliable parameter for judging the extent of pollution in water (Amirkolaie, 2008). Chemical Oxygen Demand ranged between 80.0 – 216.0 mg/L with minimum value of 141.0 mg/L at station I and 343.9 mg/L at station IV.

The total hardness of the lake was very high compared to their permissible limit of BIS (1998). It may be due to addition of detergents or sewage contamination. A high value of phosphates and sulphates confirms the lake receiving sewage influx(Amin Hossaini Motlagh et al, 2013) and eutrophication of lakes(Bishnu Kanth Shukla,2020). This was in accordance to Total dissolved solids were higher than BIS permissible limits of 2000 mg/L. The major sources of total solids in the water body are detergents, domestic sewage, runoff, leaching of substances from rocks in surrounding area and may also be attributed to the catchment watershed.

The diversified species of Euglenophyceae were observed in good numbers at all stations. Euglenophyceae was represented by diversified species of Euglena, Lipocinclis, Phacus and Trachelomonas. *Euglena acus, E. polymorpha, E. Viridis, E. elastica, E. oxyuris, Lipocinclis fusiformis, L. ovum, Trachelomonas hispida, T. volvocina, Phacus curvicauda, P. caudatus, P. longicauda, P. accuminatus, P. orbicularis*, were the dominant species recorded in the present observation. *Euglena, Phacus and Trachelomonas* were used as bio indicators of eutrophic lakes and are commonly encountered in waters with rich oxidizable organic matter. This is in conformity with Suresh, 2015.The high pollution in the lake is confirmed by the presence of *Euglena oxyuris* and *E. gracillis. Euglena and Trachelomonas* are the good bio indicators of eutrophic lake. The highest peaks of Euglenophyceae were reported in the winter and low during summer and monsoon. Accumulation of organic loads from surface run-off, autochthonous and allocthonous organic load, sewage, increasing temperature and clear sun-shine may be the reasons for the dominance of Euglenophyceae in winter. Similar observation was made by Ansari Ekhalak (2013) and Altaf H. Ganai (2014).

The Linear MRA reveals the R^2 value for all the 20 independent factors is 0.997 at station I, 0.958 at station II, 0.909 at station III and 0.947 at station IV respectively. The best regression model obtained by backward elimination method represented the factors accounting algal variance significantly and eliminated insignificant factors. The coefficients in the best model are given in Table 2, 3, 4 and 5 and the best regression model obtained by backward elimination method is given by equation 1, 2, 3 and 4 at Station I, II, III and IV respectively.

At station I, Euglenoid flagellates have attained high peaks during winter and bloom of *Trachelomonas sp.* was observed. Euglena sp., *Lipocinclis sp.* and *Phacus*

sp. were also represented during winter. The lowest peaks were observed in August with the representation of *Euglena sp*. and *Phacus sp*. The Linear MRA analysis (Table 2) reveals that all the physico-chemical factors together account for 97.4% variation in algal growth. Among them temperature, pH, Free CO_2, calcium, DO, COD, silicates, sulphates, nitrates, nitrites, TS, TDS, HCO_3^-, phosphates and magnesium are the minimum factors that could influence the growth of Euglenophyceae to the maximum extent of 99.2%. pH, Free CO_2 and nitrites exhibited positive influence on the growth of Euglenoids at 1% level. The direct relation of pH was in accordance with Ashwani Dubey (2012) and Ansari Ekhalak (2013). The positive relation of Free CO_2 was proved by Ashesh Tiwari (2006), Hosmani (2008) and Shankar (2012). Temperature and HCO_3^- negatively influenced the algal growth. Similar observation was made by Sur Altaf H. Ganai (2014) and Suresh (2015). Calcium, silicates, sulphates exhibited direct relationship with Euglenophyceae members at 1% level. The positive influence of sulphates was observed by Ashwani Dubey (2012). DO, COD and nitrates showed the significant positive influence on the growth of algae at 1% level. This is in accordance with Shankar (2012) and Suresh (2015). The positive correlation of COD and Euglenoids was reported by Suresh (2015). The negative influence of TDS, magnesium and phosphates at 1% level was observed in the present investigation (Table 2). Similar observation was made by Suresh (2015) regarding TDS and phosphates. Negative correlation of magnesium was observed by Ananthaiah (2010). Silicates exhibited positive correlation with Euglenophyceae at 1% level influencing 40% of algal variance. Nitrites influenced with 20% algal variance on positive side at 5% level. Similar observation was made by Ananthaiah (2010). TDS and TS at 1% level influenced algal growth on negative side with 43% and 42% algal variance respectively. The higher peaks of Euglenophyceae were associated with high pH and silicates and low TS and TDS.

Table 2 : Multiple Regression Analysis of Phisico-Chemical Factors on Euglenophyceae at Station I Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
6	(Constant)	-31177.553	6764.365		-4.609	.002
	Temp	-42.766	11.226	-.192	-3.809	.005
	PH	627.765	46.841	1.404	13.402	.000
	$FreeCO_2$	136.906	10.499	.846	13.040	.000
	HCO_3^-	-2.070	.187	-.632	-11.096	.000
	DO	402.035	33.757	1.230	11.910	.000
	COD	6.052+	.633	.821	9.564	.000
	Ca^{2+}	1.977	.498	.193	3.967	.004
	Mg^{2+}	-3.219	.477	-.323	-6.751	.000
	PO_4^{3-}	-225.428	25.610	-1.820	-8.802	.000
	SiO_2	10172.546	990.354	.835	10.272	.000
	$SO4_2^-$	30.782	4.417	.831	6.969	.000
	$N0_3^-$	208.657	26.478	1.200	7.880	.000
	NO_2^-	983.089	280.993	.316	3.499	.008
	TS	39.550	4.628	3.085	8.545	.000
	TDS	-40.592	3.996	-3.519	-10.158	.000

a. station = STATION I   b. Dependent Variable: Euglenophyceae(CP)

$CP=-31177.553-42.766\ Temp+627.765\ PH+136.906\ FreeCO_2-2.070\ HCO_3^-+402.035\ DO+6.052\ COD+1.977\ Ca^{2+}-3.219\ Mg^{2+}-225.428\ PO_4^{3-}+10172.546\ SiO_2+30.782\ SO4_2^-+208.657\ N0_3^-+983.089\ NO_2^-+39.550\ TS-40.592\ TDS$ -------------------- (1)

At station II, Euglenoid flagellates have attained peaks in November represented by the bloom of Trachelomonas sp. The species were *Trachelomonas volvocina, T. hispida and T. euchlora*. At this station, all the physico-chemical factors together account for 95.8% of algal variance in a statistically significant manner. Carbonates, Free CO_2, HCO_3^-, magnesium, phosphates, sulphates, nitrates, TS and TDS are the minimum factors that could influence the growth of Euglenoid flagellates to the maximum extent of 86.0%. Among these factors nitrates, TDS, sulphates are influencing algal growth on negative manner at 1% level. This was in accordance to Suresh (2015). HCO_3^-, and phosphates are found to be exerting a positive influence on algal growth at 5% level and 1% level respectively. Agale (2013) reported similar relationship and quoted HCO_3^- as one of the important factors regulating Euglenophycean growth. This was also in accordance with Agale (2013) and Ansari Ekhalak (2013). In the present observation carbonates exerted indirect relation at 1% level. This was in accordance to Ananthaiah (2010). Magnesium and TS exhibited negative relationship with the growth of Euglenoids at 1% level and Free CO_2 at 5%level. Chlorides are negatively correlated with algal growth at 6% level and significantly influencing algal variance to an extent of 16%. Similar negative correlation was reported by Suresh (2015). This is in contrary with Ansari Ekhalak (2013). Nitrates exhibited negative correlation at 8% level, contributing 12% of algal variance (Table 3). Silicates and nitrites at 1% level positively correlated with Euglenophyceae with 31% and 30% of algal variance. Direct relationship of nitrites and algae was in accordance with Ananthaiah (2010). TS and TDS are negatively correlated with the growth of algae at 1% level

and 5% level and influencing algal variance significantly to an extent of 37% and 23% respectively. In the present study the higher peaks were associated with high bicarbonate concentration and low sulphates and TS.

Table 3: Multiple Regression Analysis of Phisico-Chemical Factors on Euglenophyceae at Station II

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
12	(Constant)	39248.055	6169.100		6.362	.000
	CO_3^{2-}	-16.828	3.500	-1.127	-4.808	.000
	$FreeCO_2$	-70.306	25.308	-.572	-2.778	.015
	HCO_3^-	1.063	.407	.385	2.612	.020
	Mg^{2+}	-9.450	1.439	-1.079	-6.565	.000
	PO_4^{3-}	231.794	45.615	2.113	5.081	.000
	$SO4_2^-$	-30.039	7.809	-.924	-3.847	.002
	$N0_3^-$	-142.924	40.622	-.919	-3.518	.003
	TS	-8.660	2.160	-.766	-4.009	.001
	TDS	-3.754	1.165	-.555	-3.223	.006

a. station = STATION I b. Dependent Variable: Euglenophyceae(CP)

$CP = -39248.055 - 16.8282\ CO_3^{2-} - 70.306\ FreeCO_2 + 1.063\ HCO_3^- - 9.450\ Mg^{2+} + 231.794\ PO_4^{3-} - -30.039\ SO4_2^- - 142.924$
$-8.660\ TS - 3.754\ TDS \text{---------------------} (2)$

At station III, MRA revealed all the factors together constitute 90.9% of algal variance significantly. Among them the minimum factors Free CO_2, organic matter, temperature, total hardness, silicates, TS, TDS are the minimum factors that explain the variation in Euglenophyceae to the maximum extent of 82.6%. According to regression analysis temperature at 1% level, carbonates, chlorides, calcium and magnesium at 5% level influenced algal growth on negative side (Table 4). This was in accordance to Vijaya (1999) and Ananthaiah (2010). TH, sulphates and nitrites had a direct relation with Euglenoids significantly at 1% level. Temperature, OM exerted negative influence on the algal growth at 5% level with 23% and 17% of algal variance (Table 4). Free $CO2$ influenced Euglenoid growth positively at 6% level with 14% of algal variance. TH and silicates showed positive correlation at 8% level and 1% level influencing the growth of Euglenophyceae with 13% and 61% of algal variance. Algal growth is indirectly proportional to TS and TDS, exhibited negative correlation at 1% level. TS influenced to an extent of 43% and TDS with 45% of algal variance. Higher concentration of silicates and nitrites and low levels of TS are associated with the peaks of Euglenoids in the present observation.

Table 4: Multiple Regression Analysis of Phisico-Chemical Factors on Euglenophyceae at Station III

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		

13	(Constant)	-15600.297	3057.223		-5.103	.000
	Temp	-100.643	24.571	-.449	-4.096	.001
	CO_3^{2-}	-5.055	2.300	-.286	-2.198	.044
	Cl^-	-2.533	.899	-.445	-2.819	.013
	TH	3.641	1.185	1.013	3.073	.008
	Ca^{2+}	-5.310	2.068	-.681	-2.567	.021
	Mg^{2+}	-10.783	4.071	-.910	-2.649	.018
	SO_4^{2-}	42.831	7.867	1.015	5.444	.000
	NO_2^-	8031.221	1376.692	1.088	5.834	.000

a. station = STATION I   b. Dependent Variable: Euglenophyceae(CP)

$$CP= -15600.297-100.643-5.055\ CO_3^2-2.533\ Cl^-+3.641\ TH\ -5.310\ Ca^{2+}-10.783\ Mg^{2+}$$
$$+42.831\ SO_{42}^-+8031.221NO_2\ \text{--------------------} (3)$$

At this station IV, all the physico-chemical factors together account for 94.7% of algal variance in a statistically significant manner. Free CO_2, COD, calcium, magnesium, silicates, chlorides, BOD, phosphates, nitrites; TDS are the factors which statistically influence the algal variance significantly a up to 85.9% according to linear MRA. Significant influence of Free CO_2, COD and silicates was observed at 1% level on positive side. Calcium and magnesium exhibited positive relationship with algal growth at 5% level (Table 5). This was in accordance with Sudha Rani (2004), who observed a positive influence of calcium and magnesium on the growth of Euglenophyceae. Chlorides, BOD, nitrites and TDS exerted a significant negative influence on the Euglenoid growth at 1% level. Phosphates influenced at 5% level on negative side. According to Pearson Correlation Matrix, temperature and organic matter influenced indirectly and exhibited negative correlation with algae at 1% and 6% level respectively with an algal variance of 29% and 15% (Table 5). Silicates showed positive correlation with algal growth at 1% level and influenced algal variance to an extent of 35%. TS and TDS strongly influenced the growth of Euglenophyceae with 19% and 20% of algal variance on negative side at 5% level. Higher peaks of Euglenoids were associated with low TDS and silicates at this station.

Table 5 : Multiple Regression Analysis of Phisico-Chemical Factors on Euglenophyceae at Station IV

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
11	(Constant)	118366.368	40954.589		2.890	.013
	$FreeCO_2$	590.270	135.981	1.387	4.341	.001
	Cl^-	-6.772	2.100	-.495	-3.224	.007
	BOD	-23.835	4.760	-1.505	-5.007	.000
	COD	79.535	15.046	2.460	5.286	.000
	Ca^{2+}	8.560	3.598	.311	2.379	.033
	Mg^{2+}	19.960	8.690	.453	2.297	.039
	PO_4^{3-}	-235.483	103.493	-.473	-2.275	.040
	SiO_2	17080.152	4245.363	.660	4.023	.001

NO$_2^-$	-16173.653	4815.522	-.813	-3.359	.005
TDS	-55.375	12.835	-1.033	-4.314	.001

a. station = STATION I   b. Dependent Variable: Euglenophyceae(CP)

CP=-118366.368+590.270 FreeCO$_2$-6.772 Cl$^-$--23.835 BOD+79.535 COD+8.560 Ca^{2+}+19.960 Mg^{2+}

-235.483 PO$_4^{3-}$+17080.152 SiO$_2$-16173.653 NO$_2^-$-55.375TDS -------------------- (4)

IV. CONCLUSION

The present investigation elevated the impacts of physico-chemical Parameters on distribution and diversity of Euglenophyceae in Saroornagar Lake. The water of Saroornagar Lake is highly polluted as the physico-chemical parameters such as chlorides, total hardness, phosphates, sulphates, BOD, total solids and total dissolved solids were higher than permissible limits and dissolved oxygen is in very low concentration when compared with the standards stipulated by WHO (1971), ISI (1982), and BIS (1998). The evaluated physico-chemical parameters considerably influenced the distribution and diversity of algae. Euglenoid flagellates were represented by diversified species and presence of *Euglena, Phacus and Trachelomonas* species which are tolerant to pollution and serve very good bio indicators of eutrophic pollution. All these species indicates polysaprobic condition of the lake and high degree of organic pollution.

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Does Government Fiscal Policy in Ghana Asymmetrically Affect Growth?

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ABSTRACT

Using ARDL and NARDL approaches, this study examines whether government fiscal policy symmetrically or asymmetrically impact economic growth in Ghana from the period 1988 to 2018. The study outcome reveals that fiscal policy variables used exhibited long-run cointegration with economic growth for both ARDL and NARDL models. Government tax revenue, expenditure and labour showed a strong positive and significant impact on economic growth whilst capital had a significant but inverse effect on economic growth in the long-run for ARDL. NARDL model shows that positive shocks of government tax revenue exerted much impact on growth rate compared to its negative shocks in both long and short run. Estimations form the long-run suggested that positive shocks of government expenditure increase growth rate whereas the negative shocks decrease growth. The Granger test, from the NARDL model, showed a Uni-directional causation moving from LNEXP_NEG→LNGDP, LNTR_NEG→LNGDP, LNTR_POS→LNGDP while a bi-directional causality is recorded for LNEXP_POS→LNGDP and LNLAB→LNGDP. In the ARDL model bi-directional causality is recorded from LNEXP→LNGDP, LNTR→LNGDP and LNLAB→LNGDP. The research then concludes with a strong asymmetric relationship between fiscal policy and economic growth. Recommendations raised are that government should avoid raising taxes but should look for policies that will help widen its tax revenue base and in financing projects government should avoid unproductive projects that do not yield economic growth.

Keywords: Economic Growth, Fiscal Policy, Asymmetric, ARDL, Ghana.

JEL Classification: F43, E62, C22

I. INTRODUCTION

In most economic policies, economic growth often takes centre stage and is important to be connected with economic development, as without growth there can be no development. Nevertheless, growth does not inherently mean development. Growth simply refers only to production, while development refers

to all economic changes, including social, political and institutional changes that follow changes in output (Quashigah et al. 2016). Robert Lucas argues that growth and development are two distinct fields of research 'with the theory of growth described as the dimension of economic growth that one has an understanding of, and development as those that one does not. According to Chugunov, et al., 2021 and Easterly and Rebelo, 1993 fiscal policy is the use of public expenditure, taxes, and borrowing to influence the pattern of economic activity, as well as the level and growth of aggregate demand, production, and employment.

The effects of government fiscal policy on economic growth, especially in emerging economies, are a source of great debate. Fiscal policy's main goal is to hasten socio - economic growth by pursuing a policy pose that ensures a balance between taxing, spending, and borrowing that is compatible with long-term growth. However, in developing nations, the amount to which fiscal policy encourages economic growth continues to be a source of theoretical and empirical disagreement. In growth models that involve public services, the optimum tax policy is dependent on the type of public services. Fiscal policy refers to the government's deliberate spending of money and imposition of taxes with the goal of influencing economic indicators in a favorable direction which involves Long-term economic growth, greater job creation, and low inflation (Engen et al., 1992; Easterly and Rebelo, 1993; Gray et al. 2007; Pasichnyi, 2020). As a result, fiscal policy attempts to maintain economic stability while increasing public spending. The government's budget, which manages the public sector plan by defining the country's economic life, is mostly responsible for the execution of fiscal policy. The employment of a public budget as a tool in the administration of a nation's economy is, in reality, its most significant feature (Omitogun and Ayinla, 2007; Gray et al. 2007). Due to the role played by government fiscal policy in economic growth in the

development process of Ghana's economy, it is crucial to understand the determinants and aspects of economic growth and to decide whether Ghana's growth rate is keeping up with other developing countries.
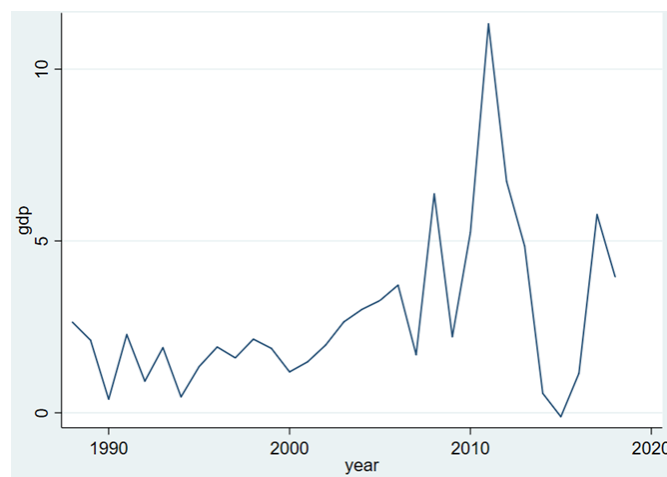
Fig.1: Growth rate Performance of Ghana.

Fig.1 presents the growth rate the country has experienced over thirty years and can be seen that there has not been a drift of continuous upward trend but the growth rate keeps fluctuating within 0 to 6%. The highest growth rate the country recorded was 11.32% which happened in 2011. These fluctuations in growth rate are a result of political instability, inadequacy of human capital, and as well the drop in cocoa price which was the foundation of the economic stability of the country in the 1960s (Baafi Antwi, 2010). Frequent change in government or political leaders has been a principal contributing factor that had impeded growth and development in Ghana. Economists view political instability to be a primary malady that impedes economic success. As a result of political instability, policymakers' views are likely to be shortened, resulting in sub-optimal structural adjustment. This might lead to constant policy revisions, resulting in greater volatility and a negative impact on macroeconomic performance (Alesina et al., 1996; Asteriou and Price, 2001; Jong-A-Pin, 2009; Aisen and Veiga, 2013). Nonetheless, this led to a lot of policy formulation by the

government of Ghana to improve the economic growth rate of the country.

The purpose of policy formulation and implementation by the government of Ghana is to speed up economic activities, growth and social development within the country. Two key views on the role of government fiscal policy in fostering economic growth and development have been expressed. Keynesian and endogenous theories have often thought that it is important to use fiscal policy to stimulate growth rate. On the contrary, the classical, along with the neoclassical theories, perceive governments as fundamentally bureaucratic and less productive, and as a result, they appear to impede growth rather than promoting it (Ocran, 2009). As far as economic conditions are concerned, countries in Africa and other developing countries have passed through many historic transformations. Most of them have undergone an economic transition from skewed and regulated markets to free-market economies. Policymakers from these countries have had a sustained interest in the role fiscal policy plays in economic growth and development in responding to the challenges associated with the transition (Twumasi, 2012).

In Ghana, fiscal policy is demand-based where the government of Ghana use it in attaining macroeconomic goals like the balance of payment, economic growth, price stability and reduction in unemployment. In other words, expenditure on research and development, education, health, sanitation, water, agriculture, transport, etc. by the government of Ghana will increase the potential of human capital, leading to an increase in the provision of aggregate resources. In this case, the economy will see its national output rising, unemployment dropping, and prices falling (Baafi Antwi, 2010).

   The study is significant because its findings will aid in answering concerns such as: (i) Do government tax revenue and expenditure anticipate changes in Ghana's growth rate? (ii) Will positive and negative shocks of tax revenue and expenditure influence economic growth? (iii) Will the Keynesian theory be validated in Ghana? The findings will aid authorities in establishing, harmonizing, and executing policies that are consistent with the Ghana's structural objectives considering the shocks from fiscal policy tools. Moreover, this study is important because it adds to the current knowledge on the linkage between government fiscal policy and economic growth and will serve as a resource for future scholars interested in conducting study in this area. Finally, the diverse results reported in literature revealed that there is a widespread disagreement based on divergent opinions on the benefits and drawbacks of fiscal policy instruments as an influencing component on economic growth. Hence, the study bridges the gap in determining if fiscal policy variables asymmetrically affect Ghana's economic growth. The study is categorized into five parts: the background of the study for the first part, followed by (2) literature reviews capturing theoretical backings, (3) data source and methodology, (4) findings, (5) discussions and (6) conclusion of the study.

II. LITERATURE REVIEW

2.1 Theoretical Backing
The effect of fiscal policy on economic growth has been widely studied, and the various economic schools of thought have been the subject of enormous discussions. Keynesian theories indicate that in managing a country's economic development, an active function of government policies can be successful. This was in contrast to the neoclassical and classical economic analysis of fiscal policies of the government. Along with the neoclassical economists, the classical considers fiscal policies to be alien when it comes to national growth. Classical theories specify that government expenditure foster private investment and hinders economic growth in the short-run and declines long-run capital accumulation

(Diamond, 1989; cited in Saad and Kalakech, 2009: 3). Indeed, classical economists are of the view that under most situations increase in expenditure initiate price increment and briefly increases growth rate. This is because classical is of the notion that economy regulates itself from variation to long-run equilibrium which is due to the determinant of supply nature of employment and output.

Keynesians believes that government expenditure and taxes contribute significantly to growth through aggregate demand and government spending will have a multiplier impact on production and jobs. Increased spending will foster the economy's aggregate demand, which increases private investment profitability and leads to higher investment (Ramu & Gayithri, 2016). They also argued that during periods of crisis and in developing countries, deficit spending is necessary; several policymakers have argued that deficit financing can be an effective instrument to stimulate economic development within a large number of unutilized resources. (Nelson and Singh, 1994). Keynesians take on taxes suggest that a fall in taxes will lead to a rise in aggregate demand and economic growth in that fall in taxes increases disposable income which intends to increase consumption and private investment.

2.2 Empirical review on Fiscal Policy-Economic growth

Conflicting results have been outlined by a lot of scholars on fiscal policy tools and its economic impact for example Frimpong (2020) examined foreign direct investment, government expenditure and economic growth from 1992 to 2015 in Ghana. The findings revealed that government expenditure had a positive relationship with growth rate with an increase in expenditure causing a 5% increase in GDP. Results by Tan et al. (2020) on their studies on the impact of monetary and fiscal policies on economic growth in Malaysia, Singapore and Thailand from 1981Q1 to 2017Q1 showed that government spending has a negative effect on economic growth in both Malaysian and Singapore but a positive impact in Thailand. From the findings, Thailand showed more efficacy with fiscal policy than Malaysia and Singapore. Tarawalie and Kargbo (2020) on their investigations on the efficacy of monetary and fiscal policy in Sierra Leone from 1980 to 2017. The ARDL bound test approach showed that variables are long-run cointegrated and also within the short-run dynamics government revenue and expenditure were the impacting variables of GDP growth.

Using ARDL Nakanlinzi (2019) researched government expenditure and economic growth in Uganda. Augmented Dickey-Fuller and Philip Perron unit root test were employed and the research showed no evidence of unit root at first difference. Moreover, government expenditure proxied as recurrent and development expenditure had a significant and positive impact on economic growth in Uganda in the long run. Sen et al. (2019) examined the impact of expansionary fiscal policy on output in Bangladesh economy. The study proxied expansionary policy as a total investment, total revenue and government expenditure from 1994-2017. A stationary test was carried out using augment Dickey-Fuller and the result showed that data was stationary at first difference. Moreover, the result reviewed that government expenditure influenced gross domestic product negatively while government investment and total tax revenue impacted GDP positively in the long-run.

Again, Mugableh (2018) analyzed fiscal policy instruments and economic growth in Jordan. The time series model showed the presence of cointegration and causal relation among variables used. Lastly, the study discovered a positive long-run relationship between government expenditure and economic growth whereas total tax rate had a negative influence on growth rate. Shevchuk and Kopych (2018) studied Ukraine fiscal policy and other

variables on output from 2001 to 2016. They found that government spending and net revenue have a strong positive relationship with output. It was also found in the study that an increase in government spending results in low mobility of capital. Studies conducted by Evans et al. (2018) on effect of monetary and fiscal policy on the economic development in Africa from the period 1995-2016 suggested that government spending and taxation have negative and positive impacts respectively on GDP per capita. Darko (2017) explored growth impact on government consumption and transfer payments from quarterly data of 1984 to 2015. The estimated values reviewed that government expenditure negatively impacted economic growth in Ghana for both the long and short run.

Moreover, using autoregressive distributed lag and vector error correction models, Ialomitianu et al. (2016) examined equilibrium relationships and dynamic causality analyses between economic growth and fiscal policy tools in Jordan for the period of 1978-2017. The findings indicate evidence of co-integration and causal linkages between economic growth and the instruments of fiscal policy. Government spending has a long-term positive effect on growth, indicating that general government spending has a positive impact on economic growth. Quashigah et al. (2016) empirically examined the potency of fiscal policy on the growth of Ghana. Quarterly time series data from 1983 to 2012 was analyzed and discovered that government tax revenue impacted growth positively while government consumption expenditure negatively affected economic growth.

Furthermore, findings by Takyi and Twum (2015) revealed fiscal policy tools have a positive and significant effect on growth in both the long and short term. Havi and Enu (2014) examined the potency of monetary and fiscal policies on Ghana's economy and established that fiscal policy influence

growth rate positively. Using the ARDL model approach Twumasi (2012) surveyed the impact of fiscal policy on the economic growth of Ghana. The bound test disclosed the presence of the long-run cointegrating effect of fiscal variables on growth. Empirically, the outcome suggested that government taxes and consumption spending negatively impacted growth in the long run. Lastly, Oriavwote and Eshenake (2015) found that petroleum profit tax and government expenditure significantly affected the level of economic growth in Nigeria.

Studies carried out by Frimpong, 2020; Darko, 2017; Quashigah et al., 2016; Takyi and Twum 2015; Havi and Enu 2014; Twumasi 2012 looked at the symmetric impact of fiscal policy tools on economic growth hence this study sought to investigate the asymmetric impact and causal effect of fiscal policy on growth rate in Ghana since most research failed to address that.

III. DATA SOURCE AND ECONOMETRIC METHODOLOGY

Most of the studies conducted in this area have looked at the linear function in determining the effect or impact of fiscal policy variables on economic growth by evaluating the long and short-run dynamics of fiscal policy variables on growth as symmetric. That is to say, researchers pursue testing causal relationships between the fiscal variables and economic growth to measure the direction and the extent of the impact. For the period 1988-2018, the evidence of fiscal policy indicators was obtained from the (BoG, 2020) and WDI 2020. The variables include government tax revenue (TR), government expenditure (EXP). According to the keynesian, government ability to tax and to spend improves the performance of economy and performance of economic growth is critical as its miles backing to the overall performance of GoG. Therefore, tax revenue and expenditure are used as an effectiveness indicator for fiscal policy (Frimpong, 2020; Nakanlinzi, 2019; Ialomitianu et al. 2016). GDP

is used as a proxy for economic growth (Mugableh 2018; Shevchuk and Kopych 2018; Oriavwote and Eshenake (2015) whereas labor force and capital formation are used as control variables. **Table 1** reports the descriptive information of the variables. the study employed ADRL and NARDL in achieving the objective of the study. The advantage of the NARDL is to help explore the impact of positive and negative shocks of TR and EXP on GDP. Studies in Ghana have not looked at the asymmetric effect of fiscal policy tools on growth rate. Therefore, we have:

Table 1 Variable description

Var	Description	Data Source
GDP	GDP per capita growth (annual %)	WDI (2020)
TR	Government tax revenue (% GDP)	BoG (2020)
EXP	General government final expenditure (% GDP)	WDI (2020)
LAB	Total Labour Force	WDI (2020)
CAP	Gross fixed capital formation (% GDP)	WDI (2020)

$GDP = f$ (government tax revenue, government expenditure, labour, capital)　　　(2)

Out of Eqn. (2) we had

$$lnGDP_t = \varphi_1 + \varphi_2 lnTR_t + \varphi_3 lnEXP_t + \varphi_4 lnLAB_t + \varphi_5 lnCAP_t + \varepsilon_t \qquad (3)$$

In Eqn. (3) lnGDP, lnTR, lnEXP, lnLAB, lnCAP are the natural log of economic growth, government tax revenue, government expenditure, labour force and capital. $\varphi_{2,3,4,5}$ are the respective coefficients of the variables. ε_t is the stochastic error term. In determining the validity of the data set, a stationarity test was conducted using ADF (1979) and PP test (1988) of a unit root. The null hypothesis of the unit root was tested against the alternative of no unit root. The calculated t-statistics were compared with a 5% critical value and there is a rejection of the null hypothesis when absolute values of the t-statistic are lesser than the 5% critical value. Then unrestricted ARDL and ECM model is formulated as:

$GDP = f$(Fiscal policy, Labour, Capital)　(1)

$$\Delta lnGDP_t = \vartheta_1 + \sum_{i=1}^{a} \vartheta_{2i} \Delta lnGDP_{t-i} + \sum_{i=1}^{b} \vartheta_{3i} \Delta lnTR_{t-i} + \sum_{i=1}^{c} \vartheta_{4i} \Delta lnEXP_{t-i} + \sum_{i=1}^{d} \vartheta_{5i} \Delta lnLAB_{t-i}$$
$$+ \sum_{i=1}^{f} \vartheta_{6i} \Delta lnCAP_{t-i} + \delta_1 lnGDP_{t-1} + \delta_2 lnTR_{t-1} + \delta_3 lnEXP_{t-1} + \delta_4 lnLAB_{t-1} + \delta_5 lnCAP_{t-1}$$
$$+ \gamma ECT_{t-1} + \mu_t \qquad (4)$$

From Eqn. (4) ϑ_1 represent the constant term, Δ indicate difference operator, $\vartheta_{2,3,4,5,6,}$ and $\delta_{1,2,3,4,5}$ are the coefficients of a short and long run. a, b, c, d and f are the optimal lag length to be determined by SC (Schwarz) information criterion. The null hypothesis proposed that (H₀: $\vartheta_1 = \vartheta_2 = \vartheta_3 = \vartheta_4 = \vartheta_5 = \vartheta_6 = 0$), assuming no cointegration among variables is tested against the alternative (H₀: $\vartheta_1 \neq \vartheta_2 \neq \vartheta_3 \neq \vartheta_4 \neq \vartheta_5 \neq = \vartheta_6 \neq 0$), assumes the presence of cointegration among variables. The null hypothesis of no cointegration is rejected when the computed F-statistics is greater than the upper bound critical value I (1). Similarly, the null hypothesis is accepted when the F-statistic is smaller than the critical values I (0). Finally, the result is indecisive when it falls in between the lower and upper bound, γ is the adjustment speed of short-run deviation to long-run equilibrium and μ_t is the stochastic error term (Pesaran et al., 2001; Romilly et al., 2001).

However, to study the non-linear or asymmetric relationship between fiscal policy variables and growth. Shin et al. (2014) proposed the NARDL model which accounts for the asymmetric partial sums of expenditure and tax revenue into positives and negatives when they are decomposed. Possibly, government expenditure and tax revenue could react differently to positive or negative shocks and therefore, these variables may have an asymmetric impact on economic growth. So, the partial sums of negative and positive changes in expenditure and tax revenue are introduced as:

$$TR_t^+ = \sum_{i=1}^{h} \Delta TR_i^+ = \sum_{i=1}^{h} \max(\Delta TR_i^+, 0) \qquad (5)$$

$$TR_t^- = \sum_{i=1}^{h} \Delta TR_i^- = \sum_{i=1}^{h} \min(\Delta TR_i^-, 0) \qquad (6)$$

$$EXP_t^+ = \sum_{i=1}^{j} \Delta EXP_i^+ = \sum_{i=1}^{j} \max(\Delta EXP_i^+, 0) \qquad (7)$$

$$EXP_t^- = \sum_{i=1}^{h} \Delta EXP_i^- = \sum_{i=1}^{h} \min(\Delta EXP_i^-, 0) \qquad (8)$$

Shin et al. (2014) replaced the positive shocks by (TR_t^+, EXP_t^+) and (TR_t^-, EXP_t^-) as negative shocks variables in the unrestricted ARDL and ECM models in equations (4) as:

$$\ln GDP_t$$
$$= \vartheta_1^* + \sum_{i=1}^{g} \vartheta_{2i}^* \Delta \ln GDP_{t-i} + \sum_{i=1}^{h} \vartheta_{3i}^* \Delta \ln TR_{t-i}^+ + \sum_{i=1}^{j} \vartheta_{4i}^* \Delta \ln TR_{t-i}^- + \sum_{i=1}^{k} \vartheta_{5i}^* \Delta \ln EXP_{t-i}^+ + \sum_{i=1}^{l} \vartheta_{6i}^* \Delta \ln EXP_{t-i}^-$$
$$+ \sum_{i=1}^{m} \vartheta_{7i}^* \Delta \ln LAB_{t-i} + \sum_{i=1}^{n} \vartheta_{8i}^* \Delta \ln CAP_{t-i} + +\delta_1^* \ln GDP_{t-1} + \delta_2^* \ln TR_{t-1}^+ + \delta_3^* \ln TR_{t-1}^- + \delta_4^* \ln EXP_{t-1}^+ + \delta_5^* \ln EXP_{t-1}^-$$
$$+ \delta_6^* \ln LAB_{t-1} + \delta_7^* \ln CAP_{t-1} + \gamma ECT_{t-1}$$
$$+ \mu_t \qquad (9)$$

Normally equation 9 is stated as the non-linear/ asymmetric model whereas equation 4 the linear symmetric ARDL model. Few hypotheses in asymmetric should be considered. Firstly, whether $\Delta TR_{t-i}^+ (\Delta EXP_{t-i}^+)$ and $\Delta TR_{t-i}^- (\Delta EXP_{t-i}^-)$ accept different lag orders in either model which will depict short-run asymmetry. Secondly, if by the same lag i the estimated coefficient of $\Delta TR_{t-i}^+ (\Delta EXP_{t-i}^+)$ will be different from $\Delta TR_{t-i}^- (\Delta EXP_{t-i}^-)$ which depicts the short-run asymmetric effects. Thirdly, strong asymmetric short-run effect will be accepted if the proposition $\sum_{i=1}^{h} \vartheta_{3i}^* \neq \sum_{i=1}^{j} \vartheta_{4i}^*$ and $\sum_{i=1}^{j} \vartheta_{5i}^* \neq \sum_{i=1}^{j} \vartheta_{6i}^*$ is nullified in the asymmetric model in Eqn. (9) by Wald test. Lastly, whether Wald test annulled $\delta_2^* / \delta_1^* \neq \delta_3^* / \delta_1^*$ and $\delta_4^* / \delta_1^* \neq \delta_5^* / \delta_1^*$ in Eqn. (9), the asymmetric long-run impact of government tax revenue and expenditure on economic growth be will determined. In the next section both symmetric and asymmetric models in Eqn. (4) and (9) are estimated.

IV. EMPIRICAL RESULTS

Table 2 shows descriptive statistics and a correlational matrix of regressor and explanatory factors for the study, which used time series data from 1988 to 2018. All other variables, with the exception of GDP, are regularly distributed. In terms of mean, the greatest value was reported by LAB, followed by CAP, TR, EXP, and GDP in

that order. Again, EXP has the lowest standard deviation, indicating that it is the least volatile of the variables analysed, whereas LAB has the largest standard deviation, indicating that it is the most volatile. The remainder of the variables, with the exception of CAP, are favourably skewed. Since k>3, GDP is concentrated towards the tail end. GDP has a positive relationship with TR, EXP, and CAP, according to the correlational matrix.

Table 2 Descriptive statistics and correlation matrix.

Statistics	LNGDP	LNTR	LNEXP	LNLAB	LNCAP
Mean	2.7937	16.5835	10.6503	90.129	20.5063
Median	2.1107	16.2600	10.1716	89.000	21.1308
Maximum	11.3154	22.0500	15.3082	13.000	29.2463
Minimum	-0.1139	10.7700	7.0695	60.000	11.2395
Std. Dev.	2.3594	3.1657	1.9716	20.266	5.6137
Skewness	1.7766	0.0473	0.5260	0.1802	-0.0997
Kurtosis	6.6817	2.2244	2.7782	1.9069	1.8449
Jarque-Bera	33.816	0.7885	1.4932	1.7111	1.7746
Probability	0.0000***	0.0741*	0.0473**	0.0025***	0.0117*
Correlation Matrix					
LNGDP	1.000				
LNTR	0.3307	1.0000			
LNEXP	0.4074	0.0282	1.0000		
LNLAB	0.4396	0.6509	-0.2822	1.0000	
LNCAP	-0.3441	0.4032	0.3025	0.3072	1.0000

*Note ***significant at 1%, **significant at 5% and * significant at 10%.*

To evaluate stationarity, this section starts from the unit root analysis and it is important to exclude any variable that is integrated of order 2, I (2) which has no odds on the Pesaran boundaries. The stationary test results from ADF and PP in **Table 3** show no evidence of unit root for GDP, TR, EXP, LAB and CAP at all levels of significance. GDP and EXP showed level stationarity. However, all variables became stationary after the first difference and none of them was integrated at order 2, I (2). From the results, the study concluded a mixture of I (0) and I (1) which support the criterion of ARDL.

Table 3 Unit root Test at levels

Variable	Levels				First Difference			
	ADF Test		PP Test		ADP Test		PP Test	
	Value	Prob	Value	Prob	Value	Prob	Value	Prob
LNGDP	-3.557	0.014**	-3.556	0.0137**	-8.090	0.000***	-8.206	0.000***
LNTR	-2.030	0.273	-1.768	0.3881	-6.215	0.000***	-7.642	0.000***
LNEXP	-3.158	0.033**	-3.209	0.0293**	-5.489	0.000***	-7.796	0.000***

LNLAB	-21347	0.233	-1.169	0.6742	-3.304	0.024**	-3.362	0.021**
LNCAP	-2.735	0.080*	-2.751	0.0774*	-5.231	0.0002***	-5.310	0.000***

*Note ***significant at 1%, **significant at 5% and * significant at 10%.*

In determining the optimal lag for the symmetric model in Eqn. 4 the study employed the Schwarz information criterion and the result obtained from symmetric bound testing is displayed in **Table 4**. The F-statistic (F= 12.94961) is significant at all levels when compared with the critical lower and upper bounds, hence we established the existence of long-run symmetric cointegration among variables. The optimal lag specification for this study is (1,1,0,0,1).

Table 4 Symmetric Bound Test.

		Critical Bounds	
Statistic	Significance	I (0)	I (1)
F- statistic 12.949	10%	2.2	3.09
	5%	2.56	3.49
	2.5%	2.88	3.87
	1%	3.29	4.37

To ascertain whether fiscal policy variables have either a symmetric or asymmetric effect on growth, the ARDL and NARDL models in Eqn. 4 and 9 were evaluated. **Tables 4** reports on both ARDL and NARDL. The positives and negative decomposition of government tax revenue and expenditure in **Fig. 2** to **Fig. 5** are examined to see if their relative shocks have a significant effect on growth.
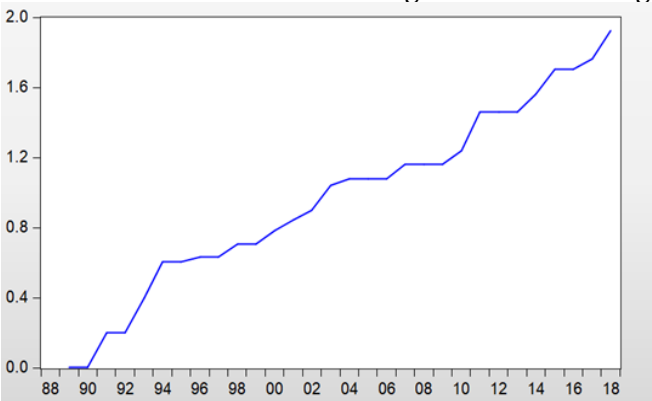
Fig. 2 Positive component of tax revenue
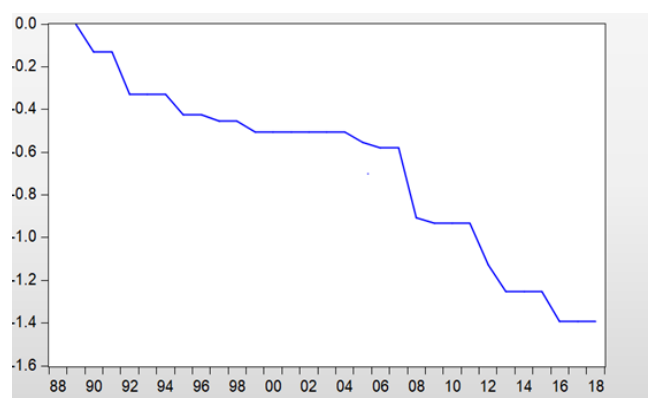
Fig. 3 Negative component of tax revenue
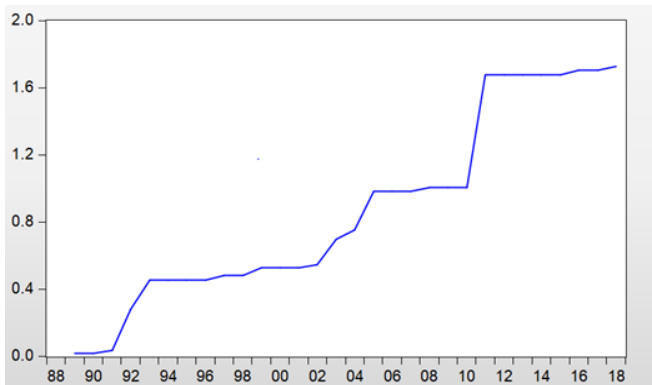
Fig. 4 Positive component of government expenditure
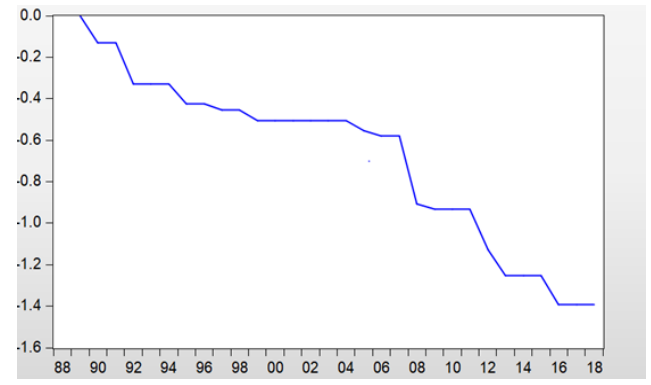
Fig. 5 Negative component of government expenditure

Tables 5 provide the short-run and the long-run basic evaluations of linear and non-linear ARDL specification models. The coefficients of TR and EXP showed a significant effect on GDP in Ghana for the short-run estimate. The positive and negative shocks exerted by TR and EXP have a rise or fall on GDP. Thus, a percentage increase (decrease) in TR or EXP will lead to an elastic increase (decrease) of 33.56% (19.03%) or 30.85% (56.98%) in GDP, respectively. Again, the upsurge of 1% of TR leads to a decline of 42.91% of GDP while that of EXP increases GDP by 56.62% in the short run. On the other hand, the results from NARDL revealed positive coefficients for both positive and negative shocks of EXP and TR in the long run. The positive and negative shocks of EXP and TR exerted a significant impact on GDP. Thus, a percentage increase (decrease) in EXP and TR leads to an increase (a decrease) in GDP by an elastic value of 63.94% (21.53%) and 20.66% (19.17%), respectively in the long run. Again, TR and EXP were statistically significant in the long-run ARDL model with negative and positive coefficients. A percentage improvement in TR shrinks economic growth by 74.86%, while EXP expands GDP rate by 37.64%, respectively.

However, LAB and CAP used as controlled variables for the study were statistically significant for both ARDL and NARDL in the long run. A rise of 1% in the size of the labour force in Ghana, as seen in **Tables 5**, will increase 92.34 and 64.08 percent expansion in GDP. Conversely, CAP had an inverse impact on GDP for symmetric and asymmetric models. A percentage increase in capital will cause a decrease of 61.81 and 39.59 percent in Ghana's GDP.

Table 5. Results od Symmetric and Asymmetric coefficients

Variables	Coeff	T-stat	Coeff	T-stat
Short-run estimates				
ΔLNTR	-0. 429*	-1.974		
ΔLNTR (-1)	-0. 688**	-2.051		
ΔLNTR$^+$			0.335	1.568
ΔLNTR$^-$			0.190***	2.628
ΔLNEXP	0.5662*	1.873		
ΔLNEXP$^+$				0.309*
ΔLNEXP$^-$				0.569
ΔLNEXP$^-$(-1)				0.028
ΔLNLAB	0.768***	2.948	0.870***	3.191
ΔLNCAP	-0.412	-1.439	-0.857	-1.704
ΔLNCAP (-1)	-0.606***	-3.132	-0.771***	-3.556
Long-run estimates				
LNTR	-0.748***	-4.8328		
LNTR$^+$			0.206***	2.215
LNTR$^-$			0.197***	4.944
LNEXP	0.376***	5.994		
LNEXP$^+$				0.639***
LNEXP$^-$				0.215***
LNLAB	0.641***	3.315	0.923***	3.470
LNCAP	-0.396***	-4.793	-0.618***	-4.554
C	-0.912***	-3.686	-0.764***	-1.657

Diagnostics Test

ECT (-1)	-0. 596***	-9.528	-0.624***	-3.563
X^2_{LM}	0.507		0.550	
X^2_{JB}	0.615		0.597	
X^2_{RS}	0.512		0.675	
R^2	0.786		0.821	
Adj-R^2	0.688		0.727	
Loglikehood	15.088		10.032	
F_{test}	8.415***		7.706***	
$X^2_{waldtest\ LR(TR)}$	4.205**		3.636**	
$X^2_{waldtest\ LR(EXP)}$	3.097**		4.715**	
$X^2_{waldtest\ SR(TR)}$	4.526***		2.897	
$X^2_{waldtest\ SR(EXP)}$	3.566***		5.132*	

Note (+) and (–) indicate the positive and negative shocks of Fiscal policy. Diagnostic tests X^2_{LM}, X^2_{JB} and X^2_{RS} representing heteroscedasticity, normality in residual distribution, and serial correlation. The NARDL model is carried out on an automatic ARDL framework using SIC.***, **, and * represents the 1%, 5% and 10% rejection level respectively.

The lowest part of **Tables 4** present some diagnostics tests, from the estimated results of both ARDL and NARDL: the Ramsey Regression Equation; the LM test for residual; normality test; wald test and heteroscedasticity by Breusch–Pagan–Godfrey show a good fit that passes through all the test performed.

The Granger results

The Granger test is used to investigate the causality among the LNEXP, LNEXP_NEG, LNEXP_POS, LNTR, LNTR_NEG, LNTR_POS, LNLAB, AND LNCAP of the associations that exist amongst the variables Granger (1988). **Table 6** summarizes the Granger test, from the NARDL model, there is Uni-directional causation moving from LNEXP_NEG→LNGDP, LNTR_NEG→LNGDP, LNTR_POS→LNGDP while a bi-directional causality is recorded for LNEXP_POS→LNGDP and LNLAB→LNGDP. In the ARDL model bi-directional causality is recorded from LNEXP→LNGDP, LNTR→LNGDP and LNLAB→LNGDP (Hatemi, 2011; Chigbu, and Eze, 2012). In both model LNCAP show no causality.

Table 6. Granger Causality Test

Null Hypothesis:	NARDL				ARDL			
	Obs	F-Stat	Prob.	Direction of causality		Obs	F-Stat	Prob.	Direction of causality
LNEXP_NEG→LNGDP	27	9.809***	0.005	Uni-directional	LNEXP →LNGDP	28	4.958**	0.031	Bi-directional
LNGDP→ LNEXP_NEG		0.664	0.423		LNGDP →LNEXP		6.024**	0.027	
LNEXP_POS →LNGDP	27	6.807**	0.015	Bi-directional					Bi-directional
LNGDP →LNEXP_POS		3.280*	0.054		LNTR →LNGDP		7.024**	0.013	
					LNGDP →LNTR	28	3.026*	0.072	

LNTR_NEG →LNGDP	27	6.282** 2.073	0.019 0.163	Uni-directional	LNLAB →LNGDP		11.931**	Bi-directional
LNGDP →LNTR_NEG					LNGDP → LNLAB	28	* 5.1129**	0.002 0.032
LNTR_POS →LNGDP	27	13.159*** 0.410	0.001 0.528	Uni-directional	LNCAP →LNGDP			No-causality
LNGDP →LNTR_POS					LNGDP →LNCAP	28	0.754 0.029	0.393 0.864
LNLAB →LNGDP	28	11.931***	0.002	Bi-directional				
LNGDP →LNLAB		5.113**	0.033					
LNCAP →LNGDP		0.754	0.393	No-causality				
LNGDP →LNCAP	28	0.029	0.864					

*** , **, and * indicate significant at 1%, 5%, and 10% levels, respectively.

V. RESULTS AND DISCUSSION

From the results obtained it was established that government tax revenue significantly influenced GDP, inferring that continuous increment in taxation by GoG impede the general performance of the economy. Profit made after-tax becomes too small for the companies to reinvest into projects or even sponsor new projects. On the side of individuals, increment in taxes affects purchasing power, leading to a fall in aggregate demand for goods and services, hence shrinking the growth of businesses through production and the growth rate of the economy. Comparing the impact created by taxation on growth, an increase in taxation exerted much decline in growth rate and development compared to decreasing tax rate.

Again, from the analysis, it was revealed that government expenditure has a significant influence on economic growth meaning that if the GoG should invest and spend on projects that are beneficial to the development of Ghana this will have a multiplying effect on the economic performance of the country as stated by Keynesian theory. Spending on public goods like education, healthcare, and infrastructure, for example, enhances the economy and increases productivity. Investing in the quality of labor for future objectives is akin to educational expenditure. Moreover, investment in capital stock, such as infrastructure upgrades like better transportation and telecommunications, is another significant contributor to spending. Capital goods facilitate enhanced services, as well as additional revenue and employment for businesses and households. Government spending can improve the economy's ability to perform by increasing the value of public goods, and thus influence changes in production levels and national income. In Ghana most government projects are abandoned due to political changes and this act has gone a long way to hinder the growth rate and development of the country. The finding of this study is consistent with Frimpong (2020); Tan et al. (2020) with Thailand; Nakanlinzi (2019); Mugableh (2018); Shevchuk and Kopych (2018), and Ialomitianu et al. (2016) but inconsistent with the result of Tan et al. (2020) with Singapore and Malaysia; Sen et al. (2019); Evans et al. (2018); Darko (2017); Quashigah et al. (2016) and Twumasi (2012).

The positive coefficient of labour force stems from the traditional principle of productivity. The effect of the labour force on growth rate was projected to have a substantial positive impact on the long-run growth rate. An increase in the size or efficiency of the workforce inevitably contributes to a rise in demand

and, therefore, economic growth. Ghana has been faced with unemployment for the past decade. More than 70% of the skilled labour force are jobless, which has a more significant economic impact on production, hence impeding the country's growth.   As far as the effect of labour on economic growth is concerned, studies have also confirmed the predictions of the production theory: Raleva (2014); Amanja and Morrissey (2005), and Gupta et al. (2005) but are inconsistent with Baafi Antwi (2010) who found a negative impact of labour on economic growth. Within the years the study was conducted, the country recorded the highest gross fixed capital formation in 2005 and 2015 with 29.0024 and 29.2463, respectively. The recent capital formation happening in Ghana are railways, roads, industrial and commercial buildings which are expected to lead to tremendous high turnover in the economic growth rate in the long term. And this does not coincide with Baafi Antwi (2010) findings of a positive effect of capital formation on the growth rate in Ghana.

The general meaning of the finding is that fiscal policies are an effective instrument for economic growth and development in Ghana. The results also imply that improvements in EXP improve economic activities, capital accumulation, labor force enhancement, and energy consumption levels within the economy, increasing the country's general growth rate. However, an increase in taxation rather shrinks economic activities, hence, development.
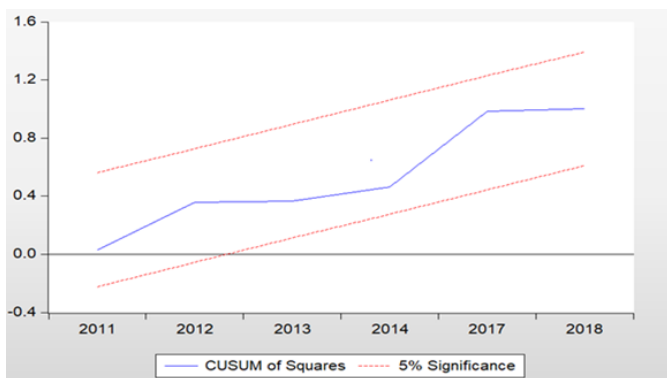
Fig 6 Cumulative sum of recursive residual
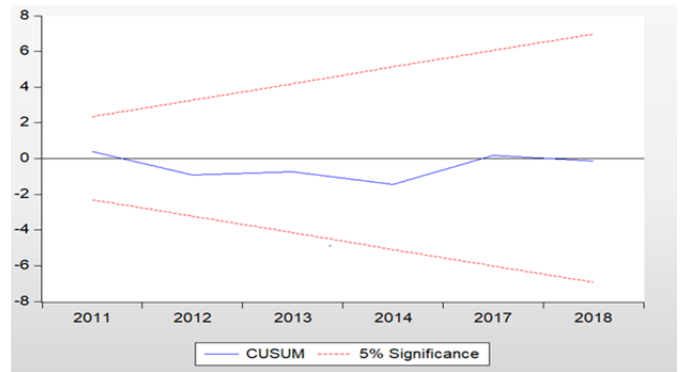
Fig 7 Cumulative sum of square recursive residual

In addition to the stability test carried out the study employed CUSUM and CUSUMSQ statistics test recursive plot, testing the break points and base on the null hypothesis of parameters not showing stability in Fig. 6 and Fig.7. i.e., the CUSUM and CUSUMSQ stability test examining the significance of trajectory at 95% bound. Concerning Fig. 6 and Fig.7 there is a rejection of the null hypothesis, therefore the conclusion of stable parameters for regression is accepted.

VI. CONCLUSION AND POLICY IMPLICATIONS

The research empirically examined the relationship existing between government tax revenue, government expenditure, labour, capital and economic growth using linear ARDL and non-linear ARDL models spanning from 1988 to 2018. To investigate whether there is possible association among the variables used. The ARDL bound test was first estimated, confirming the existence of long-run cointegration between fiscal variables and GDP. The study further tests the decomposition of positives and negatives shocks of TR and EXP on GDP The findings from the proposed models suggest that fiscal policy variables influence GDP both in the short-run and long-run. The positive shocks of TR affected GDP compared to its negative shocks in the short-run. Estimations for the long-run suggested that positive shocks of EXP increase GDP whereas the negative shocks decrease GDP. In a nutshell, positive shocks of EXP exerted a heavy impact on GDP in the long-run compared to the short-run. However, positive shocks of TR influenced GDP in the short-run as compared to the long-run. Again, LAB and CAP were

statistically significant for both models in the long-run hence, the study concludes of strong asymmetric relationship between fiscal policy variables and economic growth.

The study, therefore, recommends that economic policymakers in Ghana should analyse the composition of government expenditure to boost growth due to its direct effect on growth and to avoid crowding out which is a result of borrowings used to sponsor unproductive public consumption. Moreover, it reprimands government to introduce policies that would expand the tax base rather than raising taxes. This includes measures that would remove dodging and include more formal and informal sectors contributions. The tax base in Ghana can also be broadened by considering policies that would raise the level of business activities. Another suggestion raised by this study is that, in long-run labour force has a strong and positive impact on growth therefore, the speed of Ghana's economy can be improved by policy that guarantees quality and sustainable growth.
Data Availability Statement

World Bank Group (2020) World Development Indicators 2020, Washington DC: World Bank. [Dataset for GDP, EXP, LAB and CAP]. https://datacatalog.worldbank.org/dataset/world-development-indicators. and BoG- [Dataset for TR] https://www.bog.gov.gh/economic-data/
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Study on Flexural and ILSS Properties of Kenaf and E-Glass Fiber Reinforced Polymer Matrix Composites

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ABSTRACT

Natural fibers are extensively being used for the production of hybrid composites. Hybrid Nano composites can be developed by combining natural fiber/synthetic fibers with epoxy resin and nano filler. Nano particles are considered as high potential filler materials for the improvement of mechanical and physical properties of polymer composites. As the nano scale filler materials are usually free of defects, hence, their applications in the field of polymer composites area set up new trends of prospect.

In this study an effort has been made to produce new type of polymer matrix composite with epoxy as the matrix with graphene as the Nano filler and kenaf and glass fiber as the reinforcing material. The objective of this research work is to investigate the possible utilization of glass to the Kenaf, in Epoxy matrix composites with and without the reinforcement of nano filler and the effect of Nano filler to the kenaf and glass content on the physical and mechanical characterization will be examined. Therefore the hybrid nano composite, specimen with different weight percentage of graphene like 0%, 0.5%, 1% and 1.5% graphene with kenaf/e-glass fibers are prepared and used to characterize Flexural and ILSS properties. The combination yielded good result with graphene Nano filler. The scanning electron microscopy (SEM) is utilized for the morphological investigation of the hybrid nano composite material.

Keywords : Nano particle, Kenaf, Flexural, ILSS(Inter laminar shear strength),SEM

I. INTRODUCTION

A composite material is characterized as the blend of at least two constituent materials, which are basically insoluble into one another to such an extent that the properties of the mixed combination are superior to the amount of the properties of every constituent taken independently. The objective of this mix is to

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determine the most desirable characteristics of the constituent materials. There are two classes of constituent materials matrix material encompasses and supports the reinforcement materials with their relative positions. The reinforcement gives their exceptional mechanical and physical properties to improve the matrix properties.

The most commonly used matrix materials are polymer matrix materials. The polymer material has high molecular weight. This material has different processing methods which in turn has versatility inproperties. This versatility in properties of polymer makes them attractive matrix material for many applications. A very large number of polymeric materials, thermosetting and thermoplastic, are being used as matrix materials for the composites. The polymer matrices are selected on the basis of adhesive strength, fatigue resistance, heat resistance, chemical and moisture resistance.

Fibers are the reinforcement and the main source of strength while matrix glues all the fibers together in shape and transfers stresses between the reinforcing fibers. The fibers carry the loads along their longitudinal directions. Common fiber reinforcing agents include asbestos, carbon/graphite fibers, beryllium, beryllium carbide, beryllium oxide, Similarly common matrix materials include epoxy, phenolic, polyester, polyurethane, poly ether ketone, vinyl ester etc,.

The natural fiber reinforced composites have attracted considerable importance as a potential structural material. The attractive features of the natural fibers like jute, sisal, coir and banana have been their low cost, light weight, high specific modulus, renewability and biodegradability. Composites reinforced with such natural fibers have thus been a subject of intense study for low strength, low cost application in contrast to the synthetic fiber reinforced composites. These fiber reinforced plastics(FRP), are getting popularity as primary and secondary structural materials in aerospace,

automobile, civil construction applications, marine, sports industry, textile industries, renewable energy sectors, defense, and other areas due to their inherent mechanical properties, such as low density, high strength-to-weight ratio, excellent durability, high stiffness-to-weight ratio, non corrosive nature, dimensional stability, good thermal and electrical insulation properties and ease of fabrication. . Furthermore, natural fiber reinforced polymer composites form a new class of materials which seem to have good potential in the future as a substitute for scarce wood and wood based materials in structural applications. Hybrid composites can be developed by combining natural fibers/natural fiber and natural fibers/synthetic fibers with epoxy, polyester, phenolic, poly vinyl ester, poly urethane resins, etc., new composites with addition of more than one reinforcement from natural resources, such as natural fiber/natural fiber or natural fiber/nanofiller from organic sources as an alternative to synthetic fibers. Hybridization involving the combination of nanofiller and natural fiber in the matrix results reduction of water absorption properties and increased in mechanical properties. Natural fiber/nanofiller-based hybrid composites can be used in building and construction materials, transportation (automobiles, railway coaches, aerospace) packaging, consumer products, etc., and also could be possible to produce acoustic insulator and extremely thermally stable materials.

II. METHODS AND MATERIAL

In this study, an effort has been made to produce

new type of polymer matrix composite with epoxy as the matrix with nanofiller graphene as the filler, kenaf (organic fiber) and glass (inorganic fiber) as the reinforcing material.

Fabrication method:

Handlay-up method: is basically an open molding technique that is suited for fabricating from small to large variety of composites. Production volume per mold is low, however it is possible to make up the composites in large quantities using multiple stamps. The hand lay technique is the most basic type of fabrication which is simple in the process, offers varying ranges of sizes and also provides tooling at low price, however skilled operators are needed to obtain the consistency in quality and good production rates. The below shows the simple hand lay up process.

Simple hand layup method for hybrid and hybrid Nano composites

The maintained volume fraction for the matrix and reinforcement is 40:60. The resin to hardener ratio is100:10

1) Initially a discharge operator (wax) is showered totally on the mould surface to maintain a strategic distance from the adhering of polymer to the surface.
2) Then thin plastic sheets are set at the best end and base end of the shape plate with a specific end goal to acquire a decent surface complete of the composite laminate.
3) The fortification as woven mates are cut according to the span of the form and are put at the surface of shape after Perspex sheet.
4) Then the Nano filler (graphene) of different weight percentage of 0.5, 1, 1.5 is blended to the epoxy resin in appropriate extent alongside a hardener at the evaluated speed of 400-500rpm and poured onto the surface of tangle which is now set in the mould.
5) The epoxy resin is consistently spread by methods for brush.
6) Second layer of mat is then set on the surface of the polymer.
7) A roller is proceeded onward the mat-polymer layer so as to expel any kind of air caught and crush out the abundance polymer that is followed on the fortification.
8) The process is rehashed for each layer of polymer and mat till the required layers are stacked to accomplish the thickness.
9) After setting the plastic sheet, the release agent is showered on the inward surface of the best shape plate which is then kept on the stacked layers and the weight is connected. The restoring happens at room temperature for about 48hours.
10) Then shape is opened and the created composites part is taken out and additionally handled in a oven at 100°C for polymerization to stay away from the development of voids.

The same method is carried out without the addition of nano filler Graphene for the fabrication of hybrid composites. During the fabrication of laminates, the alternate layer of kenaf and glass are added until thickness of 4mm is obtained.

Composites Laminates	Nano filler	Fiber orientation	Thickness	Fiber Layer Compositions
Kenaf/Glass	0.5 wt%	Bi-directional	4mm	G+K+G+K+G+K+G+K+G+K+G
	1wt%			G+K+G+K+G+K+G+K+G+K+G
	1.5 wt%			G+K+G+K+G+K+G+K+G+K+G

Materials used

The materials used are the epoxy resin, graphene nanofiller, kenaf fiber and glass fiber. These materials fabricated using hand layup technique to frame a hybrid composite and hybrid nano composites. Utilizing these two types of composites, they are described to examine the scanning electron microscope other mechanical properties like flexural test, interlaminar shear quality

Epoxy resin: the resin used is epoxy resin LY 556 and hardener HY 951 is used in fabrication. The epoxide group can be referred to as a glycidyl group. They are the polymers that are normally made up by methods for gathering epichlorhydrin with biphenyl. By carefully selecting of hardener the curing rate can be controlled according to process demands.

Graphene: Graphene is a crystalline allotrope of carbon with 2-dimensional properties. Its carbon atoms are densely packed in a regular atomic-scale chicken wire (hexagonal) pattern.

Kenaf fiber: The kenaf fiber derived from the outer fibrous bark is also known as bast fibre. Kenafbast fiber has superior flexural strength. Kenaf fiber can be utilized as reinforcement material for polymeric composites as an alternative to glass fiber.

Mechanical properties of kenaf fiber

Properties	Units	Kenaffiber
Density	(g/cm3)	1.4
Tensile Strength	Mpa	930
Flexural Strength	Mpa	98000
Specific Strength	KN.m/Kg	61
Young's Modulus	Mpa	53000
Flexural Modulus	Mpa	7300

Glass fiber

Glass or electrical grade glass was originally developed for standoff insulators for electrical wiring. It was later found to have excellent fiber forming capabilities and is now being used exclusively as the reinforcing material commonly known as fiber glass, they can be used in continues fiber form or short fiber form.

III. RESULTS AND DISCUSSION

In the present work mechanical properties like flexural strength and interlaminar shear strength of kenaf/e-glass fiber reinforced hybrid composites as well as kenaf/e-glass reinforced graphene nanofilled hybrid nano composites are studied and tests are conducted as per ASTM standards.

Flexural test

Flexural strength is determined by ASTM D790 standard test method. In this test, a composite beam specimen of rectangular cross-section is loaded in three-point mode. Sample is cut into flat shape of size ($12.5 \times 100 \times 4mm^3$), in accordance with ASTM standards D3410 as shown in fig a) and fig b) before and after flexural test. Flexural test: The flexural test for different hybrid nano composites are performed as per the ASTM standards at the test speed of 5mm/min.

Inter laminar shear strength:

Inter laminar shear test was led as per ASTM D2344-84. The information recorded during the three-point twist test was utilized to assess the inter laminar shear strength (ILSS). The test was led utilizing the equivalent tensometer utilized for flexural test with twist test installation. For various weight level of graphene filler, four indistinguishable examples were tried, and normal outcome was discovered. ILSS was determined by using the following equation

$$ILSS = (3F_{max})/4bt$$

Where, F= the maximum load in(N)

b=width of the specimen (mm)

t=Thickness of the specimen (mm)

Fig:a
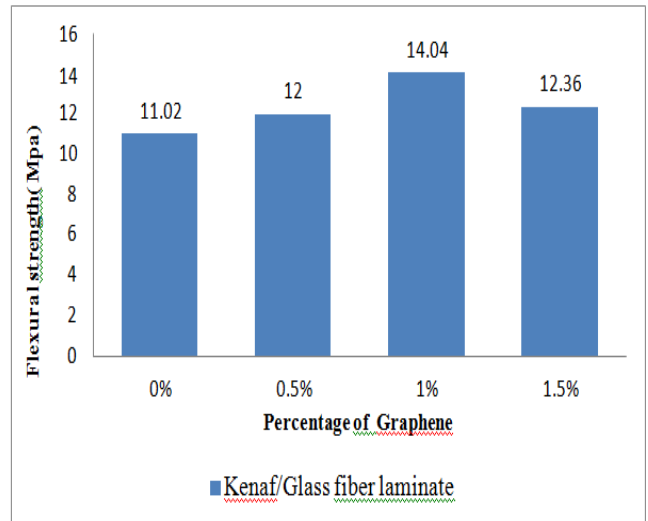
Fig:b

Fig: a)Flexural samples as per ASTM standards

Fig: b)Flexural samples after test

Flexural Test Results for Kenaf/Glass Hybrid Nano composites

Composite Laminate	wt% of Graphene	Max. load (N)	Max. Displacement (mm)	Flexural Strength(MPa)
Kenaf/Glass	0	515.8	8.164	11.02
	0.5	742.4	7.34	12.00
	1.0	632.5	6.297	14.04
	1.5	477.6	5.864	12.36

The maximum and minimum flexural strength of 14.04Mpa and 11.02MPa were recorded for 1% and 0% of grapheme filler laminates respectively as shown in fig. The flexural strength decreases after 1% of grapheme due to the poor dispersion of nanofillers this may result in poor strength. It is observed 1% graphene filler laminate could withstand higher flexural strength than other laminates. The laminate of 1% of grapheme can withstand the maximum load of 632.5N

Inter laminar Shear Strength Test

The ILSS test are carried out for kenaf and glass hybrid composites with different weight percentage of graphene as per ASTM D2344 standards and answers are presented in the following table

ILSS Test Results

Composites Laminates	Wt% of Graphene	Shear Strength(MPa)
Kenaf/Glass	0	30.94
	0.5	44.54
	1	37.95
	1.5	28.65
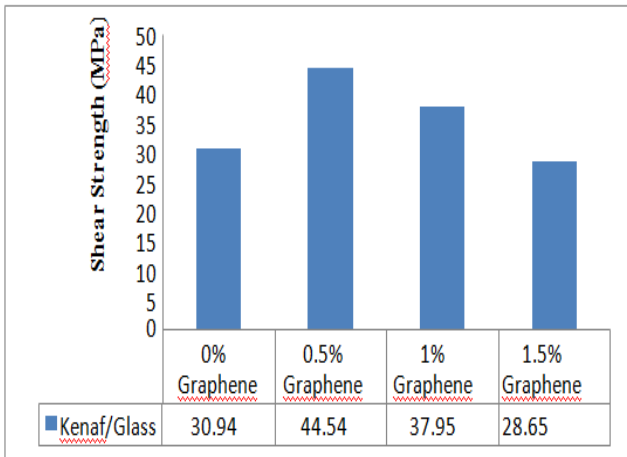
Shear Strength of Kenaf/Glass hybrid composites

Fig: SEM images of Kenaf/Glass fiber composites

The results indicate that kenaf, glass hybrid composites depends on the matrix material and only less contribution of fibers in taking place. Thus it is affirmed that the kenaf/Glass hybrid composites with 0.5% of graphene shows better results than the other character of composite laminates tested.

Characterization by Scanning Electron Microscope (SEM)

The scanning electron microscopy is utilized for the morphological investigation of the composite material. The surface perspective of the kenaf and Glass hybrid composite will be dissected for better derivation of the explanations behind failure and diminished in quality through the pictures that are exhibited in the figure beneath. Laminate are at first covered with gold sputtering directing material before observing the surface through SEM. The fiber diffusing, cleft and internal structure of the separated surface of the composites laminates are doubtlessly detectable from photos showed up through the scanning electron microscopy.

Above figure Demonstrates The breakage of Kenaf/Glass fiber present along epoxy resin.

IV.CONCLUSION

From the experiments conducted to study the effect on adding different weight percentage of Graphene to the hybrid composites. The following conclusions can be drawn
Fabrication of Kenaf/glass fiber hybrid polymer composites with different weight percentage of graphene were prepared successfully by hand lay-up process.

It is found that flexural strength is maximum for 1% of graphene for kenaf/glass nano composites.
The inter laminar shear stress properties for kenaf/glass hybrid composites with 0.5% of graphene having 44.54Mpa is better results than the other character of composite laminates tested.

It is noticed that the kenaf/glass laminates is manifesting high amount of voids having 4.376%. This is because the kenaf has a large number of hydroxyl group making them to be hydrophilic in nature.

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A Laboratory Platform for Plotting Speed-Torque Characteristics of a Vector Controlled Induction Motor

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ABSTRACT

This paper presents a platform for illustrating the speed- torque characteristics of a vector controlled three-phase induction motor. The methodology is based on acquiring the estimated torque and actual speed of a three-phase induction motor and plotting the speed-torque characteristic in real time. The platform contains a graphic interface to drive the motor and acquire the data, an induction motor, an AC drive, a communication protocol between the computer and the AC drive, and a loading system for the motor based on the claw pole alternator. LabVIEW has been used for designing the control interface. This control interface includes speed adjustment, stop command, direction of rotation, and drawing the speed-torque characteristic in real time to make the student able to notice the performance of the induction motor in the vector control mode.

Keywords: Vector Control, Ac Drive, Induction Motor, Speed–Torque Characteristic, Modbus, LabVIEW, claw pole alternator, encoder.

I. INTRODUCTION

The increase in the industrial need to adjust the torque of the induction motor has made the auto driving course an essential part in the engineering curricula for students of electrical machinery and industrial automation [1]. Vector control of the induction motor is one of the most widespread industrial applications, as it provides a good response in transient situations and gives full torque at low speeds, and it is one of the fields in which research is most published [2], but the separation between torque and flux components is still ambiguous for students so far [3] and this requires many educational experiments in this field. In order to clarify these concepts we need an educational platform that helps students to understand the principle of the vector control and shows the performance of the motor in this method with real-time monitoring of motor parameters.

In this paper, a control interface is designed by LabVIEW to drive a commercial vector drive [4] via Modbus. Although AC drive contains a software to drive the induction motor through the computer, but its options are limited and its cost might be high [5].

As for the loading system of the motor, it is the claw pole alternator, although there are many loading systems, this system was chosen because it is safer, more durable, costs less and is widely available in the local market [6]. This paper presents a scientific contribution to the algorithm used for data acquisition through an AC drive and also presents a new method for designing a low-cost real-time learning platform.

Unlike most researches in this field, vector control method has been simulated and also practical experiments have been presented by plotting the speed-torque characteristic of an induction motor at different loads and speeds.

For example in [7] an educational platform is performed for electrical machinery students that determines speed-torque characteristic of an induction motor driven by a conventional control method. In [8] and [2], the speed, torque and flux of the induction motor have been acquired, but the constant value of torque hasn't been calculated, and they recommended the design of a speed - torque control system of the induction motor. In [5] the researcher sent control commands from the LabVIEW software to the AC drive via Modbus, but the control loop remained open, he did not verify the validity and completeness of data transmission, and he recommended studying closed loop control. Also, the research [9] is a virtual platform, not practical experiments.

This article is directed to enhance the educational process of vector control method, in addition to the acquiring the data of AC drives via Modbus, and it supports the researches in the field of generation by using the claw pole alternator.

This paper is organized as follow: section 2 describes the vector control methodology with simulation in MATLAB, section 3 describes the platform equipment like the induction motor, AC drive, and loading system, section 4 describes the implementation of the communication system between LabVIEW and the AC drive, and sections 5, 6 describe the practical application and conclusions respectively.

II.   VECTOR CONTROL METHOD

The vector control method is based on controlling the three-phase induction motor in a similar way of controlling DC motor where we can control the flux and torque separately [10].

The vector control method is based on transform the three fixed axes a, b, c into the $d^s - q^s$ coordinate system which has two fixed axes. This is by Clark transformation. If the d^s axis applies to the "a" axis, the voltage equations will be:

$$V_{ds}^s = \frac{2}{3}V_a - \frac{1}{3}V_b - \frac{1}{3}V_c \qquad (1)$$

$$V_{qs}^s = \frac{1}{\sqrt{3}}V_b - \frac{1}{\sqrt{3}}V_c \qquad (2)$$

Similarly, the equations of currents in the axis $d^s - q^s$ are:

$$i_{ds}^s = \frac{2}{3}i_a - \frac{1}{3}i_b - \frac{1}{3}i_c \qquad (3)$$

$$i_{qs}^s = \frac{1}{\sqrt{3}}i_b - \frac{1}{\sqrt{3}}i_c \qquad (4)$$

In order to convert from the fixed axes $d^s - q^s$ to the rotated axes $d^r - q^r$ we use the Park transformation and the equations of the currents is as follows:

$$i_{ds}^r = i_{ds}^s \cos\theta_e + i_{qs}^s \sin\theta_e \qquad (5)$$

$$i_{ds}^r = -i_{ds}^s \sin\theta_e + i_{qs}^s \cos\theta_e \qquad (6)$$

We calculate θ_e from the equation:

$$\theta_e = \int (w_r + w_m) \qquad (7)$$

the variable w_r represents the slip speed and can be calculated from (8):

$$w_r = \frac{L_m * I_{qs}^r}{\tau_r * \psi_{dr}^r} \qquad (8)$$

$$\tau_r = \frac{L_r}{R_r} \qquad (9)$$

W_m can be calculated by multiplying the mechanical speed into the number of poles (10)

$$W_m = W_{mechanical} * p \qquad (10)$$

ψ_{dr}^r can be calculated form the equation (11)

$$\psi_{dr}^r = i_{ds}^r * L_m \qquad (11)$$

The torque equation will be as follow:

$$Te = \frac{3}{2} * p * \frac{l_m}{l_r}\left(i_{qs}^r * \psi_{dr}^r\right) \qquad (12)$$

Based on the foregoing, a model was designed to convert the value of the current in the three axes into the rotating coordinate system $d^r - q^r$, shown in Figure 1. By changing the load torque on the motor, we notice that I_{qs}^r changes while I_{ds}^r remains almost constant, Table I. Based on that, we can say that the vector control system is similar to the control system of a DC motor.

TABLE I. THE CHANGE IN THE VALUES OF THE CURRENT COMPONENTS ON THE AXIS $d^r - q^r$ ACCORDING TO THE CHANGES IN THE LOAD TORQUE

T [Nm]	I_{qs}^r [A]	I_{ds}^r [A]
0	6.6	28
50	24.23	27.8
100	42	27.5
150	60	27
200	78.3	27
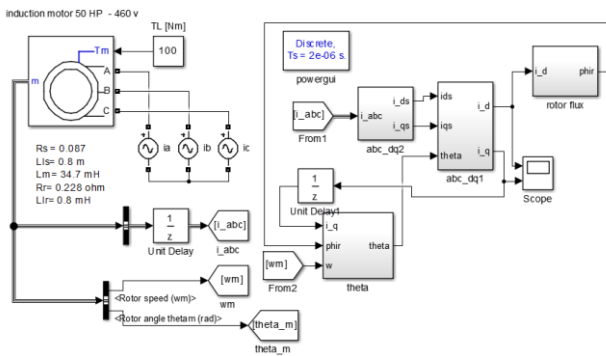
Figure 1. Model for acquiring current values of a vector-controlled three phase induction motor

III. DESCRIPTION OF THE PLATFORM

A. The Three Phase Induction Motor

The motor used is a squirrel cage three-phase induction motor, its specifications are shown in the table II.

TABLE II. SPECIFICATIONS OF THE INDUCTION MOTOR USED

Parameter	Specification
Power	0.75 Kw
Operational Voltage	220 V AC Delta / 380 V AC Star
Operational Frequency	50 Hz
Number of Poles	4
Speed	1370 rpm

B. The AC Drive

Also called Adjustable Speed Drive (ASD) or Variable Speed Drive (VSD) The AC drive uses vector control method to drive an induction motor, shown in Table III. It is based on controlling speed and torque, in addition to saving energy when decelerating [11]. In order to use the vector control method to drive the induction motor, you must enter the settings and set the drive system to be vector control. In order to use the LabVIEW to control the AC drive, the command receiving settings in the AC drive must be set to RS485. In order to measure the speed accurately, we used an optical encoder, and the AC drive must be adjusted to obtain the speed from the Encoder, which is mounted on the motor shaft.

TABLE III. SPECIFICATIONS OF THE AC DRIVE

Parameter	Specification
Power	1.5 Kw
Operational Input Voltage	230 V AC / One Phase
Operational Output Voltage	230 V AC / Three Phase
Frequency	0.1 - 400 Hz
Communication Protocol	RS485

C. Claw Pole Alternator

There are many loading systems for the induction motors, in many studies Prony brake is used for loading, but this brake gives high temperature at high powers [10] and it is not possible to design a Prony brake at low cost. Therefore, the claw-pole alternator which belongs to salient pole machine, has low cost compared to other kinds of alternators [10], and it is widely used as an alternator in the vehicles. The claw-pole alternator contains internal poles, while the output is three-phase with a large number of pairs of poles. This alternator differs from salient pole machine in that it operates at higher speeds and is small in size [6]. This alternator contains a bridge rectifier so that the output becomes DC, and it also contains a voltage regulator feeds the excitation cooils to maintain the alternator output at 24 volts [10].

In our project, we removed the voltage regulator to control the excitation current separately. Figure 2. shows the relation between the rotational speed and the output current. Since the nominal speed of the induction motor is 1370 rpm, we cannot connect the alternator with the motor directly, so we used pulleys to make the speed of the alternator becomes rpm 2740 when the motor rotates at synchronous speed.

TABLE IV. CLAW POLE ALTERNATOR ALT-T140

Parameter	Specification
Output Voltage	24 V DC
Operational Output Current	140 A
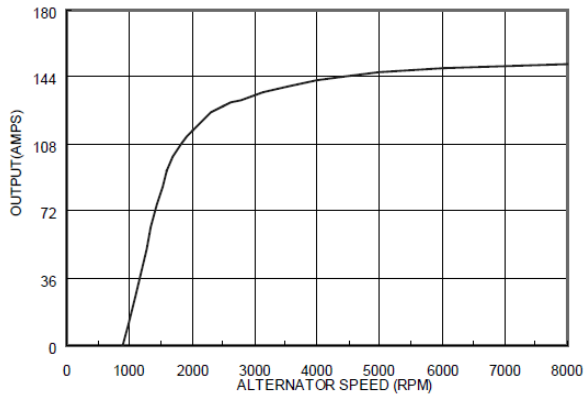
Figure 2. Relation between alternator speed and the output current

IV. COMMUNICATION SYSTEM BETWEEN LABVIEW AND AC DRIVE

1) Modbus

It is a serial communication system widely used to connect industrial electronic devices together and was developed for industrial applications. It uses RS485 in its physical layer. Modbus connects many electrical equipment called terminals (RTUs) with the supervising computer. There are three types of Modbus RS485, the first one is Modbus RTU, which uses a binary representation system for data and uses a CRC (Cyclic Redundancy Check) system for error checking in order to ensure the reliability of the data, and the second is Modbus ASCII which uses ASCII characters to transfer data, LRC (Longitudinal Redundancy Check) error detection [10]. Modbus ASCII messages begin with a colon (:) and end with a newline (CR/LF)). The third type is Modbus Plus and AC drives do not support this system [11]. Modbus consists of the Application Data Unit (ADU) which contains the Protocol Data Unit (PDU).

ADU = Address + PDU+ Error Check.
PDU = Function Code + Data.

2) Driving The AC Drive Via Modbus ASCII

First, the connection settings must be set to receive commands through Modbus ASCII and AC drive must be given a specific address (in this project number 1 is used) [11]. The PC which is connected to the AC drive through Modbus ASCII sends commands to the AC drive like: forward direction with specifying the required frequency, or sends reverse direction with specifying the required frequency. The code of each command shown in Table V, Table VI. shows the address of the registers associated with the parameters used in the project.

TABLE V. CMD

Command	Function Code
Read	03H
Write to one Register	06H
Write to Multi Registers	10H

TABLE VI. ADDRESSES USED IN THE PROJECT TO DRIVE THE AC DRIVE AND COLLECT DATA

Address	Function	Code
2000H	Stop	0001H
	Run	0002H
	Forward	H0012
	Reverse	0022H
2001H	Frequency Command	
210BH	Estimated Torque ratio	Read Only
210CH	Motor Speed (Hz)	

The program is based on sending the required speed with the direction of rotation, after that the AC drive returns the completion of the process of receiving the command. In order to obtain the speed and torque, the program sends a command to read the speed and torque registers, and the AC drive sends the value of both speed and torque to the computer. Figure 4 shows the user interface to drive the motor.

V. RESULTS AND DISCUSSION

Figure 4 illustrates the user interface for driving an AC drive to adjust the induction motor's speed, specify the direction of rotation, and pause data acquisition to change the load or speed, with displaying of torque value, actual speed, synchronization speed, and slip.
Figures 5.6.7 show. The program for sending and receiving data from the AC drive. Figure 8 shows the speed-torque characteristic plotting code. The induction motor is engaged with the claw pole alternator. Excitation coils of the alternator are connected with a 24V DC source [10], and the stator coils are connected with a rheostat (0-34 Ohm) as shown in Fig. 9.
To plot the speed-torque characteristics, the speed is set at the value of 5 Hz and the load resistance at the value of 34 Ohm, and by pressing the Forward key, the motor rotates at the required speed and the interface starts plotting the speed-torque curve in real time, after that the value of the resistor is reduced gradually until reaching three times of the nominal torque. Then Pause key is pressed, resistance is returned to its maximum value, and speed is increased to 10 Hz. This procedure should be repeated. The result is shown in the figure. 10.
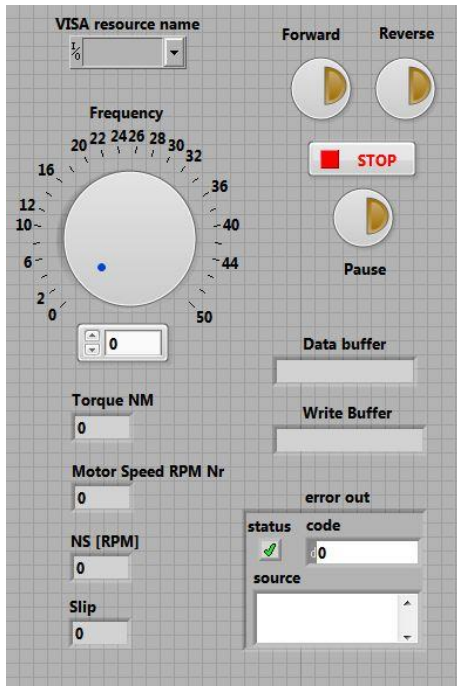
Fig.4: User interface for driving the AC drive
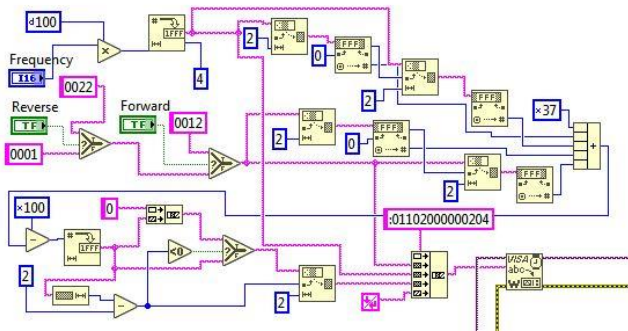
Figure 5. Sending the value of the speed and direction of rotation with the calculation of the value of the LRC
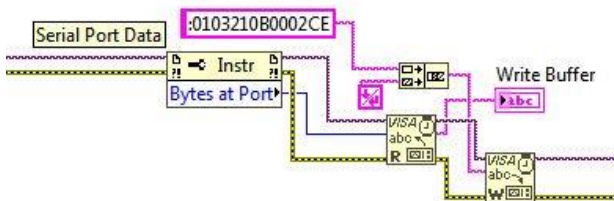
Figure 6. Receiving the response from AC drive and sending the command to read the torque and speed
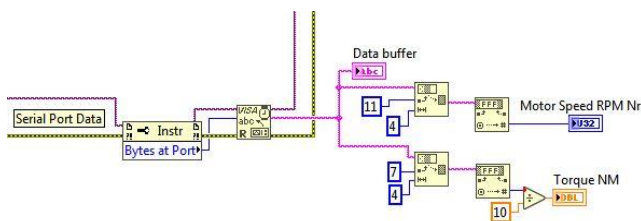
Figure 7. Acquiring the value of both speed and torque
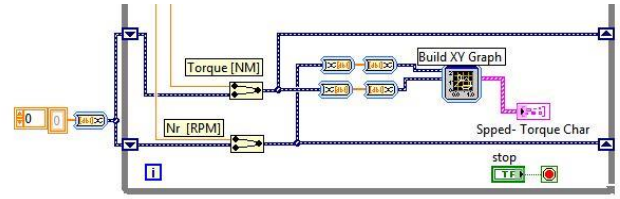
Figure 8. Speed-torque characteristic diagram of an induction motor
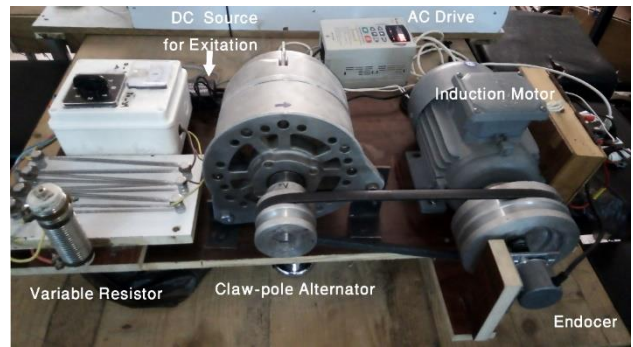
Fig.9 The full project
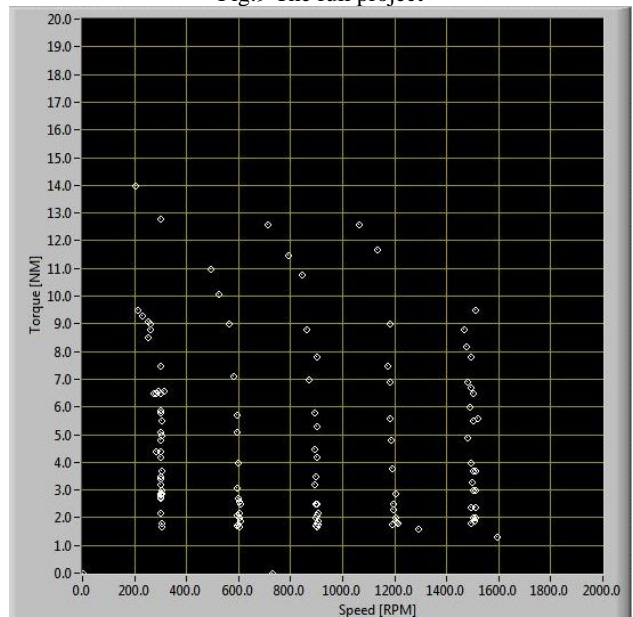
Figure 10. Speed-torque characteristic of a vector controlled induction motor

VI. CONCLUSION

This paper presents an educational platform and it uses LabVIEW to teach industrial automation students the vector control method by modelling a vector control system and plotting the speed-torque characteristic of a three-phase induction motor in real time, the curve showed motor stability at varying speeds and loads. The methodology used is based on utilizing the AC drive to drive an induction motor, acquiring the rated torque and

speed, and using the claw pole alternator to load the motor.

This platform costs less comparing with other vector control platforms, in addition to its ease of use. This helps students to understand the vector control system and its curves.

In future, the vector control system will be designed to fully drive an induction motor without using commercial AC drives.

VII. ACKNOWLEDGEMENT

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Cite this Article

Simple Automated Verification of Field Size Indicator for Quality Assurance of Medical Linear Accelerator

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ABSTRACT

Purpose: The purpose of this study is to automate the field size verification to facilitate mechanical check aspect medical linear accelerator (linac) quality assurance in a MATLAB-based algorithm on electronic portal imaging device (EPID) images.

Methods: A total of 5 reference datasets (i.e. field sizes of 5 cm × 5 cm, 10 cm × 10 cm, 15 cm × 15 cm, 20 cm × 20 cm, and 25 cm × 25 cm) and 15 test datasets (i.e. reference field sizes plus 1 mm, 3 mm, and 5 mm increments) acquired by 6 MV Elekta Linac were used in this study. The proposed algorithm implemented a full automatic threshold with a value of 230 as a segmentation technique. The automated results were compared with manual results obtained using a ruler.

Results: The automated results are comparable to manual results (i.e., the difference of both is within 2% or equal to 3 mm). The range of minimum to maximum difference between automated and manual was 0 - 3 mm and the maximum difference found in the 15.3 cm field size setting.

Conclusions: We have successfully developed an automated procedure of field size verification and confirmed that the proposed algorithm provide a fast and accurate results.

Keywords: Collimator, Field Size Indicator, Linear Accelerator, Quality Assurance, Radiotherapy

I. INTRODUCTION

The international growth in the number of cancer and deaths worldwide caused by cancer encourages the stakeholders to take into consideration the most efficacious treatment techniques and modalities [1-3]. Since the potential of radiation was discovered in the late 1890s, scientific and technological developments regarding the use of high-energy ionizing radiation to kill cancer cells rapidly followed this discovery, and it led to radiotherapy [4]. At the time, the progress was focused on the construction of innovative radio-therapeutic modalities [5]. The first medical linear accelerator (linac) was used to treat patients by delivering megavoltage X-rays in early of 1950s [6]. Nowadays, design, components, safety and control features of medical linac have evolved in order to provide stable, reliable, flexible, and cost-effective radiotherapy treatment modality [6-8].

Radiotherapy has been an effective treatment for many cancers. In order to meet the goal of radiotherapy, it is crucial to monitor the performance of all medical linac components. The medical linac must be controlled periodically to assure that performance parameters have not deviated from their baseline value in accordance with the time of the device acceptance. For the purpose of quality assurance (QA) of medical linac, the American Association of Physicists in Medicine (AAPM) issued the report Task Group 40 (TG-40) [9]. In 2009, AAPM released an update of TG-40 in TG-142 [10]. Dosimetry, mechanical, safety, and respiratory gating aspect were included in the QA procedure. However, there are certain aspects of the QA procedure that occasionally followed further exploration as needed to ensure that users can perform QA efficiently and identify the errors [11]. The collimator is included in the linac equipment that needs to be checked periodically.

Field size and its shape are crucial in accurately dose delivery in radiotherapy. A conventional treatment machine shapes the radiation field by a set of dense metal collimator and configures into rectangular fields. A combination of these collimator jaws and secondary customized blocks produces the desired radiation beam [12]. In consequence, most recommendations for QA of medical linac require verification of collimator field size indicator. AAPM suggested that the field size indicators are checked monthly by comparing the indicated field size to the measured value on QA BeamChecker Plus or a graph paper [9, 10].

The current field size indicator QA at Ken Saras Hospital, Central Java, Indonesia, is performed using a print-out of electronic portal imaging device (EPID) images to identify the errors manually using a ruler. The manual observation can be less accurate, time-consuming, and not practically performed as a routine test in clinics. Conversely, using commercially available QA software (i.e Siemens Medical Solutions) leads to increase in substantial funds. Previous researchers developed software or methods for the purpose of field size QA programs [13, 14]. Abdallah and Boshara [13] used texture analysis to assess 10 cm × 10 cm field size from a radiographic film image [13]. The computerized assessments were then compared to manual measurements. Njeh et al. [14] reported the simple QA test tool which can be used in conjunction with either EPID or computed radiography (CR) to visually verify linac light and radiation field congruence with respect to the purpose of positioning the patient. Both measurement results were within the tolerance level recommended by the AAPM (i.e. tolerance level of 2 mm) [9, 10]. However, radiographic films provide limited accuracy and cannot be processed digitally. Even more with the drive toward film-less radiation therapy setting, so that the recent field size checks replaced film to EPID [14,15]. To the best of our knowledge, there has no studies on the automation of field size measurements from EPID images. Therefore, the objective of the current study was to develop a simple and efficient algorithm in MATLAB for mechanical check aspects of monthly QA (collimator field size indicator) based on EPID images for various field sizes.

II. METHODS AND MATERIAL

A. Image acquisition procedure

This study was conducted at Ken Saras Hospital, Central Java, Indonesia. A total of 20 EPID images were classified into reference and test datasets. The images of reference dataset (i.e. field sizes of 5 × 5 cm, 10 × 10 cm, 15 × 15 cm, 20 × 20 cm, 25 × 25 cm) were presented in Figure 1. The test datasets were implemented to assess the error in the proposed algorithm. A total of 15 field sizes were taken from reference field sizes plus 1 mm, 2 mm, and 3 mm increments. All EPID image datasets were acquired using 6 MV Elekta Linac, between September – October 2020. The acquisition procedure was

performed by positioning source-to-surface distance (SSD) at 100 cm, gantry and collimator were set to 0 degrees. Shadow tray was used to set both reference and test field sizes. Acquisition protocol was set so an image was acquired for the appropriate field size. The image datasets were then saved in TIFF format.
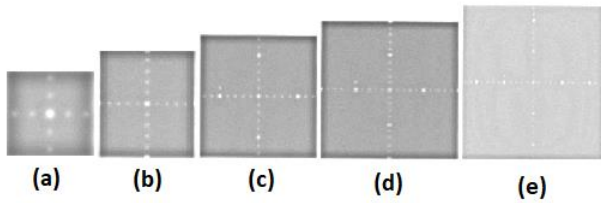
Figure 1. Reference datasets: (a) 5 × 5 cm, (b) 10 × 10 cm, (c) 15 × 15 cm, (d) 20 × 20 cm, and (e) 25 × 25 cm of rectangular field sizes.

B. Proposed algorithm

The automated procedure for verification of field size indicator was developed on MATLAB R2015b. Figure 2 presents the flowchart of the proposed algorithm. There were several steps in the automated verification of the field size. The first step was to input all reference and test images. The next step was image segmentation [16]. We used a threshold with a value of 230 in the segmentation stage due to it was not sensitive to background noise. The image was then converted from grayscale to binary image and so the foreground object can be calculated in terms of its area. The last step was calculation the side boundary of the rectangular field size. The displays user interface of the algorithm is shown in Figure 3.
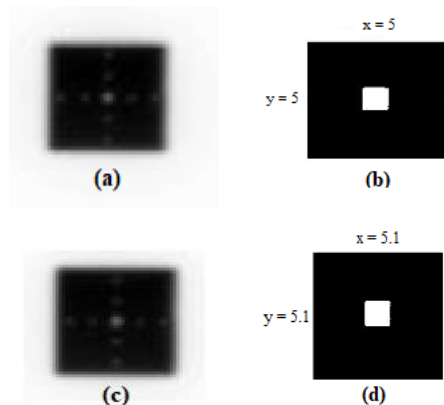
Figure 2. Workflow of the proposed algorithm
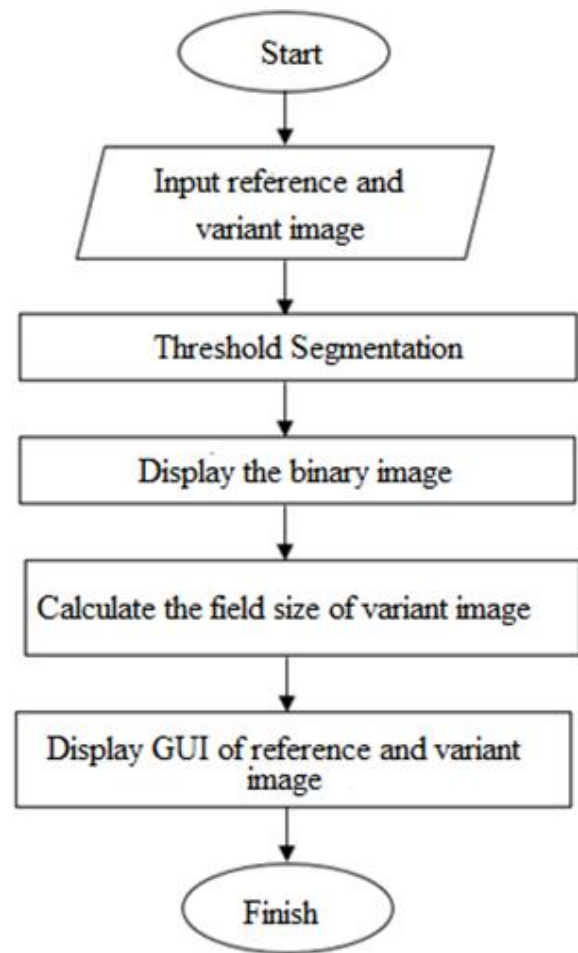
Figure 3. The screen display of the proposed algorithm user interface (a) initial reference image of 5 × 5 cm field size, (b) 5 × 5 cm reference image as a result of thresholding and after filling the all pixels within the field size boundary with a value of 1, (c) initial variant image of 5.1 × 5.1 cm field size, and (d) 5.1 × 5.1 cm variant image after threshold procedure.

C. Manual verification

The final result from the developed algorithm was a rectangular field size dataset in the x- and y-axis. The results of automated measurement were compared to manual datasets which were verified visually by a senior medical physicist of the hospital. Manual measurement of field size was performed by print the EPID image on a sheet of paper. The distances of each side were measured using a ruler. The measurements for each field size were repeated for 3 times, then the

averages and standard deviations of the measured field sizes were calculated.

III. RESULTS AND DISCUSSION

The results of manual and automated procedures for both reference and test datasets were tabulated in Table 1. Overall, the difference between manual and automated measurements was less than 2%. In certain field size settings, manual measurement gives greater results than automatic measurement. The maximum difference between automated and manual measurements was 3 mm or still less than 2 %, found in the 15.3 cm field size setting. Therefore, results obtained from this study indicate that all field size setting was still within the tolerance level of 2 mm [9, 10]. The correlation of manual and automated measurements is presented in Figure 4. It is found that both has linear correlation with $R^2 > 0.99$. The R^2 values is close to 1 means that the automatic method has very strong relationship with the manual measurement.

When tested using our laptop supported by Intel® Core™ i5-4210U CPU @ 1.70GHz 2.40 GHz and RAM of 8 GB, our proposed algorithm run less than 4 s, so that it is obviously faster than manual measurement. We realize that the speed of running the program is greatly influenced by the specifications of the device used. Manual measurements can take longer (i.e. longer than 60 s) because it needs to print the EPID images then positioning the print-out image carefully so that the border of the printed image matches to the ruler.

This study aims to develop an automated procedure for field size measurement of medical linac so that an effective and time-saving QA can be performed in the clinical routine. Previously, an automated measurement of field size was proposed and validated on 10×10 cm of field size obtained from radiographic film and processed using image texture analysis [13].

Different from Abdallah et al. [13], in the current study, we used EPID as an image acquisition tool. EPID is primary designed for verification of patient setup and to measure the x-ray intensity transmitted through a patient during treatment session [17]. Therefore, due to the EPID image has a sub-millimeter spatial resolution and high contrast resolution, EPID image is an ideal tool for verifying x-ray field size rather than radiographic film [18]. The original image format obtained from EPID is in TIFF format. We used a threshold with the value of 230 as a segmentation technique to separate the main object and background and then assign object fill with a value of one. The segmentation stage in this study was run automatically.

Table 1. The results of x-axis and y-axis for various field sizes of automated and manual measurements

Adjusted field size (cm)	Field size (cm)		Difference	
	Automated verification	Manual verification	(mm)	(%)
5.0×5.0	5.0×5.0	$5.0 \times 5.0 \pm 0.057$	0	0
5.1×5.1	5.1×5.1	$5.1 \times 5.1 \pm 0.057$	0	0
5.3×5.3	5.3×5.3	$5.4 \times 5.4 \pm 0.000$	1	1.9
5.5×5.5	5.6×5.6	$5.7 \times 5.7 \pm 0.028$	1	1.8
10.0×10.0	10.0×10.0	$10.0 \times 10.0 \pm 0.000$	0	0
10.1×10.1	10.2×10.2	$10.2 \times 10.2 \pm 0.057$	0	0
10.3×10.3	10.3×10.3	$10.5 \times 10.5 \pm 0.057$	2	1.9
10.5×10.5	10.6×10.6	$10.7 \times 10.5 \pm 0.000$	1	0.9
15.0×15.0	15.0×15.0	$15.0 \times 15.0 \pm 0.057$	0	0
15.1×15.1	15.1×15.1	$15.2 \times 15.2 \pm 0.000$	1	0.7
15.3×15.3	15.2×15.2	$15.5 \times 15.5 \pm 0.003$	3	1.9
15.5×15.5	15.5×15.5	$15.6 \times 15.6 \pm 0.000$	1	0.6
20.0×20.0	20.0×20.0	$20.0 \times 20.0 \pm 0.057$	0	0

20.1×20.1	20.2×20.2	$20.2 \times 20.2 \pm 0.057$	0	0
20.3×20.3	20.5×20.5	$20.5 \times 20.5 \pm 0.000$	0	0
20.5×20.5	20.6×20.6	$20.7 \times 20.7 \pm 0.057$	1	0.5
25.0×25.0	25.0×25.0	$25.0 \times 25.0 \pm 0.000$	0	0
25.1×25.1	25.1×25.1	$25.3 \times 25.3 \pm 0.000$	2	0.8
25.3×25.3	25.5×25.5	$25.5 \times 25.5 \pm 0.057$	0	0
25.6×25.6	25.7×25.7	$25.7 \times 25.7 \pm 0.057$	0	0
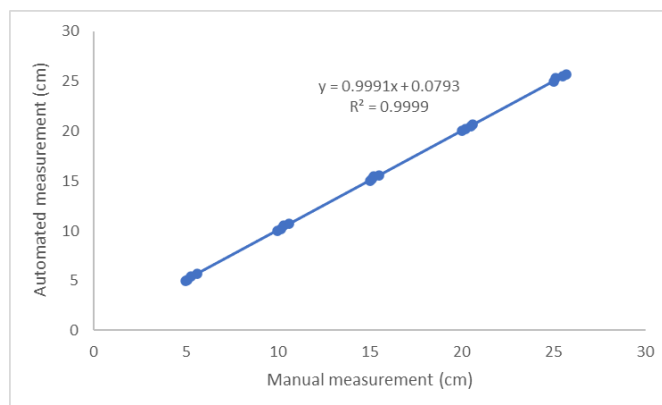
Figure 4. Comparison of manual versus automated measurement

The results of automated measurement were then compared to manual measurement observed by senior medical physicist. We found that the differences between results of automated and manual measurements were within 2%. The automated and manual measurements have a very strong correlation with an R2 > 0.99.

We found our algorithm gives more accurate results than manual observations. In several field size settings, manual measurement provides a higher value than automated measurement. This difference may be affected by user subjectivity during the assessment of the field size boundary with an observation limit of 1 mm. Conversely, our algorithm allows assessment of the edge of field size in an automatically approach with a pixel value was less than 1 mm. Therefore, our proposed algorithm would greatly assist medical physicists in conducting a simpler and more efficient field size verification by pressing a single button.

IV. CONCLUSION

The MATLAB algorithm developed in this study provides a simple way for effective measurement of field size verification. The results revealed that both automated and manual verification still within the tolerance level by AAPM TG-40 and TG-142 (i.e 2 mm). The percentage difference between manual and automated measurements was within 2%. The proposed algorithm was able to obtain accurate results and can be easily performed as a routine test in clinics.

V. ACKNOWLEDGEMENT

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Cite this Article

Ageing, Neurodegeneration and Parkinson's Disease

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ABSTRACT

For the human development aging is one of the important aspect among which on cellular processes and functions are predispose to neurodegeneration and synthetic changes in the body are involved in the pathogenesis of Parkinson's. The accumulation of the cellular development and their function leads to the progression of Parkinson's. The formation of ROS, generation of oxidative stress, disruptions in inflammatory pathways like COX, LOX, formation of lewy bodies, protein degradation, genetic mutations, mitochondrial depletion and several other pathways involved in the pathogenies. These may be due to age related decline in acetylcholine and dopamine levels. On medical findings from survey it's been discovered Parkinson's is age associated ailment and quite a times irreversible yet curable on early stages and can be treated with dopamine and acetylcholine analogues, where levodopa and carbidopa is considered to be the drug of choice at different doses for the inhibiting progression of Parkinson's.

Keywords : Neurodegenerative disease, Genome instability, Life expectancy, Ageing, Parkinson's disease, Alzheimer disease

1. INTRODUCTION

In living creature, "ageing" usually refers to a sequence of time-dependent bodily and anatomical adjustments that lessen Physiological reserve and useful capacity. Ageing happens at different rates in numerous species, and inter-individual variations exist within a species and in the different tissues of an individual. The principal motive of getting older in most character is their lifestyle, own circle of relatives genes and the outcomes of the environment. Although mind cells are especially liable to the collected outcomes of getting older. An important modification throughout ageing is that the loss of irreplaceable cells, most perceptibly within the brain, heart, and skeletal muscles. We all age, our brains age, but only a few humans broaden neurodegenerative diseases. Neurodegenerative disorder is regression and progressive deterioration of neurological characteristic with lack of speech, vision, hearing, or locomotion, frequently related to seizures feeding difficulties, and impairment of mind. (Shubhankar, M., and P. M. Ajit,2018). The neurodegenerative diseases are Parkinson's disease (PD), Alzheimer disease (AD), prion disease, Motor neuron disease (MND), Huntington's disease (HD) , Spinocerebellar ataxia (SAA) ,Spinal muscular atrophy (SMA). Alzheimer disease is a progressive disease that destroy memory and other important mental functions

and cause by abnormal build build-up of protein in and around brain cell and also by increase in acetylcholine (ACH). Parkinson's disease (PD) is a neurodegenerative disorder characterized by the progressive loss of dopamine (Dawson TM, 2006). In addition to dopaminergic neuropathology, there is dysfunction in cholinergic, serotonergic, glutamatergic and noradrenergic pathways (Charvin, D., Medori, R., Hauser, R. et al., 2018). PD is classified as a synucleinopathy, as α-synuclein, a presynaptic neuronal protein, is a major constituent of Lewy bodies, which are a pathological hallmark of PD (Charvin, D., Medori, R., Hauser, R. et al., 2018). Interestingly, α-synuclein has a completely unique significance in the aetiology of PD as it seems to hyperlink familial and sporadic kinds of the disease. The presence of aggregates in patient brains suggests that the proteostasis of α-synuclein is disturbed in PD (Charvin, D., Medori, R., Hauser, R. et al., 2018). Indeed, α-synuclein exists in various conformations in a dynamic equilibrium that is modulated by many factors, including oxidative stress, post-translational modifications and concentrations of fatty acids, phospholipids and metal ions, and a tight balance of these factors controls the levels and aggregation of α-synuclein (Charvin, D., Medori, R., Hauser, R. et al., 2018).

Parkinson's disease (PD) is the second most common neurodegenerative disorder in adults over the age of 60 years. According to the Global Burden of Disease study (2018), the worldwide burden of PD has more than doubled over the past two decades from 2.5 million patients in 1990–6.1 million patients in 2016. India is home to nearly 0.58 million persons living with PD as estimated in 2016, with an expected increase by 19% by 2050 (united nation population India). Recent study (2020) of International Parkinson and Movement Disorder society estimated that 9.4M population live with PD and Country-specific number include; US (930k) , Japan (344k) ,Germany (266k) , France (157k) , Italy (149k) ,UK (142k) , Spain (120k) .According to

Parkinson's news today an estimated 4 percent of people with Parkinson's disease are diagnosed before the age 50 . Men are 1.5 times more likely to have have Parkinson's than women.

Many age-associated neurodegenerative sicknesses are characterized through accumulation of disease-unique misfolded proteins in the central nervous system. These include β-amyloid peptides and tau/phosphorylated tau proteins in AD, α-synuclein in PD, superoxide dismutase in amyotrophic lateral sclerosis, and mutant huntingtin in Huntington's diseases (Hung, Chia-Wei, 2010). The relationship between age and protein misfolding is not yet clear. It can be associated with cellular changes that arise all through ageing. For example, cells reduce and the best manipulate of protein synthesis declines with ageing. This might also additionally reason or make contributions to the formation of misfolded protein aggregates and in the end cause disease. In a small number of the population, aging neurodegeneration is accelerated by individual (e.g. brain injury), environmental factors (e.g. toxins) and genetic factors (e.g. alphasinuclein gene mutations) in order to reach the critical threshold of clinical symptoms throughout lifetime (Müller, W. E., Eckert, A., Reddy, P. H., eds., 2020). Thus, neurodegeneration in Parkinson's it appears to represent the common ultimate pathway of "normal brain aging" and all other risk factors, including genetics and the accumulation of the neurotoxic protein alpha-synuclein (Müller, W. E., Eckert, A., Reddy, P. H., eds., 2020). Ageing affects several cellular processes that incline to neurodegeneration, and age-associated modification in cellular perform predispose to the pathological process of PD. The build up of age-associated somatic harm combined with a failure of compensatory mechanisms. The etiology underlying the improvement of Parkinson's remains unclear. So far, around 18 genes have been recognized as the genetic causes for familiar Parkinson's disease, which provide crucial information about the pathogenesis of the disease. Recently,

accumulating genetic discoveries have discovered the association among vesicle trafficking and parkinson's disease. The disruption of cell vesicle traffic leads to impaired breakdown of certain proteins and also leads to abnormal protein aggregation, which has a toxic effect on neurons. Rab GTPases (Rabs) carry out the primary features in intracellular trafficking events. Moreover, a sequence of new research have found out that the certain rabs are involved in modulation of α-synuclein. The alteration of these proteins has been reported to be one of the rare causes of early hereditary PD. These new findings provide new insight into the molecular pathogenesis of PD.

2. Mechanism of ageing

Genome instability

Genome instability is define as the process prone to genomic changes with high frequency of mutation to chromosomal rearrangement. It can be divided into two types- chromosomal instability (CIN) and micro- and mini- satellite instability (MIN). Chromosomal instability refers to changes in chromosomes structure and number that lead to chromosomes gain or loss. It is cause by the failure of mitotic chromosomes transmission or spindle mitotic check point. Micro- and mini satellite instability leads to repetitive DNA expansion and contraction and occur by replication slippage, mismatch repair impairment, homologous recombination etc. During cell cell division genomic instability is associated with failure of parental cells to accurately duplicate the genome and precisely distributed the genomic material among the daughter cells. Genetic instability can also have a specialized role in the generation of variability in developmentally regulated process, such as immunoglobulin (Ig) diversification.

According to the figure 1, DNA damage occurs due to exogenous threats (physical, chemical, biological) and endogenous threats (replication error, spontaneous hydrolytic reactions, reactive oxygen species). When DNA damage erroneous DNA repair or replication occurs and results in to DNA mutation. After DNA

mutation neoplastic transformation, cellular degeneration and functional decay occurs which ultimately results in to cancer, degenerative disease, ageing etc.
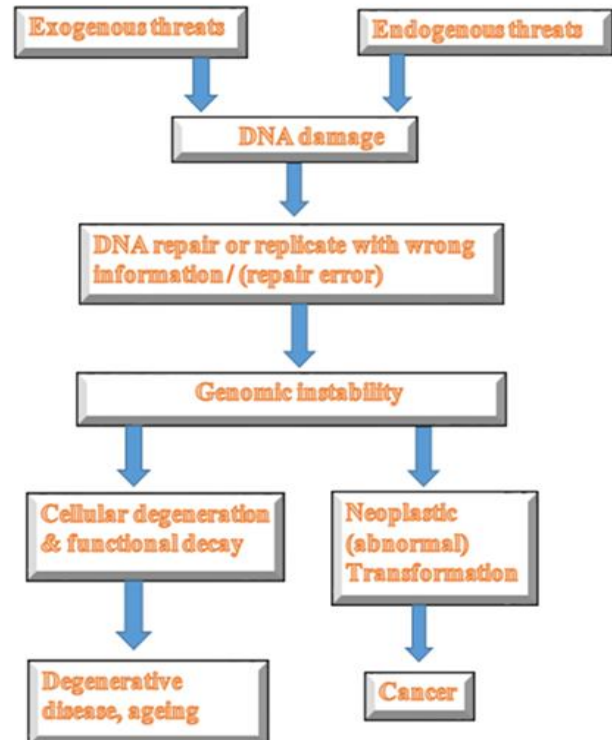
Figure 1. Mutation, Ageing & DNA damage

3. Role of genetical and environmental factor in ageing

Structural and function throughout life is maintain organism by genes. Healthy ageing and longevity in humans are controlled by the combination of genetics and non-genetics factors. Family studies shows that 25% of variation in human longevity is due to genetics factors. Genetics is a powerful tool for identifying the mechanisms of ageing. Large-scale genome-wide association studies have recently identified many loci that influence key human ageing traits, including life span. Multi-trait loci have been linked with serval age-related disease, suggesting shared ageing influences. Vertebrate possesses specialized system so the genetics of ageing is more complex in vertebrate. According to researches gene sirtuin 6 (SIRT6) is responsible for more efficient DNA repair in species with longer life spans. Genetic disease like progeria also known as Hutchinsons-Gilford progeria syndrome (HGPS) or the

Benjamin buttom disease cause child's body ageing rapidly. Progeria disease is cause by the LMNA gene. This disease affects human of all gender and races equally. Almost all children with Hutchinsons-Gilford progeria syndrome (HGPS) don't live past age 13. Symptoms of progeria are a high pitched voice, hair loss including eyelashes and eyebrow, slow height and weight growth, a bigger head etc.

Temperature, food, pollutants, population density, sound, light and parasite are the environmental factors. This environmental factors either damage cellular macro-molecules or interfere with there repair. Environmental factors are responsible for the ageing process. Environmental factor could interact with genetic factor to regulate ageing and mutation that extend life span in certain condition could have different effect when condition changes. For example growth hormone (GH) deficiency increase life span under basal condition but it decrease lifespan when combine rapamycin.
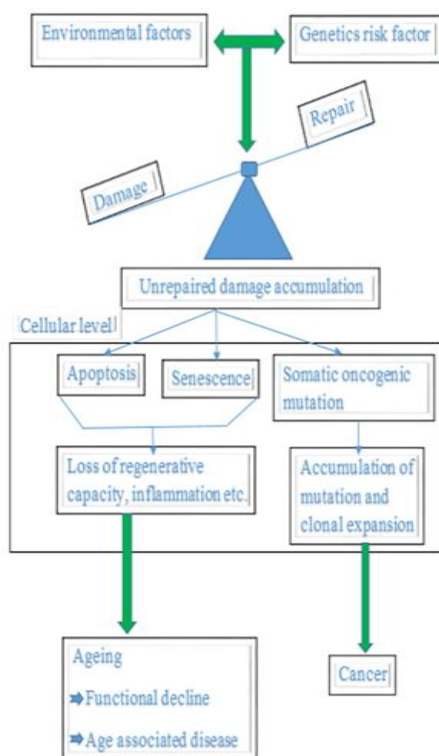
Figure 2. Major influences and mechanism of ageing

4. Theories of ageing

There is vast difference between the lifespan of animal species. Lifespan for mayflies is less than one day and for ocean quahong is more than 400 years. This enormous difference in their lifespan is due to their different abilities to adapt to the surrounding environment and response to stress, both of which are likely genetically encoded. The most globally accepted theories are given below.

Mutation accumulation theory

This theory was proposed by Peter Medawar in 1952. This theory suggest that ageing is a by-product of accumulation deleterious mutation over a time. Due to the illness leading to the death or stochastic risk of accident there is a decreasing probability of reaching more advance age. Deleterious germ line mutation are selected against early in the life when chance of survival and reproduction is high but are hidden from the natural selection (shadow area in the figure 3) at old age.
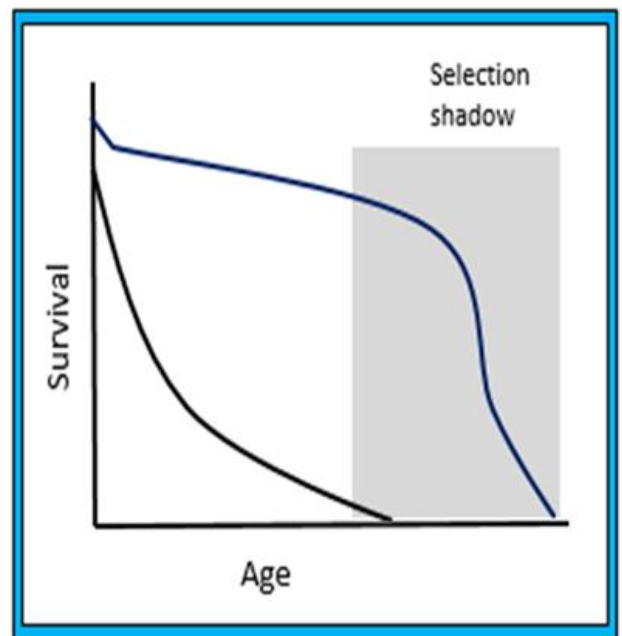
Figure 3. Accumulation of deleterious mutation can occur in the selection shadow because after reproduction, natural selection is week.

Antagonistic pleiotropy theory

This theory was 1st proposed by George Williams in 1957. This theory argues that some mutations selected because they are beneficial to early fitness becomes harmful in late life, causing ageing. Cell senescence pathway may provide may provide example in this theory. During normal mammalian development programmed senescence protects against cancer and promotes wound healing at younger age but contributes degenerative chronic disease at older age.
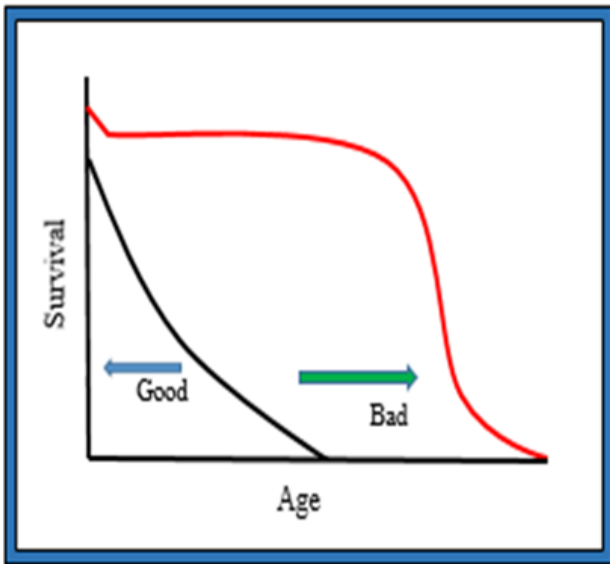
Figure 4. Unlike the mutation accumulation theory the gene suggested to be involve with the ageing phenotype in the pleiotropy theory are beneficial in early life

Disposable soma theory

This theory was formulated by British biologist Thomas Kirkwood in 1977. This theory states that given the availability of limited resources, ageing arises from the evolutionary trade-off between the growth and reproduction, on the one hand, and repair mechanism on other. Disposable soma theory is consistent with the proof that long-lived species such as human evolved by developing more sophisticated

and effective, although not unlimited. For examples comparative studies have found that the capacity to recycle deteriorated macromolecules and organelles by autophagy correlates with lifespan across species.
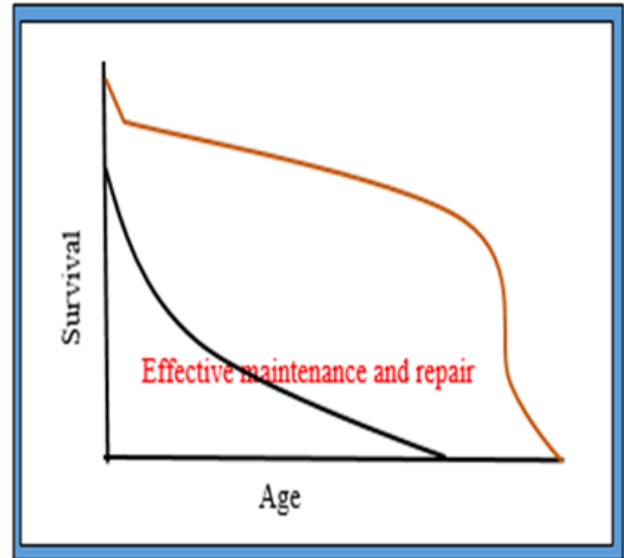
Figure 5. A representation of the disposable soma theory illustrating that effective cellular maintenance is only beneficial while there is a reasonable probability of survival

5. Life expectancy

According to world health organization WHO "Life expectancy is defined as "the average number of years a person is expected to live, based on current mortality rates and the prevalence distribution of health conditions in a population". Worldometer shows that life expectancy in 1950 AD was 47.0 years for both sexes while in 2020 AD life expectancy is 73.2 years for both sexes. In 70 years life expectancy increase by 26.2 years for both sexes. The reason for progress in life expectancy are due to betterment in education, medicine, public health, nutrition, per-capita income, government policies etc. when we compare the life expectancy between male and female we found that female have more high life expectancy than male (from figure 6). Scientist have said that space is because of a mixture of biological and social differences. Men's hormones testosterone is connected to a lower of their immune gadget and threat of

cardiovascular illness as they age. It is likewise connected to unstable behaviour: smoking, consuming alcohol and unhealthy eating habits. If diagnosed, guys are much less probable than girls to comply with doctor advice. Statistics display that guys are much likely to take life-threatening dangers and to die in automobiles accidents, or gun fights.
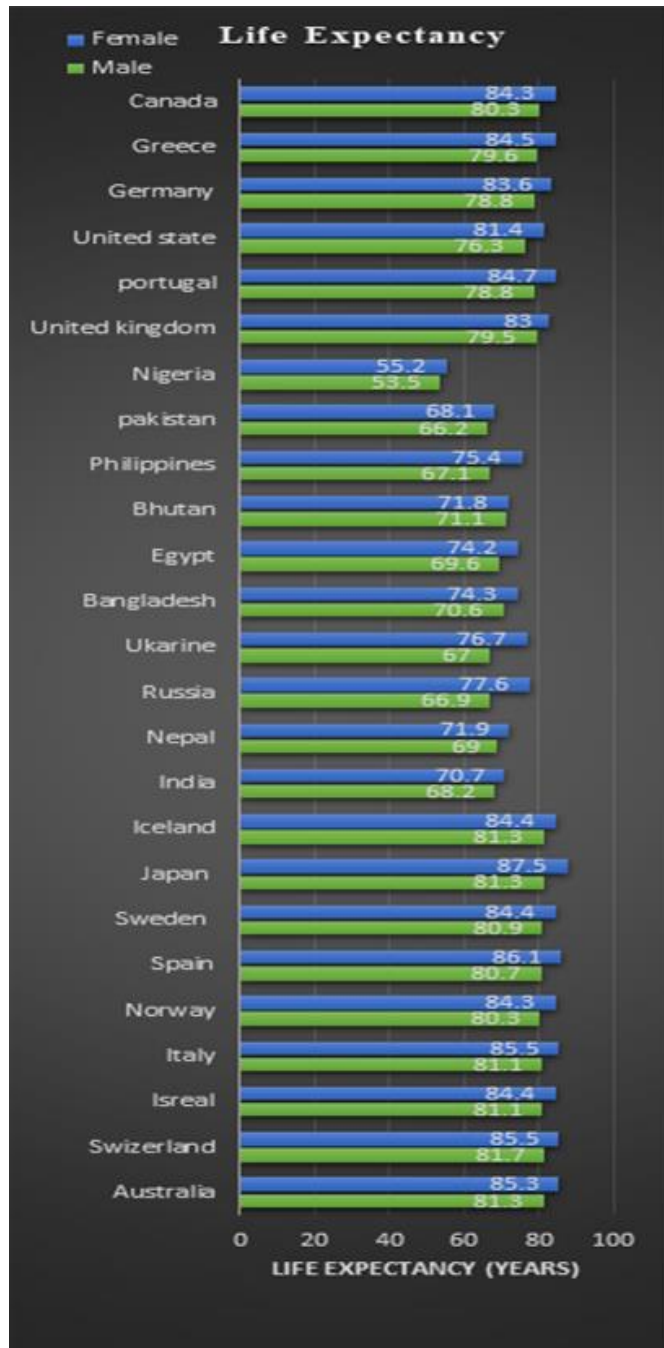
Figure 6. Life expectancy of different countries in 2020

6. Relation between ageing and neurodegeneration

Neurodegeneration is one of the most widespread age-related diseases suggesting a link between neurodegenerative diseases and age-related changes that occur in the microenvironment of the brain such as: genomic instability, changes epigenetics and loss of proteostasis. Although growing old is thought to be a prime danger element for neurodegenerative illnesses. Different types of neurodegenerative disease affect different or same brain region like Parkinson's disease, Huntington disease, Alzheimer's disease, Frontotemporal degeneration affect basal ganglia, Alzheimer's disease, Frontotemporal degeneration, Multiple sclerosis affects thalamus, Frontotemporal dementia, Alzheimer's disease, Tremors, Parkinson's disease, Huntington disease, Amyotrophic lateral sclerosis, Neuro psychiatric disorders affects Cerebral cortex, Frontotemporal lobar degeneration, Parkinson's disease, Huntington disease, Frontotemporal dementia, Amyotrophic lateral sclerosis, Spinocerebellar ataxia affects brain stem, Multiple sclerosis, Multiple systemic atrophy dystonia, Alzheimer's disease, Spinocerebellar ataxia affects cerebellum etc. Figure 6 describes some of the common factors responsible for the onset and progression of neurological disease, and provides a better understanding of the pathophysiology (Behl, T,2021)

Population-based autopsy research of the brains of elderly those who had now no longer been recognized with a neurological disease continuously file the presence of amyloid plaques, neurofibrillary tangles, Lewy bodies, inclusions of TAR DNA-binding protein 43 (TDP-43), synaptic dystrophy, the loss of neurons and the lack of brain volume in most of the brains. (Elobeid,2016). These traits range extensively among individuals, with precise lesions dominating a selected mind or being restrained to precise regions. It isn't acknowledged what reasons those lesions and whether or not or now no longer they're the precursors to neurodegeneration and illness or simply the

manufactured from mind ageing. According to at least one hypothesis, in everyday ageing, macromolecules come to be oxidized and might now no longer be degraded with the aid of using lysosomes. (Brunk, 2002). This outcomes in the greater manufacturing of lysosomal enzymes which is probably moreover now no longer capable of digest the cell material. A famous deposit that outcomes from lysosomal inefficiency is lipofuscin, that's an typical marker of aging for post-mitotic cells. (Brunk, 2002).
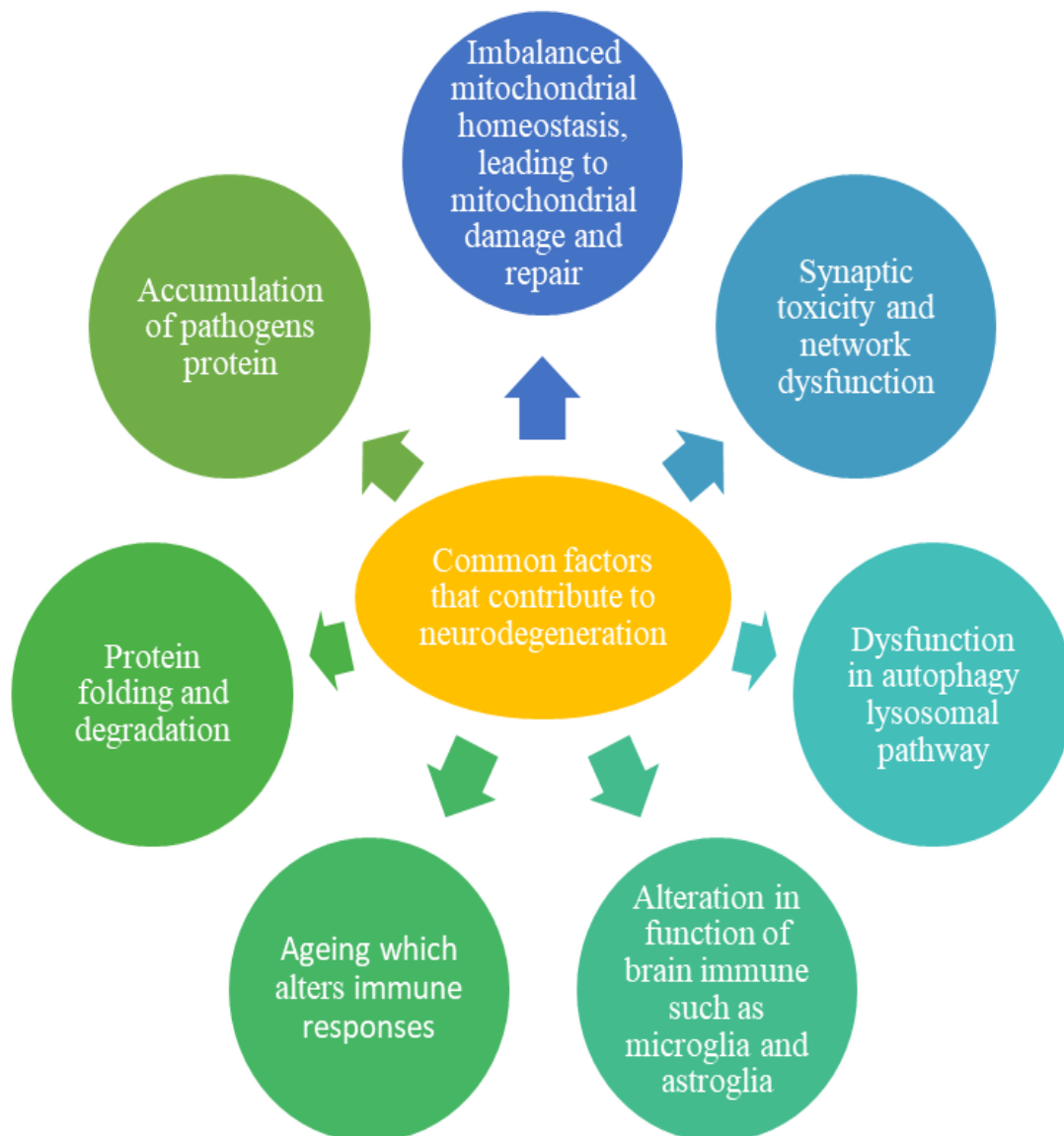
Figure 7. Some of the common factors responsible for initiation / progression of neurological disease.

7. OBSERVATION

Survey was taken from Sharda hospital and guided by Dr. Vikash bhardawaj

QUESTION	ANSWER
What age does Parkinson's disease is usually seen/start?	People usually develop the disease around age 60 or older.
Which gender is seen more with Parkinson's disease?	Parkinson's disease seems to occur more commonly in men than women.
Duration of Parkinson's disease?	In natural conditions, the average duration of Parkinson's disease is 10 years, although with a considerable range.
Life span of Parkinson's disease?	Patients usually begin developing Parkinson's symptoms around age 60 and many live between 10 and 20 years after being diagnosed.
Medicine used and often changed in Parkinson's disease?	A. Levodopa + carbidopa=(lodosyn) B. Dopamine agonist= pramipexole dihydrochloride (mirapex) dose 0.25gm C. Cognition-enhancing medications= acetylcholinestrease inhibitors and memantine / donecept5 (donaprazil hydrochloride) 5mg/day. D. Anti-tremors= Anticholinergics/
	benztropine (cogentin) trihexyphenidyl (Artane) dose= 1-2mg/day. E. Antidepressants= citalopram (citapad 20) dose= 20 mg
Complication with Parkinson's disease?	You may experience cognitive problems (dementia) and thinking difficulties, Depression and emotional changes Swallowing problems Chewing and eating problems Sleep problems and sleep disorders Bladder problems Constipation
What symptoms are there usually seen in Parkinson's disease?	Tremor. A tremor, or shaking, usually begins in a limb, often your hand or fingers Slowed movement (bradykinesia) Rigid muscles Impaired posture and balance Loss of automatic movements Speech changes Writing changes Dementia
What are the Common symptoms seen in Parkinson's disease?	Tremor Bradykinesia Stiffness Impair balance and coordination
Any Unusual symptoms seen in Parkinson's disease?	Like classic Parkinson's disease, atypical Parkinsonian disorders cause muscle stiffness,

	tremor, and problems with walking/balance and fine motor coordination. Patients with atypical Parkinsonism often have some degree of difficulty speaking or swallowing, and drooling can be a problem.
Is Parkinson's reversible?	No
What are the mood related symptoms of Parkinson's disease patient?	Depression. Up to half of all Parkinson's disease patients end up dealing with depression, Denial Fatigue, Anxiety, Apathy etc.
Up to what extent we can manage Parkinson's disease?	Parkinson's disease can't be cured, but medications can help control your symptoms, often dramatically. In some more advanced cases, surgery may be advised. Your doctor may also recommend lifestyle changes, especially ongoing aerobic exercise. Some people with Parkinson's are still working 20 years after their diagnosis. Some people who find that their symptoms make work difficult are able to transfer to a different, more manageable job or work part-time. Others are unable to continue in their jobs after a year or two.

What other treatment we can provide other than therapeutic treatments in Parkinson's disease patient?	Tai Chi. This form of exercise promotes balance and coordination, so it stands to reason that it would be beneficial for patients with Parkinson's disease Yoga Massage Therapy Movement Therapies Acupuncture

8. CONCLUSION

The mechanisms of aging and neurodegeneration are complicated and inter-associated. Ageing is the single most important element influencing the scientific presentation and path and development of PD. Normal aging can be related to very moderate parkinsonian signs, while PD has a awesome scientific picture. PD displays a failure of the regular cell compensatory mechanisms in susceptible mind regions, and this vulnerability is expanded with the aid of using a genetic susceptibility acted upon with the aid of using different genetic and environmental elements and most significantly with the aid of using age. The accumulation of age-associated somatic harm blended with a failure of compensatory mechanisms may also cause an expanded occurrence and an acceleration of PD with age. Ageing is, therefore, the primary enhancing element at the phenotypic presentation of PD. PD is an awesome instance of an age-associated disease.

9. ACKNOWLEDGEMENT

teacher Dr. SHOBHIT SRIVASTAVA who indirectly guided me for completing this review paper.

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Computing Color Transforms with Applications to Image Editing

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ABSTRACT

This paper deals with the implementation of various MATLAB functions present in image processing toolbox of MATLAB and using the same to create a basic image processor having different features like, viewing the red, green and blue components of a color image separately, color detection and various other features (noise addition and removal, edge detection, cropping, resizing, rotation, histogram adjust, brightness control, etc.) that is used in a basic image editor along with object detection and tracking.

Keywords- Image processing toolbox, GUI, MATLAB, Bounding Box

I. INTRODUCTION

In this paper the a we presented a set of MATLAB applications useful for image processing and color detection, each of which consists of user friendly graphical interface helpful for those not familiar with MATLAB programs running behind the image processor.

MATLAB based image processing is a very convenient platform and very easy to construct an algorithm. An image is a matrix of pixel values. MATLAB considers every input as a matrix. For this reason MATLAB provides an easy tool for image processing as a user can easily access each and every pixel value from the image matrices and edit it. Moreover there is an 'image processing tool box' built in MATLAB for this purpose.

Mainly users deal with three types of image, hence three different matrices. Black and white or binary image matrix consists of only zero and one, one being the brighter portion and zero being the dark part. Generally images are 8bit and corresponding image matrix is 256x256.Gray scale image is also a 2 dimensional matrix with each element value varying from 0 to 256.

Like gray scale image RGB image can be denoted by matrix with each pixel values varying from 0 to 256.In case of RGB image, three separate matrices for each red, green and blue components overlap to form a RGB image of 256x256x3 dimension. Since we are now well acquainted with image as a matrix, now any mathematical operations can be performed on an image that can be done with a matrix.

The image editor is created using the Graphical User Interface (GUI) option available in MATLAB . The editor consists of three axis and the following options:

- Browse image
- Image input using camera
- Image addition
- Gray conversion
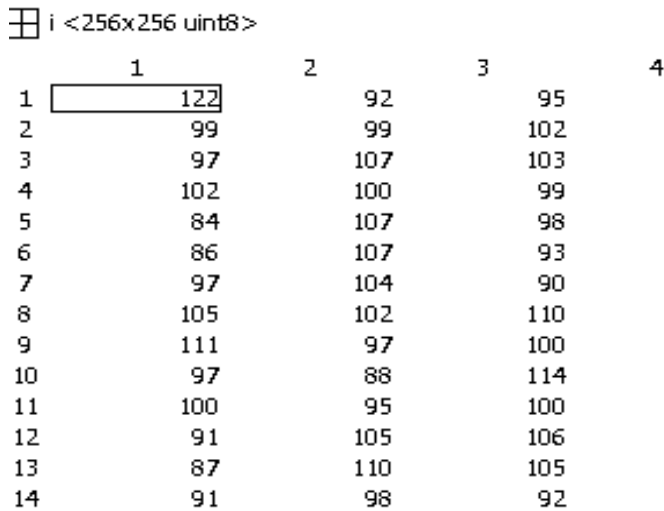
Figure 1: Gray scale image Matrix

Figure 2: MATLAB GUI

- o Noise addition
  - o Noise removal
  - o Histogram adjust
- B/W conversion
  - o B/W to color image

- o Edge detection
- Auto brightness
- Image rotate
- Image Resize
- Crop
- Clear
- Reset original
- Sliders (4) to control brightness and R, G and B component.
- Panel to view RGB format and each component separately.

Figure 3: Image addition

While creating the GUI, push button, slider, radio button, check box, pop-up menu, list box, panel and button group options available in MATLAB are used, (Figure. 2) Now each component is discussed separately.

A. Axis

Three axes are used in the GUI. The first axis is mainly for an input image. The second axis is mainly for any other effects on the original image (like after adding noise). The third axis is for the histogram or as in Figure 2 shows the image after removal of the noise. According to Figure 2,

axis one shows the gray scale image (input image), second axis shows the noise added and the third axis shows the image after noise removal.

B. Browse Image

The browse image panel helps in selecting an image from hard disk or an image taken directly from camera for further processing.

C. Image Addition

Image is a simple matrix. Since, addition can be performed on matrix, so that can also be applied on images. To do this a function 'imadd' available in MATLAB is used which performs addition of pixel values of first image to the second image.

D. Gray Conversion

Gray conversion is done mainly to convert a RGB image (three dimensional matrix) to gray scale (two dimensional matrix) having pixel values ranging from 0 to 255.

Noise Addition and Removal:

Various types of noise get added to an image when a snapshot is taken. In order to get rid of these noises various types of filters are used. To illustrate this a we have added a noise to an image externally and then applied various filters to get rid of it and evaluated the results.

Since noises are two dimensional and RGB images are three dimensional, dimensional mismatch has to be avoided while adding the noises. For this reason RGB image is converted to gray image and then noise addition and removal is performed.

Noises can be of various types such as Poisson, Salt and pepper, Gaussian and Speckle. Median and adaptive filter are mainly in use. Figure 2 shows that Poisson noise has been added to the image in axis 1, and the noise added image is in axis 2 and after applying Adaptive filter to the image we get the filtered image as shown in axis 3.

E. Black and White Image

Binary image (black and white) image is a two dimensional image with pixel values either 0(black) or 1(white).

Figure 4: Salt and Pepper noise added image

Figure 5: Gaussian noise added image

Figure 6: Speckle noise added image

1) Edge Detection: Edge detection technique is applicable only to binary images, so in case of an RGB or gray image it has to be first converted to a binary image and then edge detection technique has to be applied.

RGB image is not directly converted to B/W image. First it is converted to gray image then to B/W. This is done by applying 'graythresh' function on gray image and then 'im2bw' and 'bwareaopen' functions on the previous output consecutively.
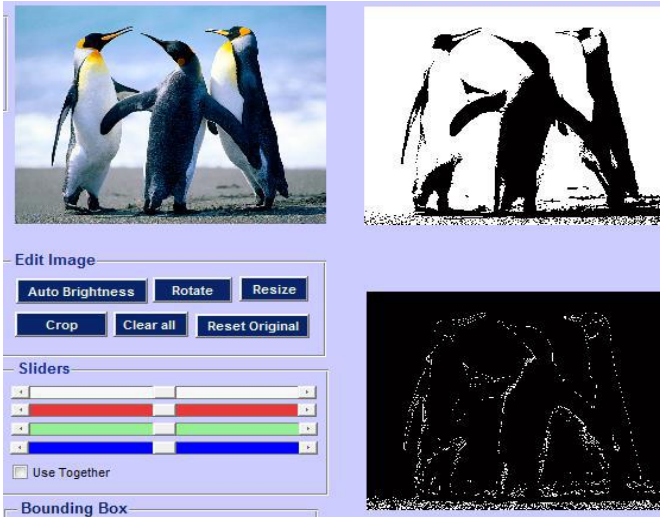
Figure 7: B/W conversion and edge detection(Sobel)

The various types of edge detection techniques are: Sobel, Prewitt, Roberts, LoG, Zerocross and Canny. Figure 7 shows Sobel technique of edge detection.

Figure 8: Canny edge detection technique used

Figure 9 : Log edge detection technique used

F. Image rotate

Image rotate is used to rotate the image to a specified degree. The command is 'imrotate'.
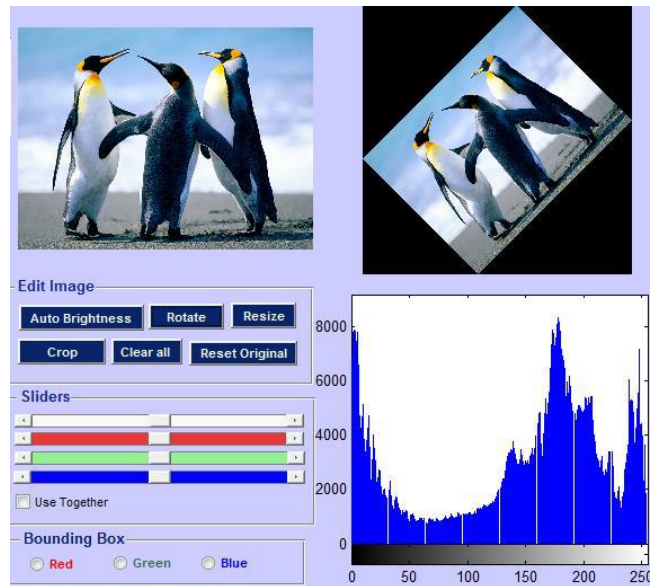
Figure 10: Image rotation

Axis 1 is the actual image, axis 2 is the rotated image and the axis 3 shows the corresponding histogram.

 G. Image Crop

Image cropping is used to select any particular portion of the whole image. The syntax is 'imcrop'.
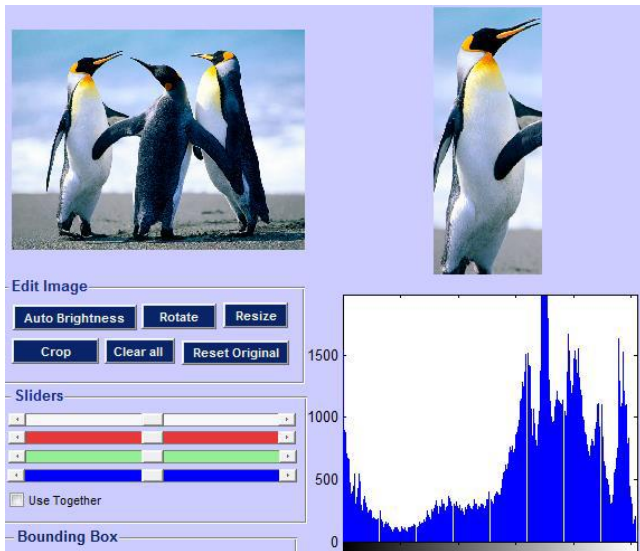
Figure 11: Image cropping

Axis 1 shows the actual image, axis 2 showing the crop portion and the intensity distribution of the cropped image is being shown on axis 3.

H. Image Resize

Image resize is being used to resize the actual image to certain multiples. The syntax is 'imresize'

Figure 12: Image resize

I. Sliders

Here four sliders are used for each of red, green and blue components individually and another for brightness. Our main aim was to control each component (red, green & blue) intensity and also brightness of the original image.
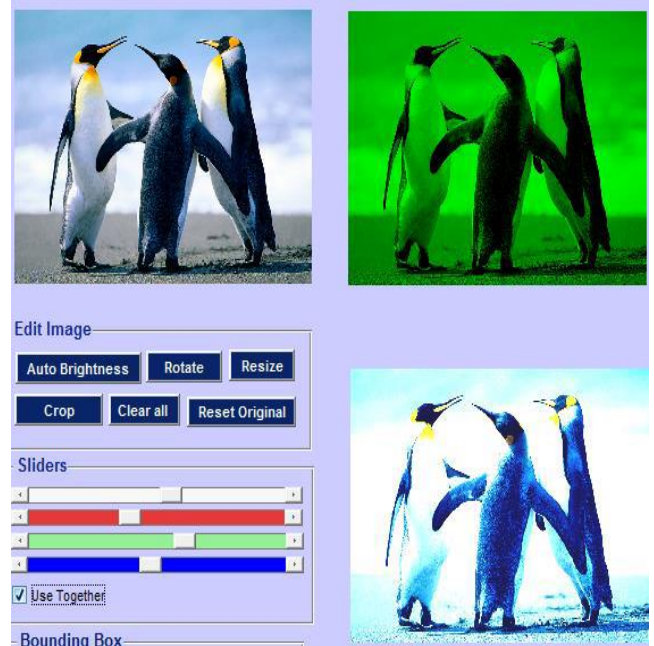
Figure 13: Sliders usage

The axis 1 is the original image, axis 2 shows a particular component change (here green) and the axis 3 is showing the result of it on the actual image.

J. RGB Format

This RGB panel is used to view the red, green and blue componenst of the image separately. It has already been mentioned that an RGB image is overlap of three two dimensional matrix.

Figure 14a: Red component

Figure 14b: Green component

Figure 14c: Blue component

K. Histogram adjust

Generally for certain images the histograms are not equally spaced or rather they are clotted to a particular intensity, hence, making the image dull or too bright. For this reason various histogram adjustment techniques are being used. Some of the well-known histogram adjustment functions are 'histeq', 'imadjust' and 'adapthisteq'.

L. Bounding Box

The bounding box concept is used in MATLAB to identify either the red, blue or green component of an image taken by the camera. It is a part of the 'regionprops' function. 'REGIONPROPS' measure different properties of a bounded image region, like area, axis and centroid.
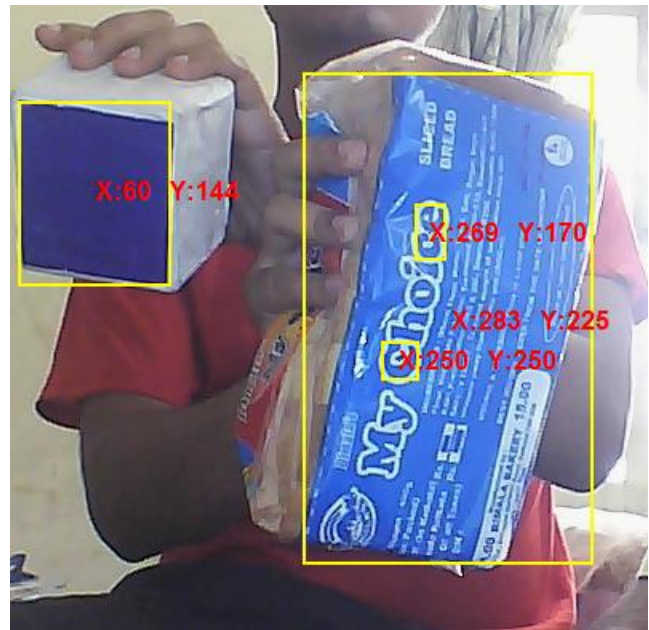
Figure 15: Blue detection
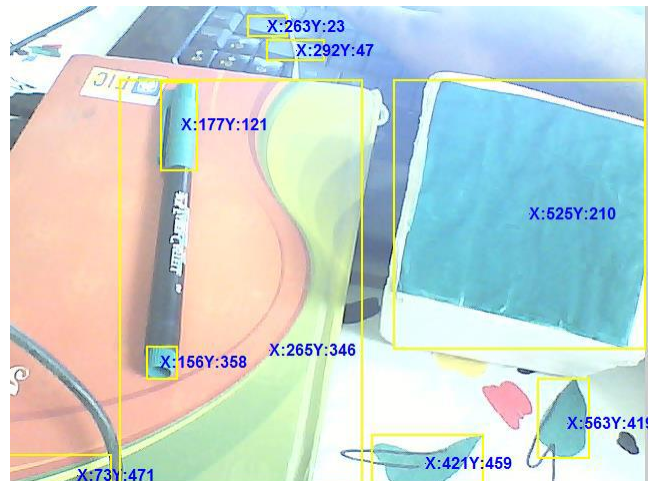
Figure 16: Green detection

Figure 17: Red detection

II. DISCUSSIONS AND CONCLUSION

Thus here various components of this MATLAB based image editor have been discussed. The authors have tried their level best to make the image editor as user friendly as possible. The purpose of the image editor is to bring the various image editing functions available in MATLAB tool box under one common platform and to make it easier for the understanding of any user. Future work can be aimed to expand the set of applications than what has been used here. we have implemented the bounding box technique used in the image editor.

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Using Zero-Knowledge Proof for Secure Data Transmission on Distributed Network

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ABSTRACT

Data security plays a major role in computer network. Because it helps to transmit data in secure way over the Internet. So we need to use strong security method for secure data transaction. Cryptography is a security tool which helps to transmit information from one place to another place over computer network. Cryptography follows encryption and decryption methods for data transmission. Cryptographic technique is completely based on key generation because it needs keys to transmit data between users. However cryptography works well in secure data transmission but it needs keys to provide security for data. In cryptography generation of keys taking more time than transmission of data. So in this paper we discuss about Zero-Knowledge Proof (ZKP) which is also based on cryptographic technique. ZKP is also useful in secure data transmission without sharing key values between users. This paper tells about overview of ZKP and how it is useful in data transmission.

Keywords : ZKP, Prover, Verifier, Secret

I. INTRODUCTION

Zero-Knowledge Proof is introduced by Glodwasser, Micali and Rackoff in 1989.Zero-Kowledge Proof is the most beautiful and powerful concept in computer science. ZKP is completely based on mathematical functions and equations. ZKP provides best way of authenticating users because it does not allow users to share any password between them, when we do not reveal any secret before transmission then no one can find what kind of information is being transmitted between sender and receiver and what kind of files

has been transmitted. The term "Zero Knowledge" is formed with no (Zero) information (Knowledge) should be revealed during communication. Zero-Knowledge Proof is the two-way protocol between sender and receiver for data communication.

II. HOW DOES ZKP WORK?

In Zero-Knowledge Proof the person who is going send information is known as prover and the person who is going to receive information is known as verifier. ZKP always tells that the prover has to prove

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his identity before transmission and the verifier has to verify the prover's identity. After verifying the identity the verifier allows the prover to send the data. Zero-Knowledge Proof is an encryption scheme and based on technique where one party can prove the truthful information to another party. The following diagram describes about how ZKP proof verifies and accepts the communication between users.

Prover Verifier

    1. Request for service

                    2. Choose

      3. Challenge

4. Solve

                5. Response

             6. Verify

7.Grant Service
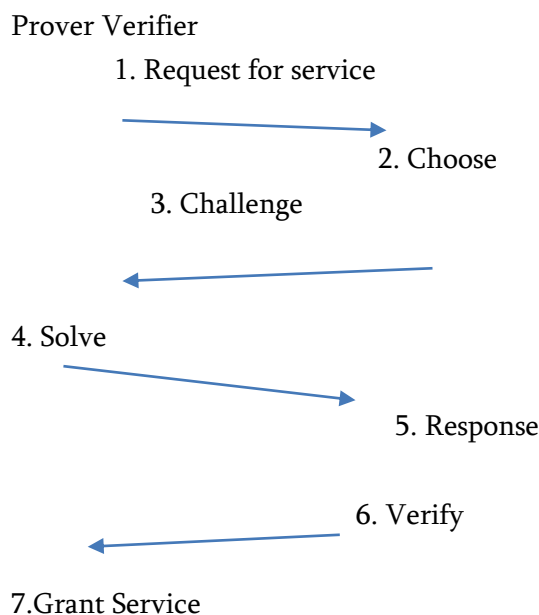
1. Request for service: This is the first phase for making communication between users, in this phase the person who wish to transmit information they can send request message to the verifier.

2. Choose: This is the second phase which will always happen in the verifier's side, here the list of provers will be waiting in this state. The verifier has to choose the user for transmission of data, here users no need to wait for longer time.

3. Challenge: Once the user has been chosen by the verifier then the verifier has to challenge the prover that he is valid user or not.

4. Solve: This task will always happen on prover's side. Prover has to compute the value according to the question which is given by the verifier.

5. Response: After calculating the value response will be sent to the verifier the one who is going to check the value.

6. Verify: Once the value received from the prover, the verifier has to post the value in zero knowledge proof algorithm to check the value

7. Grant Service: If the algorithm gives the positive value then the prover is valid user so communication will be taken place. If the algorithm gives the negative value then the prover is not a valid user so the communication will not be taken place.

ZKP builds the secure channel between users to provide protection during data exchange. When others use tight hacking technique to steal data it protects in such a way that it avoids data leakage in any tight hacking method. This is the safest technique in transfer of sensitive information because it supports powerful authentication method.

III. TYPES OF ZERO KNOWLEDGE PROOF

The scenario of zero knowledge proof tells about it is possible to make communication with two parities in such a way without sharing or without revealing it. Based on this Zero Knowledge Proof has divided into two main categories.

i) Interactive Zero Knowledge Proof
ii) Non-interactive Zero Knowledge Proof

A. Interactive Zero Knowledge Proof:
In this type of ZKP needs interaction between users for each and every transaction. This method tells the person who is going to send information they have to compute the value and have to prove to sender that he is the valid user. The person takes N number of times to compute the value to satisfy the verifier. Interactive Zero Knowledge proof is completely based on the value which is sent by verifier. If the verifier accepts the prover is valid user then the message has been transferred them. If the verifier found that the user is not valid one then the verifier will not accept the communication with the prover. The following steps explain the concept of interactive ZKP:

Step 1: Receive the value from the verifier

Step 2: Perform computation with the value taken from the verifier

Step 3: Send the computed value to the verifier

Interactive ZKP follows the mentioned three steps to identity whether the user is valid or invalid. Here always the communication will begin with a challenge of the verifier and the response by the prover. The following is an example of interactive Zero Knowledge Proof:

1. User A picks random value k in the given range k= 1……n

2. User A computes the value of h=g^k mod p, here g is an auto generator and p can be a prime number and sends to User B

3. User B picks random value q1 in the given range q1=1…..n and sends to User A

4. User A computes the value v1=i(q1)+k mod n and sends to User B

5. User B puts this value to interactive zero knowledge protocol to verify the user

6. This protocol returns value either 1 or 0

7. If it is 1 the user will be considered to be a valid user and communication will be taken place

8. It it is 0 the user is called as a cheater and no communication will be allowed

However interactive zero knowledge proof does not allow fake communication between users. There are two main drawbacks in interactive ZKP, the first one verification will be taken place for every transaction this will take more time and emergency situation the message will get delivered late due to this verification. The second one during interactive ZKP both the users need to be in online until the communication terminated, in case of poor network the communication will not resume instead it will begin from the first step.

B.Non-interactive Zero Knowledge Proof

In this type of zero knowledge proof user who is going to communication with other user they both need not to talk or communicate during data transmission. Non interactive zero knowledge proof system always having only messages between prover and verifier. This type completely focused to avoid interaction for sending message between users, here common reference string will be given to all the users who wish to transmit data using non interactive ZKP. The person who wish to transmit data they can transmit data along with the reference string, then the person (verifier) who is going to receive they can see the message if the message has the common string then the message will be acceptable or the message get denied by the person. The question will come to our mind is if malicious user or fraud user gets this common string then they can also send wrong message to the verifier. To avoid this kind of confusion this non interactive ZKP gives random string to each and every user. Once the string has been used that never get repeated to any user for data transmission. So, malicious user tries to use this string the receiver will get alerted and that kind of communication will not be entertained in this method. We can transmit information with one reference string at a time and the string cannot be used for next data transmission.

How does non-interactive zero knowledge work?

Common string with secret

User A   **User B**
Secret S $\longrightarrow$ Verify P

Step 1: User A has the information to be sent which is known as secret S

Step 2: User A sends the secret message along with common reference string known as P

Step 3: User B receives the message P from User A

Step 4: User B divides the received message such that original message and common string

Step 5: If the common reference string is valid string then the message will be accepted by User B or else the received message will be ignored by User B

The main issue faced by all users in non-interactive zero knowledge is using common reference string. This string has the bound limit of sending message. Bound limit tells about the size of message, within

that limit we have to combine original message and common string. If cheater knows the common string then he will play your role like all message will be sent to verifier as you sent.

IV. PROPERTIES OF ZERO KNOWLEDGE PROOF

The following are properties of ZKP:

Completeness: If the statement is true then the prover is a honest user so the communication will be taken place

Soundness: If the statement is false then the prover is a cheater so the communication will not be taken place

Zero Knowledge: If the statement is true the prover need not reveal any information rather than message wants to transfer

V. ADVANTAGES OF ZERO KNOWLEDGE PROOF

Simplicity: Zero Knowledge Proof does not require any complicated encryption method because this method is not going to reveal any information to end users. ZKP is completely focused on secure data transmission and it does not support any kind of key exchange so, ZKP is very simple for secure data transmission

Privacy: Zero Knowledge Proof does not allow any user to share personal information or data. So here user details will be kept confidential. Complete privacy will be achieved in using ZKP

Security: It strengthens security by using effective authentication methods. The authentication mechanism used in ZKP provides complete protection for user's data because malicious user will not break this authentication method so our data will be transferred in secure way

Scalability: ZKP allows to add or remove any number of users on network. So, number of users will not affect the protection mechanism in ZKP. Whenever we add or remove users in ZKP the originality of

authentication method will not change or get affected by other users in network

VI DISTRIBUTED NETWORK

This one type of network which helps to combine and deliver data from more than one network. Distributed network is completely based on server and client machines, all communication on distributed network will go via server machine. Here server machine will be having details about authorized users on network. According to their usage permission rights will be given to each user on distributed network. We know that in distributed system all the nodes are connected with one another. Adding or removing number of nodes can be easier in distributed network. Failure of a single node does not affect the entire network and with the help of other nodes we can continue communication. Resources such as printers and scanners can be kept as common and these resources can be shared effectively by all the users on network

VI. CONCLUSION

ZKP is security tool which provides secure data transmission over the network. It is completely based on cryptographic technique. In cryptography communication is totally depend on keys. There are two types of keys supported by cryptography public key and private key. Cryptography allows data transmission only after successful transmission of keys. Key generation time will be more than the data transmission time. Keeping this in mind ZKP has been developed to save time during data transmission. In ZKP user can only post their value for data transmission the value will be computed by ZKP protocol. Distributed network is a collection of node connected with one another. The main disadvantage in distributed network is to provide adequate security to each and every user on network, when we combine distributed network along with ZKP we can achieve both fast data transmission and security for data. Another problem in distributed network is loss of data, to avoid this ZKP has two types they are

interactive ZKP and non-interactive ZKP. In interactive ZKP each transaction will be having the proof from receiver so there will be less chance of losing information. If we go with next type here the common string helps to avoid losing of data because without knowing the string the communication will not be taken place. So, I conclude that ZKP will help to stop loss of data as well as providing security for data in distributed network in efficient way.

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Game-Based Proactive Learning with Augmented Reality(AR)

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ABSTRACT

In this digital period in which we currently live, technology plays a vital role. With each passing day, new software or gadgets are being introduced in the tech market that improves our lives in one way or another and makes it much more comfortable. The mode of education was never the same, and it has changed continuously, today we have technology as our new mode of learning. Technology in education has the potential to drive pupils to learn more actively, resulting in a more effective learning process. Introducing enjoyable and interactive learning could capture the attention of young learners, hence improving teaching and learning. It improves one's ability to take in and grasp things. The application of Augmented Reality (AR) in the classroom has the potential to improve on traditional doctrine. This advanced technology enables users to interact with virtual environments and immerses them in realistic experiences. This application aims at teaching words by providing models of objects and tests the progress, resulting in a better learning experience for the user. This system increases the user's degree of freedom by connecting with mobile devices because of the interface's usability, portability and general convenience.

Keywords: Augmented Reality, virtual, realistic.

I. INTRODUCTION

Augmented Reality uses current reality and bodily objects to trigger simulated enhancements over the top of authenticity, in real-time.

Fundamentally, AR is a skill that lays computer generated images over an operator's view of the real world. By improving what we see, hear, feel, and smell, it blurs the boundaries between virtual and real-time surroundings. Augmented reality enhances the real-world environment with text, sound effects, graphics, and multimedia. In other words, AR brings us an enriched version of our immediate surroundings by layering digital content on top of the graphic representation of the real world. AR can be conceptualized from diverse angles of characteristics including 3D visualization of objects. Several display devices: head-mounted display, desktop, handheld devices and overhead projector are used as display metaphors for AR modelling [5]. One of the design

requirements of AR is in choosing appropriate devices for the display.

One area which might significantly benefit in the future from this technology is the education process. AR tools could guide students through the learning process in an enhanced way, as AR can upgrade traditional books with a digital layer. AR will improve both teaching and learning experience, and bring interactive dimension into the whole picture. It is also predicted that this new layer will encompass several senses which could speed up the memorization process. As technology continues to advance, educators are constantly developing new and creative ways to teach their students. From the chalkboard and the projector to smart boards and tablets, the tools being utilized in education have rapidly changed within the last decade. In more recent years, educators have begun to add augmented

reality (AR) to their ever-developing range of educational tools. Augmented Reality has the potential to carry learning out of the classrooms into the spaces by combining technology that students are familiar with and locations that they see as their own. Encouragement of easily available informal learning may be particularly successful in engaging students, extending learning to settings that may help them make connections with content, the places that offer context for it, and the peers with whom they share it.

Learning should not be boring, and it should not be limited to rote memory, in which pupils learn and grasp concepts by repetition or cramming. Teachers can use the enthusiasm and imaginative thinking that comes with using technology in the classroom to help students perform better. Games can be used as a supplement to traditional teaching approaches to help students learn more effectively. Digital games that are played in a real world setting with a virtual layer on top of it are known as augmented reality (AR) games.

Players can engage with objects in the virtual world as well as people in the real world, preventing social isolation. An increasing number of studies An increasing number of studies concentrating on AR games for learning have arisen in recent years, owing to the benefits and good effects of AR technology and serious games in the educational sphere. Its purpose is to raise students' motivation and engagement, improve their visual skills, improve their interaction and collaboration abilities with their peers but it may be perceived as a distraction from learning. Students can better understand abstract subjects by combining AR technology with a game based learning strategy, which allows them to be in places where they would be difficult or impossible to be in real life and gain first-hand experience.

II. LITERATURE REVIEW

A. Learning using AR

In general, we can differentiate 3 types of learning[1]. Visual (spatial) learners use pictures, images and spatial understanding, with as many colours and other visual media as possible.

Verbal (linguistic) learners prefer the use of words, both in speech and writing. So, techniques involving speaking and writing such as word-based techniques of assertions and scripting help a lot this kind of learners.

Physical (kinesthetic) learners use body, hands and sense of touch as a medium of learning. Even use of physical objects helps this type of learning.

E-learning[2], when combined with various methods of communicating with others, can provide the child with a variety of communication options, which aids in his or her social development. It's also a way to encourage self-learning and the development of the child's senses and skills. E- learning in kindergarten

employs a variety of techniques to aid in the development of knowledge and skills.

With the help of AR, the information about the surroundings real world becomes interactive for the user and artificial information about the environment and its objects can be overlaid on the real world[1]. AR brings many advantages for teachers, as well, as it helps analyse the learning process of students and identify the elements that could be improved. As AR offers human and content interaction, students could stay more active during their learning process and could improve in the memorization of the content.

B. Constructivism Learning Theory[3]

According to [18], social constructivism not only recognizes the learner's uniqueness and complexity, but also fosters, construct, employs, and celebrates this vital component of the learning process for gaining knowledge. This study uses constructivist learning, which is self-directed, creative, and imaginative, to demonstrate the effectiveness of AR technology. It aligns with the study's goal of making teaching and learning more relaxed, creative, and inventive in order to develop new knowledge. Preschool students could build confidence and motivation by completing the assignment in an innovative and interesting learning environment. The researchers in this study use augmented reality (AR) technology to build meanings and improve preschool children's knowledge while they respond and provide

positive feedback. Learning can take place in a virtual setting, according to research [19].

C. Vygotsky's Social Cultural Theory[3]

According to [17], when children, particularly pre-schoolers, are trying to understand something, they frequently speak to themselves. This self-talk aids individuals in figuring things out in their heads.

When preschool children learn in 3D, they frequently repeat the name of the particular animal, according to this study. [17] believes that as people become older, their "private communication" becomes less and less until it vanishes completely. Vygotsky believes that the learning curve begins at birth and continues throughout one's life. The "zone of proximal development," defined by Vygotsky, is one of the most essential ways that development progresses (ZPD). [17] The "zone of proximal development" argues that learners are pushed at a level just above, but not quite at, their current level of development. The pre-schoolers in this study acquire confidence and motivation by completing the activities. Scaffolding is frequently used in the classroom by teachers and other educators who want to take advantage of the benefits of ZPD.

D.. Game-Based Learning [6]

Several theories have been developed to overcome the monotony of traditional education. Educational games according to [15] are —software that enables students to learn the course contents or develop their problem-solving skills by using the game format. In the learning process, games can be used in various ways. Greenfield (1996), in his study examining the effect of digital computer games on socialization and cognitive development, found that children playing digital computer games showed the development of adults for a long time, their thinking and decision- making skills in games in a shorter period of time[16]. Today, there are many applications used educationally using augmented reality and virtual reality.

E. Gamification [6]

The use of game elements in the design of nongame processes or contents is called gamification

[13] defines the concept of gamification as —a discipline in which game related designs and game

mechanics are added into nongame environment. Participants concentrate on the activities they need to do within the game dynamics with higher motivation in the player role.[11] state that digital natives have high learning potential in online applications and game environments.

III. CONCLUSION

The line between the physical and digital worlds may blur in the future, as modern technologies enable personalized reality. Technology, which is always connected to the global grid, provides quick access to any type of information, regardless of the user's device. AR technology is a useful tool for combining the real world of learning with the virtual world created by computer software. When compared to the traditional technique of learning in the classroom, preschool children can gain a lot more information and experience in learning by using technology in the classroom. According to the findings, the AR technology created an entertaining and engaging atmosphere. As a result, using AR technology as an instructional tool is a solid foundation. Because the benefits and useful uses of AR features can engage students in learning processes and help them enhance their visualisation skills, this is the case. The features can also assist teachers in providing clear explanations and ensuring that students grasp what they are being taught.

The challenge now for educators and researchers is to create a more effective and better AR technology combo, as well as to make better use of AR technology in early childhood education.

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Distance Enhancement of Quantum Cryptography through MANET

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ABSTRACT

In the modern technology world, the cryptographic techniques are plays a major role. There are so many modern cryptographic algorithms are used to secure information through message transformation. Quantum cryptography evolved from the merging of physics and cryptography to reduce the threat that encryption encounters. It is one of the emerging fields in the computer technology. The primary objective of quantum cryptography research is to develop cryptographic algorithms and protocols that are resistant to quantum computer attacks and increase the communication distance. The various quantum cryptography protocols are demonstrated, as well as how this technology has led to the establishment of secure communication between sender and the receiver through using of MANET. We will look at the properties of quantum cryptography and the benefits of MANET it can provide in the future internet. One of the best ways for increasing the distance of message transmission over the internet is to use MANET in the field of quantum cryptography. An Ad hoc on demand distance vector (AODV) is a routing protocol for Mobile Ad hoc networks.

Keywords : Quantum cryptography, Quantum communication, Internet Security, MANET, AODV.

I. INTRODUCTION

Information Technology and Communication has advanced rapidly in recent decades. Cryptography is a method that is used to protect communication between parties from intruders. Security and cryptography are essential for every day communication via many networks. Traditional encryption methods for traditional networks are vulnerable to a variety of cyber attacks that cannot be utilized with quantum computers, and they require sophisticated mathematical calculations. Quantum cryptography was brought to light when European Union member recently declared a massive investment of $15million in the construction of a communication system that will not be vulnerable to advances in computing power and mathematics. For the time being, quantum cryptography is the only viable choice [8-9]. Many existing public key encryption algorithms (RSA, ELGamal[11], Elliptic Curve Cryptography (ECC) [12] will be rendered insecure in the quantum computer due to the

quantum computer's characteristics. The field of quantum cryptography is still in its early stages. Its significance, however, cannot be overlooked or overestimated [8-9]. In 1994, a well-known mathematician named Shor devised quantum cryptography techniques for solving integer factorization problems in polynomial time. QKD protocols vary in terms of modulation techniques, encryption and decryption methods, and the way quantum channels are established. The initial QKD system, known as DVQKD, employs discrete variables and converts them using photon polarization. Mobile ad-hoc network (MANET) is a multi-hop wireless network that self-organizes and configures itself, with the network structure changing constantly. Each node in the MANET uses wireless communication network so easily can transmit the photons through infrastructure less network. Quantum cryptography is the only encryption system now available that is practically difficult to crack with any type of computer, even quantum computers.

1. Overview of Quantum cryptography:

History

Stephen Weisner initially suggested quantum cryptography in the early 1970's with his paper "Conjugate Coding". Bennet and Brassard, two scientists who were familiar with Weisner's views, were ready to publish their own. They developed the "BB84," the first quantum cryptography protocol, in 1984. In June 2003, a team from the University of Vienna used free space to send entangled photons across the Danube. The first quantum key-encrypted money transfer took place in April 2004 between two Austrian banks.

Quantum key distribution (QKD)

Quantum cryptography is built on traditional encryption concepts, but with the addition of a quantum key distribution scheme. Quantum key distribution (QKD) is a technique for developing secure communication. It allows you to distribute and share secret keys, which are required for cryptographic protocols. The study of secure communications systems that enable only the sender and intended recipient of a message to read its contents is known as cryptography. To make a system safe, cryptographic methods and protocols are required, especially when interacting across an untrusted network like the Internet. Traditional data-encryption cryptosystems rely on the complexity of mathematical algorithms, whereas quantum communication relies on physical laws to provide security. QKD allows two parties to generate and exchange a key that may be used to encrypt and decode messages. QKD works by sending numerous light particles, or photons, between two parties over fiber optic lines. Ones and zeros are made up of a stream of quantum states known Qubits' (Quantum bits). In quantum channels the entire message will be sent as Qubits from sender to receiver.
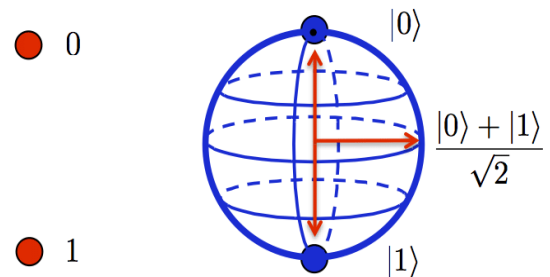
Classical Bit   Qubit

Process of quantum key distribution:

Quantum cryptography is based on two key principles of quantum mechanics: the Heisenberg Uncertainty Principle and the Photon Polarization Principle. Asymmetric key exchange can be used to exchange the actual key, as in the Diffie-Hellman key exchange protocol [19]. If implemented appropriately, QKD for key distribution in conjunction with the one-time pad provides the greatest possible security level.
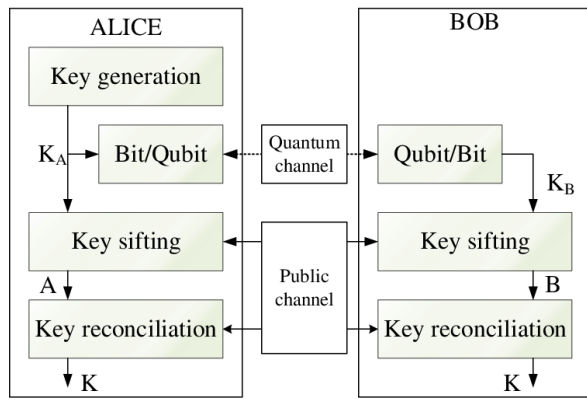
The QKD consists of following steps,

- Quantum transmission
- Sifting
- Error estimation
- Error correction
- Privacy amplification

Quantum transmission:

The Qubits are exchanged between Alice and Bob. Alice and Bob will also require reliable sources of photons are required for transmission. Alice must select the bits and basis at random, whereas Bob must choose his measurement basis. Quantum mechanical processes, which are inherently unpredictable, are an excellent source of randomness.

Sifting:

Bob tells which photons he observed and on what basis he assessed. Because his basis decision did not correspond to hers, Alice advises him which measures to delete. These bits, as well as those not identified by Bob, are then discarded by Alice. Alice and Bob now have the identical string of bits in the absence of faults. The string name is called sifted key.

Error estimation:

To estimate their quantum bit error rate (QBER), Alice and Bob publicly compare a randomly chosen portion of the sifted key. To estimate accurately, the number of compared bits should be large enough. Eve's key information may be determined after the QBER is known. Even if the fault might be due to experimental flaws rather than Eve's presence, all errors would be assigned to her. Depending on how much information she has, the sifted key will either be rejected or processed further. This is called the error estimation.

Error correction:

The goal of error correction is to turn an error-prone sifted key into an error-free key via public communication without revealing any information about the concrete value of any single bit to an eavesdropper.

Privacy amplification:

The privacy amplification procedure is implemented as a crucial stage in QKD by using universal hash functions. These hash functions, on the other hand, are usually built using mathematical complexity and are thus computationally secure.

2. Quantum key distribution protocols

There are so many Quantum key distribution protocols are available.

BB84 Protocol: [20]

Charles Bennett and Gilles Brassard (C.H. Bennett and G. Brassard, 1984) created this protocol. Heisenberg's Uncertainty Principle lies at the heart of its design. It was first described utilizing photon polarization states to transfer information, and was given the name BB84 after its creators and year of publication.
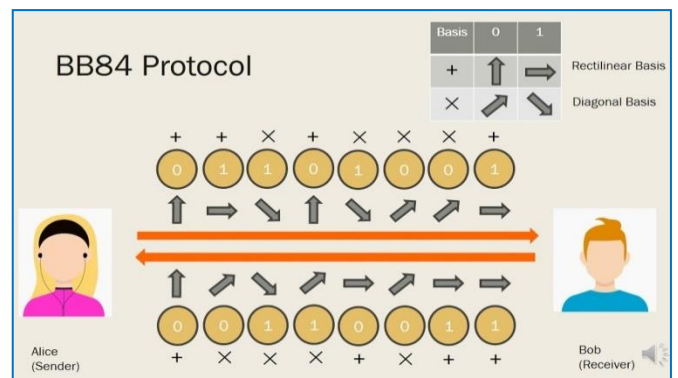
1. Alice and Bob communicate across a Quantum Channel in the first stage. Alice chooses an equal-length string of bits and bases (rectilinear or diagonal) at random.

2. Alice and Bob communicate on a traditional public channel in the second stage. Bob explains the measurement bases he used for each photon to Alice. In response, Alice notifies Bob with the bases for measuring the encoded bits that he correctly estimated.

B92 Protocol:

Charles Bennett created a simpler version of the BB84 protocol in 1992, encapsulating bits in photons with only two states. On a rectilinear basis, binary 0 is represented by 0°, whereas binary 1 is represented by 45°. The bases Alice must use to encode the bits are determined by the bits themselves. To measure the polarized photons, Bob still picks bases at random. He won't acquire any measurements this time if he selects the incorrect base. Transmissions over the quantum channel are used in the first phase of B92, whereas transmissions over the traditional channel are used in the second phase.

The EPR Protocol:

The EPR quantum protocol has three states. The polarisation states of an EPR photon pair are used to define this protocol. EPR stands for Einstein, Podolsky, and Rosen, who published a famous paradox in their essay in 1935. They challenged quantum physics' basis by showing up a "paradox." According to the authors, there are geographically separated pairs of particles known as EPR pairs whose states are linked in such a way that measuring one's selected observable A automatically dictates the outcome of the other's measurement. The protocol is divided into two stages, similar to the BB84 and B92 protocols. The first phase of the EPR protocol is carried out over a quantum channel, whereas the second phase is carried out over a conventional channel across a public channel for a fraction of a second.

COW Protocol:

Nicolas Gisin and colleagues developed the Coherent One-Way Protocol (COW protocol) in 2004 as a new protocol for effective quantum cryptography (Gisin N, 2004). It's been designed for use with weak coherent pulses. The key is retrieved using a fairly basic time-of-arrival measurement on the data line, as well as an interferometer created on an extra monitoring line, according to the protocol's description. The objective of this line is to allow the existence of a terrorist who would cause coherence to be broken by her attack to be monitored.

SARG04 protocol:

SARG04 is a quantum cryptography protocol that is based on BB84, which was the first of its type. BB84 has four states which can be used to create a new information encoding algorithm for the SARG04 protocol (V. Scarani, 2004). When the laser is attenuated, single-photon sources are replaced by pulses which are more reliable algorithm. The SARG04 protocol is used in situations where information is being emitted from a Poissonian source producing weak pulses and received by an imperfect detector.

II. An implementation of MANET in Quantum Cryptography

A mobile ad hoc network (MANET) is a network containing numerous free or autonomous nodes, commonly made up of mobile devices or other mobile components, which can rearrange themselves in a variety of ways and operate without the need for traditional top-down network administration. There are several configurations that may be classified as MANETs, and the possibility for this form of network is currently being researched. It is used in military project and DARPA (Defense Advanced Research Projects Agencies). Device in MANET is free to move in any direction independently. The network is established, controlled, and structured entirely by the nodes themselves, with no help from a centralized third party or fixed infrastructure. Apart from serving as a stand-alone network, ad hoc networks may also

be linked to the Internet or other networks, therefore expanding connection and coverage to regions with no fixed infrastructures. Easy interaction, adaptability, efficient communication, and flexibility in infrastructure-less situations are some of the primary benefits given by MANETs. The quantum cryptography communication can be done through internet in the long distance in a secured manner.

The main objectives of research work are

- To Implement the MANET's Network Security using Quantum Cryptography through internet.
- To implement the QKD Technique in Network Data Transmission.
- The Packet Delivery Ratio will be examined.
- To calculate the throughput of various Network Scenarios.

3. Characteristics of MANET:

No fixed infrastructure: MANET is a network without any infrastructure. Making connections between nodes does not involve the use of any specific hardware. Through the wireless link, all nodes communicate with one another.

Multi hop routing: When a node attempts to transfer data to another node that is beyond of its communication range, the packet should be routed through one or more intermediary nodes.

Terminal autonomy: Each mobile node in a MANET is an autonomous node that may act as a host or a router.

Broadcast Communication: MANETs use a broad cast for communication. As a result, if ten nodes are within range of the source, all of them will receive the information. These nodes then forward the message by relaying it to the nodes within their transmission range.

Dynamic topology: Because nodes are allowed to travel freely in any direction at varied speeds, the network design can alter at any time. The nodes in the MANET dynamically build routing among

themselves as they move around, producing their own network.

Routing at a high cost: Because MANETs no fixed infrastructure or access points, each node must perform the task of routing, which is time-consuming. Furthermore, when the destination is a long distance away, the routing cost has increased even more. As a result, neighboring contact is emphasized in MANETs.

Advantages:

- The major advantage of implementing a mobile ad hoc network is that it allows you to connect to the internet without the use of a wireless router. As a result, running an ad hoc network can be less expensive than running a regular network.
- MANET allows for connection failures since routing and transmission protocols are intended to deal such instances.
- MANETs may be more cost effective in some circumstances since they eliminate fixed infrastructure expenses and minimize power usage at mobile nodes.

Disadvantages:

- Resources are restricted due to a variety of restrictions such as noise, interference situations, and etc.
- There are no authorization facilities.
- Because of the lack of physical security, they are more vulnerable to attacks.

III. Security issues in MANETs

The mobile ad hoc network, or MANET, is an infrastructure-free network in which each node acts as a router, allowing the network to have a dynamic topology with nodes moving freely. MANET is vulnerable to malicious attacks and security breaches due to its lack of physical organisation. These attacks might be either internal or external in origin. Denial of service, congested connections, and misleading routing information assaults are examples of external attacks, whereas malicious nodes impersonating

regular nodes to acquire secret information are examples of internal attacks. There are some attacks in MANET.

Denial of Service attack: A denial-of-service (DoS) attack is a type of network attack that restricts or prevents authorized users from accessing system resources.

Eavesdropping: When a hacker intercepts, deletes, or changes data sent between two devices, it is called an eavesdropping attack. To access data in transit between machines, eavesdropping, also known as sniffing or snooping, relies on unprotected network interactions.

Impersonation: An impersonation attack occurs when a hacker successfully assumes the identity of one of the legitimate participants in a system or communication channel. In the scenario that the verification process fails, the attacker can bypass it, acquiring access to private data as well as the ability to monitor network traffic. As a result of these security breaches, communications may be interrupted on a regular basis, reducing the network's efficiency. Regardless of the fact that so much research has been done in the domain of QoS (Quality of service), which includes analysing packet delivery ratio, latency, bandwidth, and other factors. Recent researchers have discovered the necessity for some hardware support or peer behavior evaluation to detect misbehaving nodes. The research community has already looked at common security techniques to solve the multiple security issues that MANETs experience.

IV. Quantum cryptography security in the internet

The most significant obstacle is the QKD mechanism's limited range of use. The reason for this is that when we try to transport the key over a long distance, the polarisation of photons may change owing to many reasons, such as when we try to amplify the Qubits, the state of polarization of these photons will be destroyed by the amplifier. Only a distance of 10 kilometers may be covered using QKD. Quantum cryptography techniques might be the first to be developed. At the single quantum information level, quantum mechanics is used.

In the future, internet security will be a top priority in the quantum cryptography. Because it is the aggregation of all information systems and the information environment for human life, the Internet should be safeguarded. Quantum cryptography is the first thought when it comes to the rising security dilemma in cyberspace. Using MANET will achieve the distance of transmission between sender and receiver. MANET provide infrastructure less network with limited resources. An intelligent routing strategy is required for efficient and reliable routing with limited resources, and it must be adaptable to changing network parameters such as network capacity, traffic density, and network partitioning so that different types of applications and consumers can have different degrees of QoS. The major benefit of utilizing a mobile ad hoc network is that it allows you to connect to the internet without the use of a wireless router. There are three types of routing protocols in MANET such as Proactive, Reactive and hybrid. Reactive protocols have a lower overhead but a higher latency, whereas proactive protocols have a higher overhead but a lower latency. These characteristics can secure cyberspace security in the future Internet.

V. CONCLUSION

Quantum cryptography is a new method of encryption that is based on quantum physics and classical cryptography. When compared to traditional cryptography, its most significant advantages are unconditional security and sniffer detection. One of the most difficult problems in MANET is safe routing. In order to improve efficiency, we use asymmetric key cryptography based AODV routing which uses the principle of public key cryptography to provide

security requirements such as authentication, integrity, and non repudiation when establishing routes and transmitting data between MANET nodes. Ad-hoc On-Demand Distance Vector Protocol (AODV) is combination of destination sequence distance vector and data source routing protocol. It is used to discover and manage routes and also increase the distance of transmission through quantum cryptography. These qualities have the potential to solve a significant internet security challenge for the future Internet. Quantum cryptography ensures protection for a variety of applications in cyberspace (for example, the IOT and smart cities).

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Modern Donation Hub

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ABSTRACT

This Orphans and vulnerable children are always confronted with immense psychological and social problems. As they grow older, they are also vulnerable to maltreatment (harassment and violence), economic and sexual abuse and exploitation, due to lack of care and protection. These risks and other vulnerabilities are also likely to harm their future livelihoods as well. A sustained commitment to protecting and improving the lives of these orphaned and vulnerable children is required so as to ensure that their needs are addressed through actions at the local level as well as at the higher levels, so that interventions made can achieve the widest possible impact. So to address all these problems we design and develop a "Modern Donation Hub" at Orphanage. By using this project we delivered usable things like cloths, food items, stationary, etc. to different orphanages through android application.

Keywords: Orphanage, Android Application, Psychological and Social Problems, Children's and his daily needs

I. INTRODUCTION

In our research, why we give, a feeling of social conscience was the most widely given reason to give to charity. Whatever type of charity work they supported, 96% said they felt they had a moral duty to use what they had to help others, a sentiment very much rooted in their personal values and principles.

The vision of the organization is to build a society which loves and accepts orphans and vulnerable children so as to attain healing of their emotional wounds, build their confidence, and create space and opportunities to facilitate the development of their talents so that they can live in dignity, respect and managing their own lives independently.

The organization decided to set up a center for orphans and other vulnerable children so as to address their problems at the community level. Here also provide as well as donate the different things through modern Donation Hub to Orphanage.

II. LITERATURE SURVEY

- **Title:** a customizable android application for modern donation hub.

  Author Name: The rotary foundations, Ameri carespo

Description: At the 1917 convention, outgoing rotary president arch klumph proposed setting up an endownet for the purpose of doing good in the world. The rotary foundations helps rotary members to advance world understanding, goodwill, and peace by improving health, providing quality education, improving the environment and alleviating poverty.

- **Title:** Design and implementation of donor and donation hub interaction system based.

    Description: the donor can walk in voluntarily any time round the clock at their own convenience to donate blood in a licensed blood bank. Beside an in house camp can be organized in a blood bank on pre-fixed dates with the organisers and blood bank in charge, clothing shoes and bags, books, art, toys and games, manetory, hygine essential, sporting goods etc., we by this from any stationary store or online shopping.

- **Title:** A Fast interactive to do donations.

    We can use modern donation hub (MDH) android application for donate.

    Title: Smart donations in the era of internet- of -things:

    Description: the development in the internet- of -things (IOT) has advanced donation. The IOT can overcome that barrier. Many IOT trends relate to helping people process payments for goods faster, such as by using smart credit and readers. Those come in partially during events like crafts shows or tattoo conventions intelligent hardware can also get people in the mood to give.

III.RESULTS AND DISCUSSION

A. Motivation

In our research, why we give a feeling of social conscience was the widely-given reason to give to charity whatever type of charity work the supported 96% said they left they had a moral duty to use what they had help others a sentiment very much rooted in their personal values and principles.

B. Background

1. Lack of donation options
2. Donation process is too long
3. Donation page is not updated

Solution- solution could be our android application! It will directly donate the needy person and orphanage homes.

C. Need

Orphans are increasing day by day. Almost there are more than 100 million orphans world wide.On the other hand the number of old age homes increasing day by day. Their main issues are lack of foods, clothes and education due to insufficient money. Hence the people who are willing to donate foods, clothes and books can register through this app. This will automatically sends the request to the nearest orphange or old age home from the current location of the user. There representative of the old age or orphanage home will pickup and deliver the loads. And also live tracking of representative is provided to the donor to ensure whether the loads are delivered to the correct place or not.

A. Application: It can be used if anyone want to donate. Anyone checks the who and what donates.

B. Advantage:

1. Encourage the growth of the organisation, leading to more donations.
2. Have unlimited sending of push messages for news event reminders or volunteer meetings.
3. Grant information about sponsored activities or collaborative events.
4. Integrate social networks and blog with the app generating content without effort.

C. Disadvantage:

The only limitation will be to verify that that the actual orphanages.

IV. WORKING MODULES

A. Admin Module:

An admin module in this system will make sure that the user that is acting as an admin of the system can cooperate and easier to manage. This admin module also will make donors who is using this system can easily manage their donated products such as adding people's willing to donate stuffs, Orphanages to receive the donated stuff's, edit the people location, newly added orphanages area locations, create new catalogs and category, viewing orphanages needs, passing donated items to the orphanage. There are two system management that admin will control. First, the donated Items management system and second, delivering donated items to needy people and orphanages management system. For the items management system, admin can edit all the item details and also can add a new category and add new catalog. For the purchase, management system, admin can view all the purchasing process that is made by the orphanages and admin also will take action when orphanages made a request.

B. User Module

For the user module, it will make this system more users friendly because almost 100% of this module will be interacting with users. In this system, there will be two types of user. The first type is users who act just a guest to this system. They do not register with the system and the system view all orphanages and their needs and help them but they will be asked to enter information required to make the delivery process. The second type of this module is registered orphanages. Users who are already registered with this system can log in and view needs of orphanages, donate item, leave comments or feedback, tracking their history transaction and make donated items record. These registered users did not need to enter information each time they make the online donation because the system has already had their information while doing the user registration, doesn't have their information.
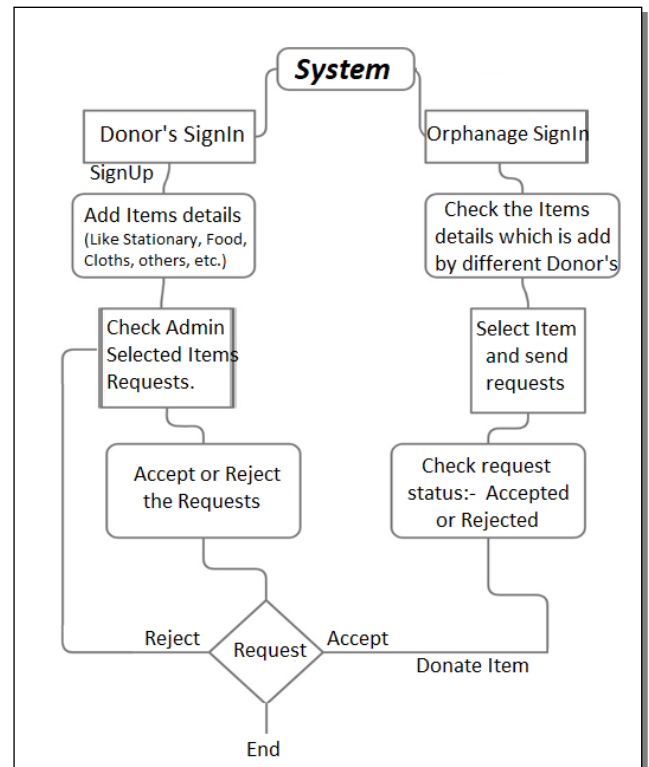
C. Donator Module

Each donator has a separate donator profile page & can edit their profile page on their own. The donator will have own dashboard to manage their donation. Only selected order status will be used by the donator for changing their item donated status. The donators can use the need alert feature for their items. The donator can set the item quantity restrictions for the orphanages. Also, the donator can create and manage the reasons which are to be selected while adding or updating an item. Also, the donator can also use his name, if allowed by the admin. In the donator panel, the donator can view the listing of incomes along with the donator and admin amount. Also, the donator can add new items on behalf of the orphanages in the donator panel itself.

V. CONCLUSION

The general objective of the project is to support orphans and vulnerable children so as to ensure that they are reached with effective social protection

measures. The idea is to give children exposure to community life, provide them with skills and an opportunity to use acquired skill to undertake practical production work. Here our proposed work has receiving more attention in the charity donation system in sharing donation data, in managing information among donors and beneficiaries, in contract management among charitable organizations and enterprises, and its application in dealing with the centered donations are growing increasingly day to day.

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Design of Multi Model Interface to Establish Communication Among Differently Abled People Using IOT

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ABSTRACT

In daily life, for the people who are deaf, dumb and blind, the communication among them is difficult. Communication is possible only in sign language which is difficult to understand and interpret. So, to prevent this, an electronic frame work is developed using WIFI Module/IOT. The dumb uses the phone to send / receive text messages which are sent to the WIFI Module and the result is displayed using controller which is connected to the LCD display and played over the speaker, i.e. the messages are transferred from the phones to a controller via cloud and played on speaker for the blind who cannot use a phone. Also, when the blind person wants to speak, a mike is provided which in turn converts the audio into text and sends message over the phones.

Keywords : Internet of Things, Liquid Crystal Display, Blindness, Deafness and Dumbness

I. INTRODUCTION

The Internet of Things (IOT) is the major significant trend in recent years. There is an explosive growth of devices connected and controlled by the internet. The wide range of applications for IOT technology mean that the specifics can be very different from one device to the next but there are basic characteristics shared by most.

The IOT creates opportunities for more direct integration of the physical world into computer-based systems, resulting in efficiency improvements, economic benefits, reduced human exertions. The number of IOT Devices is increased by 31 % since last year and is estimated that there will be nearly 30 billion devices by the end of 2020. Science and Technology have made Human life addictive to comfort but still there exists an underprivileged group of people who are fighting for finding an innovative way that can make the process of communication easier for them. According to the World Health Organization, about 285 million people in the world are blind, 300 million are deaf and 1 million are dumb.

During the last few decades, we have come across various technologies that have made our life so easier and comfortable that we even do not have to move

our body to do a task. But always running in the race to be ahead of everyone we have forgotten that we still have a section of our population called the physically disabled people who are deprived of the advancements of Science and Technology because it has not given them that comfort that is required by them to feel that they too are the part of the society and they too can walk hand in hand with others. Communication being a fundamental aspect of human life is very much difficult for the people who are Blind, Deaf or Dumb. There are a little means of communication between there people like the Braille Language for communication Between Blind people and the Sign Language for Dumb and Deaf people.

The technologies that help differently disabled people to communicate among themselves and with the normal world but all of the technologies studied so far were focusing only a certain parameter or extent of disability among the three of Blindness, Deafness and Dumbness. None of the technology was so developed that it can be used as a general approach that can tackle any combination of these three disabilities. So to solve this purpose, we proposed an approach that can be used as a general way in which people suffering from any type of combination of these three disabilities can think themselves as a part of this beautiful world.

For every person communication is the main task for a conversation. So, the primary point of taking this IOT based electronic framework is to prevent the corresponding issue since these individuals use gesture based communication which is very difficult. The Device enables the communication among the people with the impairment of vision, hearing and speaking and also with the normal individuals. The major part of the device is the Arduino Uno which is the fundamental control unit. A voice IC named APR 9600 Voice IC is used in the device for processing the output. This Device provides an easier

communication among these physically impaired persons and with the normal individuals.

II. LITERATURE REVIEW

Nikolas Bourbakis explained the challenges problem in human interaction is the communication process between blind and deaf individuals. The challenge here involves several cases like: Deaf person usually does not speak, When a blind person speaks a deaf person cannot hear, When a deaf person makes sign language, a blind person cannot see them. This paper presents a study on multi-modal interfaces, issues and problems for establishing communication and interaction between blind and deaf persons. Tyflos-Koufos is proposed in an effort for offering solutions to these challenges.

Netchanok Tanyawiwat, Surapa Thiemjarus presented a new design of a wireless sensor glove developed for American Sign Language Finger spelling gesture recognition. Glove was installed with five contact sensors. 3D accelerometer on the back of the hand in addition to five sensors on the fingers. In order to save number of channels and installation area into the same input channel on the BSN node, each pair of flex and contact sensors were used.

The signal is analyzed and separated back into flex and contact features by software.

The glove design is thinner and more flexible with electrical contacts and wirings made of conductive fabric and threads. ASL finger spelling gesture recognition experiments have been performed on signals collected from six speech-impaired subjects and a normal subject for validation. The experimental results have shown a significant increase in classification accuracy with the new sensor glove design.

M. Mohandas, S. A-Buraiky, T. Halawani and S. Al-Baiyat explained about the interfaces in sign language systems which can be categorized as direct-device or vision-based. Direct-device use measurement devices, those are in direct contact with the hand such as flexion sensors, styli and position-tracking devices and instrumented gloves. The singer's hand using a camera, which captures vision based movement, which is sometimes aided by making the signer wear a glove that has painted areas indicating the positions of the knuckles or fingers. The main advantage of vision-based systems is that the user isn't encumbered by any complex devices. However, they require a large amount of computation just to extract the hand position before performing any analysis on the images. In this paper, the directed-devise methods were discussed.

Kanwal Yousaf, Muhammad Altaf, and Zhang Shuguang proposed an application, named as vocalize to mute (V2M), uses automatic speech recognition (ASR) methodology to recognize the speech of Deaf-mute and convert it into a recognizable form of speech for a normal person. In this work Mel Frequency Cepstral Coefficients (MFCC) based features are extracted for each training and testing sample of Deaf mute speech. The hidden Markov model toolkit (HTK) is used for the process of speech recognition. The application is also integrated with a 3D avatar for providing visualization support. The avatar is responsible for performing the sign language on behalf of a person with no awareness of Deaf-mute culture. The prototype application was piloted in social welfare institute.

III.METHODS AND MATERIAL

A. Existing System

- Hand gesture based models are used
- Manual communication via signs
- Sign language was difficult to interpret

- Sensors were used to interpret the signs and convert it into a means understood by others.
- Sensors used were FLEX and MEMS
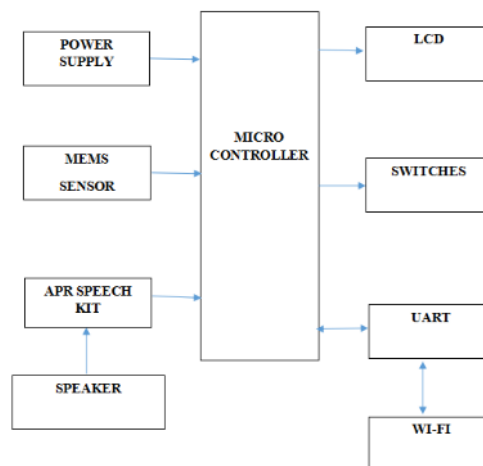
Figure 1: Existing System

B. Proposed System

- The proposed methodology is implemented by using an electronic framework.
- It consists of a voice kit with a speech recognition and Wi-Fi.
- The voices are identified by the recognition kit and it sends to the Arduino UNO and through the voice IC
- The output is played on speaker and it is displayed on LCD.

IV.SCOPE AND METHODOLOGY

A. SCOPE

Designing of a gesture system using facial expressions (face recognition)

- Perfection in monitoring and sensing of the dynamic movements involved in "Hand gesture recognition system"
- Designing of a whole jacket, which would be capable of
- vocalizing the gestures and movements of animals

- This device can be developed into a device that includes
- various sign languages in different countries
- The robot control system to regulate machine activity at remote sensitive sites
- Vision based recognition system
- Real time hand gesture recognition system using digital camera

B. METHODOLOGY

This project is about the deaf, dumb and blind people; they can't hear and speak for themselves. The introduced embedded device helps them to feel and react to the thing sharpening in their surroundings. The device starts vibrating according to its features developed. The device can hang in their neck along with the vibrating motor with it. For example if a stranger tries to enter their house without their knowledge the device start to vibrate and they can able to sense it. If the person wants to cross the road the device will help them, through vibrating while the red signal goes on. If a person crosses by and if someone calls their name they knew it by the means of vibration. The developed device helps them to run their routine life.
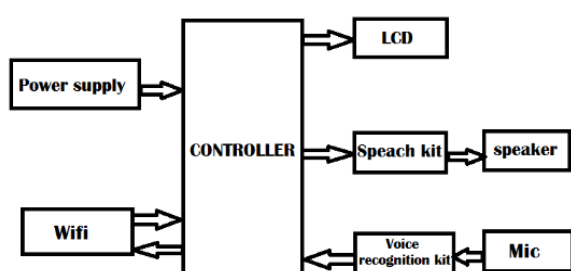
Figure 2: System Architecture

V. RESULTS AND CONCLUSION

The principle reason for this task is to help the visually impaired, hard of hearing, and dumb individuals to speak with each other and further more with the typical individuals. This electronic frame work helps the unusual individuals with typical individuals in reality. An electronic framework is created for the visually impaired, hard of hearing, and dump individuals. Presently they don't need to confront any issue to impart .Arduino is customized such that design settings promptly change without changing the whole code. In the wake of getting right outcomes, the equipment is actualized. Last outcomes are broke down after equipment usage. This framework can be created more later on. The correspondence procedure of the visually impaired, hard of hearing, and moronic individuals by this electronic framework will roll out a progressive improvement.

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An Applied Mean Substitutions Technique for Detection of Anomalous Value in Data Mining

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ABSTRACT

In the numerical value database, inliers in a database are subset of observations adequately small enough compared to the rest of the observations, which appears to be inconsistent with the remaining data set. They are the result of instant failures or early failures, experienced in many life-test experiments. The problem is how to handle Inliers in a dataset, and how to evaluate the Inliers. This paper describes a revolutionary of approach that uses Inliers detection as a pre-processing step to detect the Inliers and then applies Mean Substitution technique algorithm, hence to analyze the effects of the Inliers on the analysis of dataset.

Keywords: Data Mining, Attribute, Inliers Detection Approach Algorithm, Mean Substitution Technique Algorithm

I. INTRODUCTION

An anomalous value in database is solitary of the principle problems featured in data analysis and in the prediction. The belongings of these anomalous values are highly reflected on the final results. Our chief goal is to achieve the final result without error in the consolidated form, which is use to take decisions. Now let us consider the following example as a natural occurrence of a physical phenomenon: 0, 0, 0, 0, 0.01, 0.03, 0.08, 1.50, 1.96, 1.21, 1.75, 2.53, 3.90 and 4.10. Here, the first four observations may be treated as instantaneous failures, next three observations may be treated as early failures and other observations may be treated as coming from any failure time distribution.

In this study, a method of Inliers detection is introduced and discussed which provides an approach to treat anomalous values. This step treats the anomalous block of values from a real-world imbalanced database.

II. Background on Anomalous Data

In this study, a statistical method is discussed which provides an approach to find out pattern to discover anomalous values from a real imbalanced database with massive anomalous values. Therefore, the objective of this method is to discover the best fitted value for the anomalous value and select records completely by removing Inliers.

The function of statistical methods has gained stuff in exploring evaluation and calculation techniques. Lee, J., & Wonpil, Y[1] are the authors who have introduced Concurrent Tracking of Inliers and Outliers. Winkler, W[2] investigated Problems with inliers. Muralidharan K. and Arti M [3] investigated analysis of instantaneous and early failures in Pareto distribution. Muralidharan, K. and B. K. Kale [4] are the authors who have introduced Inliers detection using Schawartz information criterion, K.

Muralidharan, Arti. Khabia[5] introduced Inliers proness in normal distribution. K. Muralidharan [6] are the scientrst who invested theory of inliers modeling and applications. Winklers, W. E [7] are the authors who have introduced Problems with inliers. The objective of proposed study is to determine the statistical technique which may be significant in the handling of anomalous attribute values.

III. Inliers Analysis

An inlier's is a data observation that lies in the interior of a data set and is unusual or in error. Because inliers are difficult to distinguish from the other data values, they are sometimes difficult to find and -if they are in error to correct. The descriptive analysis applied on data. Following results, shown in table 1 with inliers and in table 2 without inliers, whereas that of analysis of recovered data is shown in table 3.

Table 1. Descriptive analysis OF PRE-MONSOON the data based on table-4 (with Inliers) Descriptive Statistics (with inliers)

RAIN (IN MILIMETERE)	SUM	MEAN	MEDIAN	MODE	S.D	C.V
Pre-Monsoon	1563.66	31.27	35.80	3.000	19.9	0.64
Monsoon	2019.3	40.39	36.85	3.00	30.6	0.76
Post-Monsoon	553.5	11.07	8.00	3.00	10.2	0.93

Table 2. Descriptive analysis of MONSOON the data based on table-4 (without Inliers) Descriptive Statistics (without Inliers)

RAIN (IN MILIMETERE)	SUM	MEAN	MEDIAN	MODE	S.D	C.V
Pre-Monsoon	1543.8	37.7	37.7	54.00	20.5	0.55
Monsoon	1994.3	51.1	46.8	80.4	31.3	0.61
Post-Monsoon	530.3	13.3	8.9	6.4	10.7	0.80

Table 3. Descriptive analysis of MONSOON the data based on table-4 (Recovered)

Descriptive Statistics (Recovered)

RAIN (IN MILIMETERE)	SUM	MEAN	MEDIAN	MODE	S.D	C.V
Pre-Monsoon	1883.1	37.7	37.7	37.7	14.4	0.38
Monsoon	2556.4	51.1	51.1	51.1	22.8	0.45
Post-Monsoon	663.3	13.3	9.8	13.3	9.2	0.70

The below table-4 shows Inliers Detection approach of the dataset with Inliers and treatment by removing it from database and recovering missing values use Mean Substitution technique for data recovering.

IV. PROPOSED APPROACH

As reviewed several different ways of detecting Inliers here propose a method which is a combination of different approaches, statistical and data mining. Firstly apply Inlier's detection using Inliers Detection approach algorithm to group the data into parts for discovering Inliers and removing it from dataset and then Mean Substitution algorithm for recovering the missing values from the dataset. The below figure shows the overall idea.

System Architecture
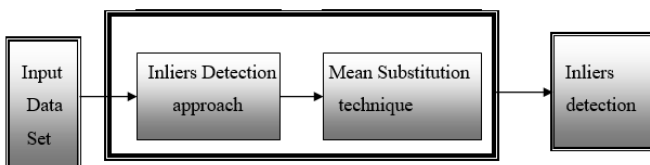
Fig. 2. System Architecture

4.1 Inliers Detection approach algorithm

The proposed method is based on finding inliers value from the data set by the Inliers Detection approach method. In general, this method is search of Inlier's value which is very close to the true mean of the attribute. If found Inliers then remove the data entry having Inliers permanently from the data set depending upon the Inliers detection criteria.

Introduction: Given an array R of size N, this procedure finds the elements of having Inlier's values.

The variable Min_Index shows the minimum value for Inliers finding in data set. Here we take Min_Range variable which indicate size of minimum for finding Inliers in a data set respectively. The variable I is used to index elements from 1 to N in a given pass.

Following are the steps of the algorithm in detail:

Step 1: Select a dataset on which Inlier's detection is to be performed from the database.

Step 2: Initialization of variables.

 Min_Index ← 05.

Step 3: Create a loop for N passes

 Repeat through step 5 for I = 1, 2… N.

Step 4: Make a pass and obtain element with Inlier's value.

If R [I] < Min_Index

Write 'Inliers found in the data set '

then R [I] = NULL   // Assigning NULL value to array.

Write 'Inliers Removed from the data set '.

 else

Write 'Inliers not found in the data set'.

Step 6: finished.

4.2 Mean Substitution technique algorithm

The intended method is based on replacing missing attribute values by the Mean Substitution technique method. This method is very much helpful for numerical attributes. In general, this method is search of missing values and after searching its value is replaced by the mean of the attribute and closest to

the value of just preceding and succeeding value of the missing values.

Introduction: Given an array R of size N, this procedure replaces the missing values with the recovered data from the Inlier's data set. The variable I is used to index elements from 1 to N in a given data. Following are the steps of the algorithm in detail:

Step 1: Select a dataset on which Missing values recovery is to be performed from the database.

Step 2: Initialize

Mean ← NULL.

I ← NULL.

Step 3: Determine the mean from the data using

Mean = $\underline{X1 + X2 + X3 \ldots\ldots.Xn}$ Or Mean = $\underline{Exi}$

N N

Step 4: Create a loop for N passes

Repeat through step 8 for I = 1, 2… N.

Step 5: Perform Missing value Recovery Process from Inliers database.

do

If (R [I] = = NULL)

then

R [I] = Mean // Estimated value

Step 6: Make iterations of each pass.

I = I +1. // Iterations

Step 7: Iteration is to be performed till condition is satisfied.

Repeat until (I > = N)

Step 8: Finished.

Stop.

V. Discussion of Results

Measure of central tendency (mean): Table-1 shows the seasonal distribution of average rainfall in different districts in Gujarat from 1955-2014(Rain fall in millimeter) dataset of average rainfall from analysis by season type Pre-monsoon, monsoon, post-monsoon. The mean of average rainfall in different districts in Pre-monsoon, monsoon and post-monsoon are 31.27, 40.39 and 11.07 respectively. After missing values at the extremes, the mean calculated from

incomplete data sets are 37.7 for Pre-monsoon, 51.1 for monsoon and 13.3 for post-monsoon.

The proposed mean substitution method is applied on the data sets of Table 1 to fill up the missing values. It is observed that mean values of Pre-monsoon, monsoon and post-monsoon are 37.7, 51.1 and 13.3 respectively. It is considerable that the mean values obtained after replacing the missing values by the proposed approach very same as the actual mean as given.

Median and Mode: From the analysis of result of Median and Mode it is found that after estimation of missing values, the values of Median and Mode obtained are close to the Median and Mode of standard dataset. On the basis of result there can be said that proposed algorithm is appropriate for Inliers finding and detection of Inliers also recovery of the data.

Standard Deviation: From the analysis of result of standard deviation it is found that after estimation of missing values, the values of standard deviation obtained are close to the standard deviation of standard dataset. On the basis of result there can be said that proposed algorithm is appropriate for Inliers finding and detection of Inliers also recovery of the data.

Coefficient of Variation: From the analysis of result of co-efficient of variation (CV) it is found that, after estimation of missing values, the values of co-efficient of variation is very near , which shows that the series is uniform now. It is observed that recovered Standard deviation values are varying close to outliers removed dataset.

VI. Experimental Results

There can be a hypothetical data which has been made by introducing some Inliers values in the well known rainfall data. The above table 4 shows Mean Substitution technique of the dataset with Inliers. Now must delete the Inliers entry and save both the dataset i.e. with Inliers entry and without Inliers

entry and run further the Inliers detection Approach algorithm and Mean Substitution technique approach to do the analysis of the data and calculate the sum of points to the value in each case.

VII. Conclusion

The conclusion lies in the fact that Inliers are usually the unwanted entries which always affects the data in one or the other form and misreports the distribution of the data. Sometimes it becomes necessary to keep even the Inliers entries because they play an important role in the data but in our case achieving and our main objective is to discovering Inliers entries and i.e. to delete the Inliers entries from database. Proposed approach provides proper consolidated report using data relative attributes of the database.

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Table 4: Mean Substitution technique approach of the dataset with and without Inliers.

Dataset of seasonal distribution of average rainfall in different districts in Gujarat from 1955-2014(Rainfall in millimeter).

		Standard Data			Inliers Results in data			Inliers Removed and Missing values obtained			Recovered Values		
SN	YEAR	Pre-Monsoon	Monsoon	Post-monsoon	Pre-Monsoon	Monsoon	Post-Monsoon	Pre-Monsoon	Monsoon	Post-Monsoon	Pre-Monsoon	Monsoon	Post-Monsoon
1	1955	49.9	77.5	9.2	FALSE	FALSE	FALSE	49.9	77.5	9.2	49.9	77.5	9.2
2	1956	31.6	3	5.3	FALSE	**TRUE**	FALSE	31.6	___	5.3	31.6	**51.1**	5.3
3	1957	0	79.9	5.2	**TRUE**	FALSE	FALSE	___	79.9	5.2	**37.7**	79.9	5.2
4	1958	36.8	83.2	0	FALSE	FALSE	**TRUE**	36.8	83.2	___	36.8	83.2	**13.3**
5	1959	33.6	0	5.4	FALSE	**TRUE**	FALSE	33.6	___	5.4	33.6	**51.1**	5.4
6	1960	63.6	77.8	12.3	FALSE	FALSE	FALSE	63.6	77.8	12.3	63.6	77.8	12.3
7	1961	54	80.4	11.4	FALSE	FALSE	FALSE	54	80.4	11.4	54	80.4	11.4
8	1962	43.7	81.2	3	FALSE	FALSE	**TRUE**	43.7	81.2	___	43.7	81.2	**13.3**
9	1963	44.1	3	8.8	FALSE	**TRUE**	FALSE	44.1	___	8.8	44.1	**51.1**	8.8
10	1964	37	80.4	8.3	FALSE	FALSE	FALSE	37	80.4	8.3	37	80.4	8.3
11	1965	3	82.3	6.1	**TRUE**	FALSE	FALSE	___	82.3	6.1	**37.7**	82.3	6.1
12	1966	35.4	78	8.8	FALSE	FALSE	FALSE	35.4	78	8.8	35.4	78	8.8
13	1967	31.3	3	7.6	FALSE	**TRUE**	FALSE	31.3	___	7.6	31.3	**51.1**	7.6
14	1968	44.2	80.1	3	FALSE	FALSE	**TRUE**	44.2	80.1	___	44.2	80.1	**13.3**

#	Year												
15	1969	37.3	83.1	6	FALSE	FALSE	FALSE	37.3	83.1	6	37.3	83.1	6
16	1970	44.3	84.4	6.3	FALSE	FALSE	FALSE	44.3	84.4	6.3	44.3	84.4	6.3
17	1971	33.7	3	36.1	FALSE	**TRUE**	FALSE	33.7	___	36.1	33.7	**51.1**	36.1
18	1972	6.5	65.7	1	FALSE	FALSE	**TRUE**	6.5	65.7	___	6.5	65.7	**13.3**
19	1973	1	11.8	6.4	**TRUE**	FALSE	FALSE	___	11.8	6.4	**37.7**	11.8	6.4
20	1974	64.9	7.1	7.8	FALSE	FALSE	FALSE	64.9	7.1	7.8	64.9	7.1	7.8
21	1975	44.7	6	6.4	FALSE	FALSE	FALSE	44.7	6	6.4	44.7	6	6.4
22	1976	55	21	6.4	FALSE	FALSE	FALSE	55	21	6.4	55	21	6.4
23	1977	37.7	3	8.4	FALSE	**TRUE**	FALSE	37.7	___	8.4	37.7	**51.1**	8.4
24	1978	65	69.4	2	FALSE	FALSE	**TRUE**	65	69.4	___	65	69.4	**13.3**
25	1979	22	36.7	6.7	FALSE	FALSE	FALSE	22	36.7	6.7	22	36.7	6.7
26	1980	3	36.4	7.4	**TRUE**	FALSE	FALSE	___	36.4	7.4	**37.7**	36.4	7.4
27	1981	54	37.8	8.9	FALSE	FALSE	FALSE	54	37.8	8.9	54	37.8	8.9
28	1982	62.1	61	9.7	FALSE	FALSE	FALSE	62.1	61	9.7	62.1	61	9.7
29	1983	12.4	37	3.6	FALSE	FALSE	**TRUE**	12.4	37	___	12.4	37	**13.3**
30	1984	36.4	34	15.1	FALSE	FALSE	FALSE	36.4	34	15.1	36.4	34	15.1
31	1985	14.3	2	36.7	FALSE	**TRUE**	FALSE	14.3	___	36.7	14.3	**51.1**	36.7
32	1986	13.5	33	16.8	FALSE	FALSE	FALSE	13.5	33	16.8	13.5	33	16.8
33	1987	3	37.6	25	**TRUE**	FALSE	FALSE	___	37.6	25	**37.7**	37.6	25
34	1988	56.4	23.1	21.3	FALSE	FALSE	FALSE	56.4	23.1	21.3	56.4	23.1	21.3
35	1989	41.3	33.4	3.6	FALSE	FALSE	**TRUE**	41.3	33.4	___	41.3	33.4	**13.3**
36	1990	7.8	3	6.9	FALSE	**TRUE**	FALSE	7.8	___	6.9	7.8	**51.1**	6.9
37	1991	8.6	34.7	9.7	FALSE	FALSE	FALSE	8.6	34.7	9.7	8.6	34.7	9.7
38	1992	0.36	44.3	10.3	**TRUE**	FALSE	FALSE	___	44.3	10.3	**37.7**	44.3	10.3
39	1993	24.6	46.8	9.8	FALSE	FALSE	FALSE	24.6	46.8	9.8	24.6	46.8	9.8
40	1994	34.4	2	6.3	FALSE	**TRUE**	FALSE	34.4	___	6.3	34.4	**51.1**	6.3
41	1995	2	23.9	3	**TRUE**	FALSE	**TRUE**	___	23.9	___	**37.7**	23.9	**13.3**
42	1996	45.9	46.1	13.4	FALSE	FALSE	FALSE	45.9	46.1	13.4	45.9	46.1	13.4
43	1997	46	63	8.2	FALSE	FALSE	FALSE	46	63	8.2	46	63	8.2
44	1998	50.3	0	44	FALSE	**TRUE**	FALSE	50.3	___	44	50.3	**51.1**	44
45	1999	4	48	3	**TRUE**	FALSE	**TRUE**	___	48	___	**37.7**	48	**13.3**
46	2000	36.2	65	23.7	FALSE	FALSE	FALSE	36.2	65	23.7	36.2	65	23.7
47	2001	32	3	36.1	FALSE	**TRUE**	FALSE	32	___	36.1	32	**51.1**	36.1
48	2002	36.7	16.4	32.8	FALSE	FALSE	FALSE	36.7	16.4	32.8	36.7	16.4	32.8
49	2003	3.5	78	1	**TRUE**	FALSE	**TRUE**	___	78	___	**37.7**	78	**13.3**
50	2004	14.6	8.8	9.3	FALSE	FALSE	FALSE	14.6	8.8	9.3	14.6	8.8	9.3
SUM		1563.66	2019.3	553.5				1543.8	1994.3	530.3	1883.1	2556.4	663.3
MEAN		31.27	40.39	11.07				37.7	51.1	13.3	37.7	51.1	13.3
MEDIAN		35.80	36.85	8.00				37.0	46.8	8.9	37.7	51.1	9.8
MODE		3.00	3.00	3.00				54.0	80.4	6.4	37.7	51.1	13.3
SD		19.9	30.6	10.2				20.5	31.3	10.7	14.4	22.8	9.2
CV		0.64	0.76	0.93				0.55	0.61	0.80	0.38	0.45	0.70

Experimental Study and Performance Enhancement of Rotary Drum Filter

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ABSTRACT

In the Chemical Industry lot of Filters are frequently used for slurry separation that involves the separation of solid-liquid phase for continuous flow operations. One of the oldest and yet effective devices used still is the Rotary Drum Filter which can be called the workhorse of the chemical process industry.

In this paper, we have discussed various parameters for enhancing the performance of rotary drum filters which include various physical well as chemical properties. My main objective was concerned with changing the various parameters like reducing the moisture content, the agitation speed, the cloth used for filtration, ph., slurry age, viscosity, cycle time, pressure drop, temperature involved which will not affect the cost of the process making it economically beneficial and handling can be done easily.

Keywords : Rotary drum filter, Moisture content, speed, pressure drop, temperature

I. INTRODUCTION

In chemical industries, the separation and filtration of slurry become an important part of many processes. This means the solid-liquid separation in this type of separation the solid- liquid mixture forms a suspension which needs to be separated for this purpose the use of the Rotary Drum filter becomes an important part. Talking about the Rotary drum filter (RDF) it was one of the oldest pieces of equipment used for the industrial liquid-solid separation which is patented in 1872 and still is used due to its durability and reliability.

For processing the slurries and discharge cake formation during a process in the chemical industry.

We use a rotary drum filter. The vacuum filter is composed of a large rotating drum covered by a cloth. The drum is partially submerged in a fluid suspension, drives around 25% to 75% of the surface area of the screen. When running in and out of the gutter, and the liquid is sucked on the surface of a substance and is rotated by the liquid/solid base, as for a pie. When the dough is running, dehydration may occur in the drum. The cake is too dry because the vacuum drum

is constantly sucking in the cake, and remove the water from it. In the final stages of the separation, in, is dismissed, as a permanent product, and the drum rotates continuously at a different separation cycle

II. WORKING OF ROTARY DRUM FILTER

The working of rotary drum filter is split into various zones like pick-up zone, drainage zone, washing zone, drying zone, and cake removal zone. The drum is immersed to the required depth in the slurry, which is agitated with help of an agitator to prevent settling of the solids. A drum rotates, vacuum is applied to those sectors of the drum which is submerged. A cake of the specified thickness is produced by adjusting the speed of rotation of the drum. The filtrate is passed out to the receiver. The drum leaves the drainage zone and enters into the water wash zone. The cake is then washed with sprays. The cake is partially dried through a current of air and the cake enters into the drying zone. Finally, pressure is applied under the material to assist the removal of the cake. The washed and partially dried cake is removed using a doctor's knife. The cake is additionally discharged by string discharge and belt discharge filters. In the string discharge filter, numbers of endless strings are placed over the width of the drum. String discharge filters are used when the cake is sticky. The wear of filter cloth is a smaller amount during this case. In belt discharge filters short endless belts are used. Higher filtration rates could also be achieved using belt discharge. All these steps are completed in one cycle of a drum. Then drum again receive a fresh lot of slurry. When the solids of the slurry are an excessive amount of that the filter cloth becomes blocked with the particles, a pre-coat filter could also be used.
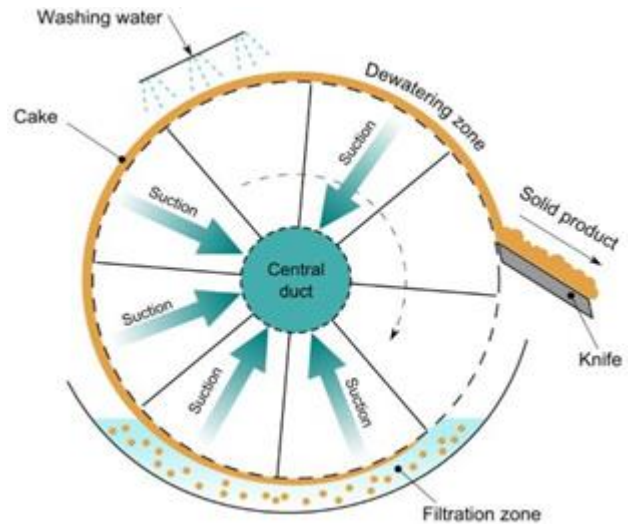
The Rotary Vacuum Drum filter is in the lower supply category and is one of the oldest filters used in the chemical process industry. Rotary drum filters are therefore used in the best part of the solid-liquid separation process. Figure 1, shows the basic components of the rotary vacuum drum filters and their components and the parameters for their operation. A valve with a bridge controls the flow of circulation so that each sector is exposed to vacuum, impact, and dead areas [3]. When the sector enters the first immersion phase and continues to wash, if necessary, to the point that it is cut off and strikes occur to aid in the use of the cake. The valve has some filters on flexible blocks and other fixed bridge rings. Flexible block blocks enable form formation to dry the scale within the filter cycle and the "active immersion" of the drum when the tender level of the tank is very high. Most drum filters have a three-dimensional valve and one line plate as shown below and to the right.

The function of the bridges is cleaning areas and fittings that separate the bridge: This bridge cuts the space and is therefore slightly wider than the inner hole of the pipe.

Dead Zone Bridge: This Bridge is open to strike just as you enter the room. Getting started helps bridge. In starting the open space is open-air and the cake can

only be built when the valve that controls the area closes. When the cake starts to appear in the tank the valve is slowly opened and completely opened when the surface of the drum is wrapped around the cake. As in continuous operation, both the lower and upper areas are under the closure this bridge is slightly smaller than the inner pipe of the pipe so that the vacuum can continue and the cake is held in a cylinder. The rotating drum filter is a highly separate liquid / solid device. It is used when further separation is a strong desire from the liquid distribution. It can be used in applications where the solid is the product or where the liquid is the product (and sometimes when both phases are the product). In the case of a wastewater application, it can be used to divert various sewage or to determine the wastewater.

III. Washing the cake

The effects of cake washing can affect the success of the process in a variety of ways. If a product, or other useful items, gets stuck in a filter, such as damp material, this could affect the cost of production or product. . It is easy to calculate product losses, as well as potential savings or product increases that may result from an improved cake washing process. To find the best cake washing effect may not be enough, the consistency of the washing effect should also be considered. It is not good to produce a delicious and healthy food ingredient that can be bought 99% of the time, but in the remaining 1%, it contains a combination cake filter that can cause stomach upset.

IV. Factors to be considered in performance enhancement

· The Drum speed vs performance,
The drum speed, in the case of any other constant, filter, modes of operation, the increase of the rotary speed will increase filter throughput. The speed of the

accelerator pedal, drum to the left of the filter. With The Increase of The Speed of The Drum ↑
A) Filter Transit Increases
B) The thickness of the cake decreases
C) The moisture content on particles I formed Increases
D) The rate of filter drum per revolution decreases
E) The efficiency of the filter aid [precoat] decreases

The fine is the process of increasing the filtration capacity, i.e., the increase of the rotary speed, the high moisture content of the cargo to the unloading of cake solids. This may result in:
(1) the loss of the product, i.e., the restoration of the original solution, or [2]to higher disposal costs, that is to say, liquid, solids, and the filtered cake. With a pre-low-power high-speed of the drum, means to lower the filtration efficiency (and therefore higher production costs). The drum speed and the TAX levels are usually adjusted to optimize the filter's performance. In all of the discharge structures, except for the pre-coat, and a different way of training and a dry cake is the adjustment of the vacuum and the air stream. Outputs the devices of the airflow, the better to be made, whether within or outside of the dryland areas of the drum. Reduced vacuum in the inlet, which leads to more tender dough of the formation, so it will be a discount for the ordering of large amounts of air to flow into the dry-room for the dryer to the mixture. And if all of the terms and conditions for the filter's action is constant, the filter capacity will vary depending on the drum speed

· Temperature of Feed
Feeding slurry feed is another important factor in producing a high-quality filter cake. An increase in feed temperature increases the filtering rate (although not as much as it does feed concentration) and also results in a low moisture content filter. Second gain for the high temperature of the feed that the vapor passing through the vacuum pump is also high temperature. Reducing evaporation works to heat the

water in a vacuum pump, which can later be used as a cake washing machine.

· Wash Water Temperature

The filter cake needs to be washed to reduce the soluble chloride to an acceptable level wallboard maker, in most cases 100 ppm. This bath takes place in the back filter the cake formation step using fresh water to remove the remaining alcohol from the cake filter. Generally, the amount of bathwater required is about 0.3 to 0.33 pounds of water per pound.

solid dry cake. The use of recycled bulk water from a liquid ring vacuum pump is an easy method of providing high-temperature bathwater. This increasing temperature of the cake wash and reduces moisture remaining in the filter after washing.

· Pressure Drop

The filtering rate is proportional to the pressure difference in both the filter and the filter cake. Decreased pressure can be achieved in several ways: -

A) Gravity: The pressure difference can be achieved by keeping the slide head above the filter area. The pressure generated depends on the slide hardness.

B) Machine: The pressure below the filter area can be reduced under atmospheric pressure by connecting a filtrate receiver to a vacuum pump and creating a pressure difference across the filter.

C) Pressure: An easy way to pump slurry into a filter under high pressure.

D) Centrifugal Power: Gravity can be replaced by centrifugal force in particle separation

V. Filtering viscosity

It can be expected that increasing the viscosity of the filtrate will increase the flow resistance so that the filtering level is proportional to the viscosity of the fluid. This problem can be overcome in two ways:

a- The filtration rate can be increased by increasing the temperature of the liquid, which reduces its viscosity. However, it is not possible if thermolabile materials are involved or if the filtrate fluctuates.

b- Burning is an alternative but the rate should be doubled.

· Filter Cloth

All types of extensions, except for the pre- coating fabric, require the measurement of the first 5 fabric design parameters to maximize filter performance. The "fine-tuning" of the belt or the texture of the fabric is usually done with changes in the type of thread and the availability of the fabric. The fabric design of the pre- release filters, however, should be connected to the type of media filter [help filter] used in the process. For this reason, the use of many fabric design options has been greatly reduced. The sophisticated fabric design offers little or nothing to the best performance, without the high cost!

Best cloth aspects

1) Fabric Design: Polypropylene [fibre-based process]
2) Thread: mono or multifilament; not twisted
3) Weaving: bearing penetration: 50-150 cm / ft² width; depending on the weight of the filter aid:
4) 6 - 10 oz, standard
5) Thread Count: by Micron fabric manufacturer measured by woven fabric does not provide profit. No weaving, no needle dropping, and cloth weaving. Empty media can be standard Dutch twill [24 x 110] or binding cloth

· The Permeability coefficient,

which is The constant (K) represents the resistance of the filter medium, as well as to filter the sediment. As well as the thickness of the dough increases, the filtration rate will decrease. In addition, the surface of the particles, and the porosity of the paste, and the stiffness or compressibility of the particles can affect the permeability of the paste.

· Filter's media area

The total volume of the filtrate then flows from the filter, it will be in proportion to the filter surface. You can improve the environment by using more than one filter. In a rotor, drum filter, the continuous removal of the dough, the filter gives you an endless process of filtration area

· Vacuum-pump capacity

performance of the pre-pairing mode, the pump should be at least 2.5-3.5 CFM per square foot of filter area. In the process, the mode of 2.0 to 3.0 cubic feet. / min per square meter is more than enough. As a rule, it is sufficient to use a vacuum pump for the little ones. The power consumption can be reduced by the use of two pumps for medium-sized and large ones. Vacuum pumps for many of the filters can not be combined in the same system, vacuum bags, and all filters. The pumps must be able to be in a vacuum of 28 "Hg), and have dimensions that correspond to the desired CFM performance at a level of 20" Hg.

· Filter Pump Capacity

performance of the pump in most applications, the primary coating, the filters have a filtration process which is considerably lower than in the pre-alert mode. A standard centrifugal pump (ANSI type only) is used as the sample, and the pump, then you can expect problems with the operation of the pump, that is, to make the pump curve for the pre-alluvial mode, the filtration process. As a rule, two pumps of different sizes and can be used to move the sample from the vacuum receiver is a great pump for the pre-coating of a pump that is the right size for the technological process. Centrifugal pumps should not be run faster than that on 1 to 750 revolutions per minute. / min), and a non-return valve, on the pressure side. They will need to be changed to work in a vacuum on the suction side and has a capacity of TDH, and in compliance with the introduction of the system. The gasket should seal (mechanical or electronic).

· Vacuum receiver,

The application of a vacuum, the receiver, presses to separate it from the two-phase mixture, which consists of the filter, i.e., air/liquid (s). In the case of the foam, the receiver must also be able to prevent the foam from the relocation of the pump The diameter of the dish, is a critical size for the implementation of the separation of the two phases, and the height of the fifth wheel is designed for the use of the current site.

· Cycle Time

The duration of the leaf test cycle is the same as the speed of the filter drum, which is usually expressed in seconds or minutes per change. The speed of the drum is usually faster, the effect is much higher. However, under these conditions, the cake is thin and sometimes wet, so the output can be damaged. At all times, a removable cake should be produced. Any final choice of cycle or drum speed is a relaxation of these conditions.

· Surface Tension

Reducing facial friction with high temperatures or with surfactants can greatly improve the cake moisture content of some items. Its benefits are non-predictable and have no significant impact on filtering quality. Where surfactants are active, vacuum capacity can be greatly reduced.

· Cake compression

Cake congestion is often found in conjunction with the filtration step to reduce the moisture content of the cake under pressure.

· Feed Concentration

In general, the higher the percentage of solid matter in a given slide, the greater the filtering rate at Kg / m2 / h, and the filter rate in m3 / m2 / h decreases. Where a large amount of solid material is required it is advisable to consider the strength of the slide by gravity. In some applications involving solidity with sludge recycle, the particle size increases, and the cake and filtrate levels may increase.

· Slurry pH

Since slurry pH and particle distribution are closely related, changes in pH can be one of the most effective ways to achieve improved slope and filtration, if the process can be tolerated.

· Dispersion of good durability solid

Dehydration is usually preferable to solid slurries in a dispersed state and is usually poorly filtered. A variety of polyelectrolyte flocculants provide a place for significant improvement in filtering levels. The effective use of flocculants, especially polyelectrolytes, in the supply of a moderately high concentration filter requires strong agitation to obtain good solids-flocculant solids. Minimum continuous development and slow aging are important.

Some slurries can be so sweet to create filtration problems and dispersal may be a better way to get liquid than diluted.

· Slurry Age

Sometimes procedures include arrest periods whether international or not, which provides a corrective effect, which adjusts the operation of the filter. Samples submitted for testing pose a risk that excessive aging may contribute to the diagnosis.

Example

I have tried to explain the problem of McCabe with the help of DWSIM software

A rotary drum filter with 30 percent submergence is to be used to filter a concentrated aqueous slurry of CaCO3 containing 14.7 lb of solids per cubic foot of water (236 kg/m³). The pressure drop is to be 20 in. Hg. If the filter cake contains 50 percent moisture (wet basis), calculate the filter area required to filter 10 gals/min of slurry when the filter cycle time is 5 min. Assume that the specific cake resistance is the same as in Example 30.2 and that the filter-medium resistance R is negligible. The temperature is 20°C.

Feed
FT-000
ESTR-004
Outlet 1
Outlet 2
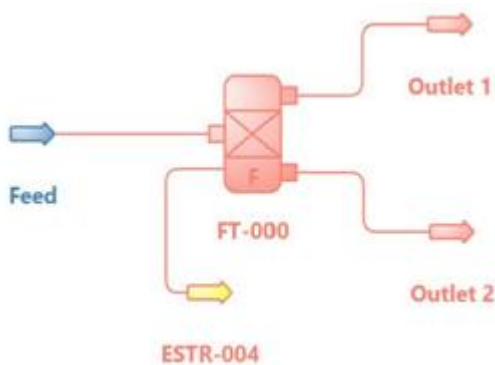
Filter - Material Stream Results

Object	Outlet 2	Outlet 1	Feed	
Temperature	68	68	68	F
Pressure	702.213	702.213	2116.21	lbf/ft2
Mass Flow	1484.32	4229.76	5714.08	lbm/h
Volumetric Flow	0.00391425	0.0183661	0.25239	ft3/s

Filter - Results

Object	FT-000	
Energy Balance	141.777	BTU/h
Total Filter Area	35.186	ft2
Cake Relative Humidity (%)	50	%
Cycle Time	0.0833333	h
Filter Medium Resistance	0	ft-1
Specific Cake Resistance	4.08919E+09	ft/lbm
Submerged Area Fraction	0.3	
Total Pressure Drop	1414	lbf/ft2

Simulation Report
DWSIM 6.4

Details

Title: MySimulation_7

Comments:

Object: Outlet 2

Type: Material Stream

Property	Value	
Temperature	68	F
Pressure	702.213	lbf/ft2
Mass Flow	1484.32	lbm/h
Molar Flow	58.8182	lbmol/h
Volumetric Flow	0.00391425	ft3/s
Density (Mixture)	105.336	lbm/ft3
Molecular Weight (Mixture)	25.2358	lbm/lbmol
Specific Enthalpy (Mixture)	-744.282	BTU/lbm
Specific Entropy (Mixture)	-1.30876	BTU/[lbm.R]
Molar Enthalpy (Mixture)	-41.4082	BTU/lbmol
Molar Entropy (Mixture)	-0.131064	BTU/[lbmol.R]
Thermal Conductivity (Mixture)	0.213419	BTU/[ft.h.R]

Object: Feed

Type: Material Stream

Property	Value	
Temperature	68	F
Pressure	2116.21	lbf/ft2
Mass Flow	5714.08	lbm/h
Molar Flow	267.529	lbmol/h
Volumetric Flow	0.25239	ft3/s
Density (Mixture)	6.28886	lbm/ft3
Molecular Weight (Mixture)	21.3588	lbm/lbmol
Specific Enthalpy (Mixture)	-863.61	BTU/lbm
Specific Entropy (Mixture)	-1.63061	BTU/[lbm.R]
Molar Enthalpy (Mixture)	-40.6655	BTU/lbmol
Molar Entropy (Mixture)	-0.138207	BTU/[lbmol.R]
Thermal Conductivity (Mixture)	0.350834	BTU/[ft.h.R]

Object: Outlet 1

Type: Material Stream

Property	Value
Temperature	
Pressure	
Mass Flow	
Molar Flow	
Volumetric Flow	
Density (Mixture)	
Molecular Weight (Mixture)	
Specific Enthalpy (Mixture)	
Specific Entropy (Mixture)	
Molar Enthalpy (Mixture)	
Molar Entropy (Mixture)	
Thermal Conductivity (Mixture)	

Object: ESTR-004

Type: Energy Stream

Property
Energy Flow

VI. Benefits

1- the rotary filter is automated and is non- stop in operation so that the labor prices are very low.

2- the clear-out has a large capability, so it's miles appropriate for the filtration of surprisingly concentrated answers.

3- version of the rate of rotation allows the cake thickness to be managed.

4- pre-coat of filter out useful resource may want to use to accelerate the filtration charge.

VII. Disadvantage

1- the rotary clear out is a complex piece of device, with many moving components and may be very expensive.

2- Similar to the filter out itself, some add-ons are connected, e.g., a vacuum pump, vacuum receivers, slurry pumps, and agitators are required.

3- the cake tends to crack due to the air drawn thru by using the vacuum machine so that washing and drying aren't green.

4- it's far appropriate only for immediately- forward slurries

VIII.   Conclusion

The experimental study and optimization have been studied. We conclude that by optimizing certain parameter in the RDF the performance can be increased with considerable cost reduction also is understood the machine usually need less attention the cloth increases the performance in RDF. Filtration efficiencies can also be improved in terms of the dryness of filter cake by significantly preventing filtrate liquid from getting stuck in the filter drum during the filtration phase.

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The Management of Non-Brand Pharmaceutical Product

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ABSTRACT

Since 2015, India began imposing the National Health Insurance program. One of the goals of implementing the program is to increase the use of generic drugs. This action was done to respond the low use of generic drugs, which is around 8%, in 2012 (World Bank, 2007). Therefore, this study tried to examine the factors that influence the purchase intention of generic drugs based on the information from physicians and pharmacists. Also the overall information risk with experience was used as moderating variable. The research sample for this includes 400 respondents. The questionnaires were distributed from September 2021 until December 2021. The questionnaire distribution takes a relatively long time due to the very small number of generic drug users were available. The result shows that physician information have the biggest effect on the purchase intention of generic drugs, and that experience has a significant effect as moderating variable.

Keywords : Generic Drugs, Physician Information, Pharmacist Information, Experience

I. INTRODUCTION

Healthcare is one of the important aspects in improving the welfare of the country, especially in developing countries. Like any other sectors in developing countries, the health sector is also experiencing financial problems. The government certainly would put maximum efforts in financing the cost of healthcare for its people, especially the ones who need it the most. One of the causes of the low purchasing power on medicines of the society is the low insurance coverage program in India. This phenomenon is certainly different if it is compared to the advanced countries. In advanced countries, almost the entire society is covered by good insurance programs. The health insurance participation level in India only covers around 30% of the total population (Prabowo et al., 2012). Therefore, the Government of India needs a proper strategy to improve the healthcare of the society. In the other side, the pharmaceutical industries often view themselves as the fast moving consumer goods (FMCG) industries. The pharmaceutical industries believe that brandings are viewed as the key assets of a company, and all assets are utilized to create and develop brandings (Kumar and Srivastava, 2013).

It is very crucial that understanding consumers' responses are important implications for businesses strategies, and the marketing decisions of the firms' products and services (Nguyen and Dilip, 2012). For the main alternative strategy for the government is to overcome this gap is by increasing the selection of generic drugs for people who seek for medical treatments.

Generic drugs are reproductions from exceeded drugs' life cycle (mature drugs). The drugs are marketed using the name of the drugs' active ingredient, and they are not protected or referred to the original drugs (Garattini and Tediosi, 2000). However, the use of generic drugs is still very low. This can be proven from the generic drugs' sales volume which is around 38% and it is below the branded drugs' level (World Bank, 2008). This fact is contradictive with the theory that states consumers will reduce their purchase intention when a price becomes too high, or considered as an unreasonable price (Wong and Zeng, 2015). This makes the customer perceive that the choice of consuming generic drugs is poor because generic drugs are considered not as effective as the branded drugs. Additionally, due to the branded drugs are being used in doctors' prescriptions, this becomes marketing strategies (Königbauer, 2007). In the consumer purchase process of generic drugs, both physicians and pharmacists play a key role as prescribers and experts (Gönül et al., 2001). These roles are taken into account by the consumers (Bonoma, 1982). We have found that consumers who are better informed, adopt an active role with selected physicians (Liu et al., 2009). There are studies that show consumers who request information from their physicians are more likely to obtain a new prescription for both the needed drugs and the alternative drugs (Mintzes et al., 2003).

II. Literature

Review 2.1 Request intention

Intention is defined as a manifestation of the consumers' will in terms of an effort and action in order to carry out a specific behaviour (Ajzen, 1991). Intention captures motivational aspects that influence the consumers' behaviour, with an existing relationship between intention and future behaviour (Armitage and Conner, 2001).

2.2 Overall perceived risk

Risk is used as a determinant variable of the purchase behaviour (Gallent and Cases, 2007), and it has been used as predictors of such (Pires et al., 2004) negatively influencing intention and future purchase behaviour (Drennan et al., 2006). On the basis of the research of Drennan et al. (2006), it can be seen that there is a negative correlation between the overall perceived risk and the prescription request intention. From these explanations, a hypothesis can be formulated as follows:
H1: Overall perceived risk has a negative influence on prescription request intention of generic drug.

2.3 Physician information

Physicians are aware of their role as experts because they are professionals with the ability to prescribe drugs or medicines. They also receive information from the pharmaceutical companies regularly. Commonly, this is done by visitations from pharmaceutical companies' representatives (Venkataraman and Stremersch, 2007). A physician is the person who provides the prescription for medication (Gönül et al., 2001).
On the basis of Gönül et al. (2001), it can be seen that there is a negative correlation between physician information and overall perceived risk. From these explanations, a hypothesis can be formulated as follows:

H2: Physician information has a negative influence on overall perceived risk of generic drug use.

2.4 Pharmacist information The pharmacists support the physician's prescription, therefore, the consumer generally accepts his or her recommendations (Hassali et al., 2007). Several studies suggest that pharmacists support the prescriptions of doctors' prescribed generic drugs (Cline and Mott, 2003). Also, the consumers are open to discuss their health problems with the doctors and accepting their recommendations (Suh et al., 2002).

A. Amelia and R. Ronald

On the basis of Hassali et al. (2007), it can be seen that there is a negative correlation between pharmacist information and overall perceived risk. From these explanations, a hypothesis can be formulated as follows:

H3: Pharmacist information has a negative influence on overall perceived risk of generic drug.

2.5 Experience

When consumers have experience the product, the difference between the perceived risk of different products decreases. González et al. (2006) analysed the relationship between the perceived risk associated with a store brand, a national brand and the experiences in the product category. These authors determined that consumers who have a lot of purchase experience in the category, and who have tried the store brand products, perceive less risk in these products. However, consumers with little experience in purchasing these products, perceive greater risk in products with a store brand than those with a national brand. Also, Mitchell (1993) believes that the experiences can influence in each dimension of risk. From these explanations, hypothesises can be formulated as follow:

H4: The negative relationship between physician information and overall perceived risk of generic drug is stronger for high experience and weaker for low experience.

H5: The negative relationship between pharmacist information and overall perceived risk of generic drug is stronger for high experience and weaker for low experience.

III. Research issue and methodology

3.1 Research issue

The research data gathering conducted by literature studies, interviews and questionnaires. Literature means study of previous studies as supporting objectives in this study. Literature sources used in this study derived from books, journals, articles, government reports, other research findings and other related data. Interview means discussions with representatives from hospitals, clinics, government agencies and economists. Secondary data means data obtained from the internet, the Ministry of Health of India's official website, and also other related parties (in medics).

3.2 Methodology

The data from a personal survey administered at health centres derived from 450 individuals. The age range of the respondents is 18–60 years old. This means that they are familiar with the generic drugs. Prior to the survey, a qualitative study was conducted. Purposive sampling was conducted, with a proportional distribution among the four selected cities in India. To obtain a random sample of respondents, the surveys in health centres and pharmacies were held in different periods of the day and different days of the week. The survey process took a relatively long time due to the very small number of generic drug users were available. Generic drug in India: why physicians and pharmacists matters

IV. Findings and discussion

This study used multiple regression to examine the effect between the independent variables to the

dependent variable. Statistical analysis tool used to answer the problem formulation of this research is SPSS 16 software. The statistical tests were conducted after all primary data have been collected.

The respondents were made up of 48.25% men and 51.75% women. Almost 50% of the group is under the age of 40. Nearly 75% of the respondents had a monthly income under 3.500.000 IDR (approximately USD 260). Finally, in terms of the level of education, nearly 21% had a university degree, while 79% still pursuing college degree or only had a primary or secondary education or less.

V. CONCLUSION, LIMITATION AND RESEARCH EXTENSION

Using generic drugs is one of the ways taken by the government in order to reduce the cost of healthcare. So the allocation of health fund can be more evenly spread out and reach all levels or classes of the society who needs it the most. If most of Indian society underestimate the generic drugs then there are two kinds of cost, which are economic cost and psychological cost. Economic cost is when the society tries to buy well-known medicine brand, and it is expensive. The medicine purchased is wasting money, because the medicines are not included in the health coverage program of India. The psychological cost is when the society does not like the generic drugs but they have to use them. Then, they have a mindset that generic drugs are not that good, the effectiveness of generic drugs will decrease, and it will be more disliked by the society.

Therefore, it is important for the government to know the variables that will significantly affect the prescription request intention of generic drugs. Overall, the perceived risk variable is the one that affects the prescription request intention of generic drugs the most. The reason is because the use of medicine is directly related to the risk of the use.

Physician information is the variable that negatively affects the overall perceived value the most. When it comes to medicine, the most trustworthy party in giving information is physician.

Therefore, it is important for physicians to give proper information, options and recommendations about generic drugs to the society. Thus, the society will trust and willing to consume generic drugs when they need them. Pharmacist information is the second most influential variable that negatively affects the overall perceived risk. Beside physician, the party who fully understand about medicine is pharmacist. The way of Indian society tend to think is following the information and reference from pharmacists. Experience is used as the moderating variable that moderates the negative relationship between physician information and pharmacist information to overall perceived risk. Good and frequent experiences will moderate the effect of physician information to overall perceived risk and it is greater than pharmacist information.

This is due to physicians are considered as the party who know more about the medicine rather than pharmacists, thus with the experiences of using, then physician information will reduce more overall perceived risk rather than pharmacist information. In low experience, either physician information or pharmacist information are affecting in decreasing the overall perceived risk but the effect is not as big as the high experience.

Cite this article as :

Blockchain-Based Crowdfunding Platform for Disaster Relief and Effective Charity

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ABSTRACT

Charity plays an essential role in our society, and often recognized as a type of social debt, leading to the circulation of a significant amount of money globally. We have seen a increased growth of organizations and public charity funds through recent years, collecting donations for various philanthropic needs. Unfortunately, most of the charity funds frequently gain much funds from the unethical organization, resulting in significant damage for industry's reputation, which results in reducing trust level which affects the ability to raise donations. We strongly believe that utilizing this technology will boost trust , increase efficiency, and encourage more donations. The Charity project, a blockchain-based charity foundation platform that facilitates the trustful network's formation and is accountable for collecting donation funds. The blockchain network contains publically recognized, trustful, and prestigious organizations. The complete system will be decentralised using Blockchain Technology, Smart Contracts and Cryptocurrency. We strongly believe that utilizing our technology will boost trust , increase efficiency, and encourage more donations. All organization's operations and functions within the platform will become fully transparent and visible, leveraging properties of immutability, provenance, and non- repudiation to the users. All organizations operations and functions within the platform will become fully transparent and visible, therefore the platform will reduce the results of dishonest actions, revealing fraudulent organizations' activity.

Keywords : Blockchain Technology, Charity, Donations, Peer-To-Peer Transactions, Cryptocurrency.

I. INTRODUCTION

Now a days Donors or investors are concerned about the impact of their contributions and are ready to donate generously for the causes they believe in but usually end up in not having any trust on the society. We have a lot of NGO's and other organizations who are in need of capital, who are working for the

betterment of society. Blockchain technology provides benefits that change the way business proceeds in the world. This new way of establishing trust helps business owners to think diversely. For charitable donations, donors must either trust a charity trust or spend time in searching crowd-funding sites based on their interests. There are a lot of online portals to donate to these charities but seems to be trust less. There are also few charity trust that call people for funds as they don't operate on a large scale. But they face a lot of problems to convey their true intentions and hence don't get enough donations. Blockchain is a peer-to-peer connections used to monitor transactions on the internet. In this project we have implemented on ethereum blockchain, interacts with the block chain through smart contracts for each transaction performed the transaction hash is generated which is provided as a proof for Transaction is performed safely/correctly. Hence, in spite of all the transparency that the charitable organizations are trying to implement in their platform, but there still exists a distrust about the way of how the money is being put to implementation. Also, if an individual wants to go out and do a noble deed by helping society , nobody would fund him as people would only trust recognized charitable organisations. Hence, in this way apart from NGOs and Organisations, individuals can also contribute their talent and time to contribute for the wellness of the society and hence can make the world better place to live. Blockchain technology increases the project transparency and has accountability. This technology helps to resolve the trust issues, as people already know what they are paying and the system involves a decentralized way to solve the problem. Through this technology donors can donate the larger funds. The user can keep a record of his transactions using Blockchain technology.

We are using the decentralized fault tolerant distributed system to build the platform where

certificates will be kept on the public distributed network of blockchain. The blockchain provides a means to obtain a decentralized transaction ledger that can be used to generate, validate and send transactions to other nodes present in the same network. Blockchain can be applied in many fields like business, industry, healthcare and many more. The system proposed here is a system that validates itself and doesn't depend on the third party websites or software's. Blockchains are being used as they are not restricted to a particular system and because they can independently verify the integrity and consistency of transactions. Through blockchain, the charity system will no longer be monopolised and restricted to one authority. The public will have easy access to the transactions and can verify if their money is being used like they expected. Blockchain is being used by many private institutions to increase cyber security. The advantages of blockchain are that it is faster, cheaper, has a decentralised system and provides secure payment information. Loss of data due to single point failure can be eliminated through Blockchain technology. Our main contribution in this design of a blockchain network is that it addresses the issues and take advantage of the new features of the blockchain technology.

II. LITERATURE SURVEY

The blockchain provides a means to obtain a decentralized transaction ledger that can be used to generate, validate and send transactions to other nodes present in the same network. The blockchain can be applied to financial services, healthcare services and business and industry. This research presents an internet- based approach for crowd funding platform for disaster relief. It employs technologies such as web harvesting data, and a user-friendly online platform interface to raise public awareness of donating to people's cause.

[1]A charity application today needs a system that validates itself without depending on any other system or application. Blockchains are not restricted to a particular system because they can independently verify the integrity and consistency of transactions. Ethereum is chosen as a platform because it is a public platform and has better scalability. It can run 7-20 transactions per second. [2] Through blockchain, the charity system will have no longer control ove rthe system and restricted to one's authority. The public will have easy access to the transactions of the organization's and can verify if their money is being use properly. This helps in equal distribution of the resources to the people and increases the accountability of the Government since all the transactions are recorded and can be viewed in case of disparity. The advantages of blockchain are that it is faster and cheaper and has a decentralised registry and provides and makes secure payment information. [3] Proposed system will trace the donations by implementation of Byzantine consensus algorithm for providing scalability. [4] Implementation of blockchain technology can be adapted for the realm of charitable donations and social entrepreneurship. [5] Introduced a novel use case where the conventional methods can be improved through decentralization with blockchains. Transactions or simply data are bundled into blocks and supported with the metadata that helps to chain the block. [6] Efficient mining of bitcoin, Distributed ledger technology is the emerging new way of keeping records by distributing them to the participants of a network. Peer-to-peer networking is used to scale the reach of these networks so that participants can all maintain and witness the same set of transactions. [7] Ethereum scripts for writing rules and protocols which controls the flow of transactions and data throughout the platform.

[8] In India, an Aadhar number is issued to all Indian citizens that asserts their biometric data along with their location and other details. The Aadhar can be utilised along with Blockchain technology for many applications like healthcare and voting, data loss due to single point failure and privacy disclosure can be eliminated through Blockchain. [9] Consensus protocol is of a large significance as it decides the parameters on which the new node is validated. An inappropriate consensus protocol may lead to undesirable results while using the application.[10] Blockchain technology can create new opportunities for each industry through its features and capabilities.The challenges faced by a blockchain application are the need of resources and scalability.

III. PROPOSED SYSTEM

A Decentralized System that provides security and prevents loss of Transactional Data. The beneficiaries can get help and create charitable projects through the platform. Money Lenders learn about charity projects on the platform, then donate to beneficiaries or the charity organizations. Beneficiaries upload their information to the platform for help, they can get and spend tokens in accordingly. Funds are directly transferred to beneficiaries .No third Party is involved. Low Transaction charges as no governmental charges are included and the Transactional Fees(Gas Fees) remains same for all the transactions irrespective of the amount that is transferred.

IV. ACKNOWLEDGMENT

guidance, this project would not have been possible, I couldn't have imagined having a better guide in my study.

I also wish to express my sincere thanks to Visvesvaraya Technological University for accepting me into the graduate program. In addition, I am deeply indebted to all the staffs of my college.

V. MAIN OBJECTIVE

The main objective of the project is to develop the platform such that the charitable trust or organizations. The main purpose of the platform are as follows:-

· To make the work of charitable trust with reporting document which makes it more easier to have a record of transactions.

· To increase the transparency of charitable trust by creating a common platform based on Block chain Technology.

VI. PLATFORM FUNCTIONALITY

The functionality of the platform depends on two people: Donor and Charitable Organization.
The functionality of a donor:

· The main functionality of a donor is to get the information about his donations to the charitable organization through the platform. A donor can get the information about his donations and can have the information on the flow of funds for different companies through a unique ID.

The functionality for charitable Organization:

· The main functionality of charitable organization is to get the updated information about the donations through many donors and foundations. The organization need to be able to record the information about the donations. Based on the donations, a charitable organization can give a report for publication on the website.

· The combination of platform with the charitable trust takes place through the API through which all donations and movements will have to be registered.

VII. CONCLUSIONS

We have proposed a system for charity work to make it more transparent through a decentralised system. It will provide a trusted system and will make the entire process more transparent. This will help to do away with the middle men between donors and charitable trust. Thus, the proposed system will trace the donations and let the donor know that his/her money has reached the beneficiary successfully. Charity chain uses Smart contracts to perform the process of donations and track them. Ethereum platform is used as it is a public platform. This will provide transparency in the donations will ultimately motivate the donor to contribute more to such flexible yet efficient and traceable charities. The Covid-19 situation has also given rise to a large demand of funds and materials. It has energized to monitor the process of capital flow and improve the functional network chain of relief materials. Blockchain has receiving more attention in the charity donation system in sharing donation data, in managing information among donors and beneficiaries, in contract management among charitable organizations and enterprises, and its application in dealing with the Covid-19-centered donations are growing increasingly day to day. It is an emergency response to specific regional disaster in the wake of the changing Covid- 19 status. Instead of a proof-of-work approach, we use a well known leader based consensus scheme from distributed computing, with the addition of incentives to participate in block creation. The ultimate goal of our research is to fulfill that blockchain supported solution taps into the integration of traditional web service and blockchain technology, speeds up the system development and then responds to the needs of users in a timely fashion.

Most importantly, the features of the system promote social good through incentives for transparency, accountability and participation.

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Study on Bio-Pesticides and Organic Pest

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ABSTRACT

Natively constructed bio-pesticides are ready by family individuals utilizing neighborhood assets without having any logical review or examination. It is typically exceptionally old matured dependable practices by intrinsically. The review was directed overpowering the time of 90 days began from July 01 to September 01 from concentrating with the view to know about natively constructed bio-pesticides corresponding to their utilization, definitions and safe use in natural cultivating the executives. Natively constructed bio-pesticides are generally well disposed climate, protected, minimal expense or liberated from cost locally accessible assets usage framework through connecting family work. The normal comprehension on natively constructed bio-pesticides and natural irritation the executives was exceptionally certain. Both preventive and control measures were taken by the ranchers in the review region. Roosting, light snare and social practices were a lot of normal in bother the executives. Absence of suitable definition, bother explicit application, season of utilization, recurrence study on viability of natively constructed bio-pesticides were missing from science and measurement back. More examination could be useful in safe utilization of it and expanded the viability rate and could be guaranteed more extensive acknowledgment in the natural cultivating rehearses.

Keywords : Homemade Bio-Pesticides, Bug Repellent Harvests, Preventive Measures

I. INTRODUCTION

The utilization of natively constructed bio-pesticides in the cultivating rehearses is old matured rehearses. It is a lot of well-disposed climate and can acquire from nature straightforwardly. It is practically liberated from cost and there is no adverse consequence on human wellbeing, soil, creatures, plants and climate. Bio-pesticides are gotten from regular materials like creatures, plants, microscopic

organisms, and minerals. Bio-pesticides will more often than not be less poisonous, all the more rapidly biodegradable, and more designated to the particular irritation [1]. Presently a-days it is generally utilized because of expanded ecological mindfulness and the contamination potential and wellbeing dangers from numerous traditional pesticides, as well as expanding worldwide interest for naturally developed food, are driving the utilization of natively constructed bio-pesticides.

Natively constructed bio-pesticides enjoying a few benefits:

· Well-disposed climate than traditional pesticides.
· Offer more designated movement toward wanted bothers,
· Frequently are successful in tiny amounts, along these lines offering lower openness. They disintegrate rapidly, leaving for all intents and purposes no destructive buildup and permit field re - passage very quickly after application.
· Can be utilized in revolution with traditional pesticides when utilized in Integrated Pest Management (IPM) programs. Such projects can offer high harvest yields while significantly diminishing the utilization of traditional pesticides.

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II. STUDY OBJECTIVES

The fundamental target of this study is to know the convenience of natively constructed bio-pesticides in natural cultivating.

Different targets are to:

· know the normal irritation in the review region
· List down the name of materials utilized for homemade bio-pesticides
· know the advantages of irritation the executives in natural cultivating
· Figure out the issues connected with natural pesticides
· distinguish the variables affecting natively constructed bio-pesticides and make suitable suggestions.

III. METHODOLOGY

The whole work includes field work, gathering data about the review region and zeroed in on bunch exercises including respondent's determination, report working with the respondents and arrangement of test structure. The work additionally comprises of arrangement of survey and field trial of poll with the designated individuals. At long last meeting was made with the directed and field tried semi-organized survey in the review area. Total 3 gatherings were led for the review. Among three gatherings one meeting was directed with the ranchers bunch having age underneath 30years, one with the ranchers bunch having age between 30-50 years and another ranchers bunch having age more than 50 years. Complete 12 respondents were chosen for the meeting haphazardly. i) Category A: ranchers age under 30 years; ii) Category B: ranchers age between 40-50 years; iii) Category C: ranchers age over 50 years At long last every one of the information were gathered and investigated and introduced in plain structure in this report.

IV. BOTANICAL INSECTICIDES

Since old times, regular mixtures from plants were utilized, pretty much effectively to give security from bug bothers. In the nineteenth century, these mixtures turned out to be logically settled and generally used in the previous time of the 20th century (Morgan 2004). Plants and a few bugs have coincided on the earth for just about three and a half million years, which possesses permitted bunches of energy for both to foster hostile and protective methodologies. Plants have created numerous techniques to help themselves from being attacked by hunters. An illustration of such plant technique is creating intensifies that are profoundly harmful to bugs (Warthen and Morgan 1985; Arnason et al. 1989; Morgan and Wilson 1999; Nisha et al. 2012).

V. Neem

In Asia, neem has a broad history of purpose predominantly against family and capacity bothers and, somewhat, against bug vermin of yields. In any case, a leap forward in the insecticidal utilization of neem was achieved by Pradhan et al. (1962) who effectively shielded the harvests from bugs by applying them with low concen-tration of 0.1 % neem seed bit suspension during a grasshopper attack. The Indian neem tree (Azadirachta indica) is one of the most significant limonoid-creating plants from the Meliaceae family. A few parts of its leaves and seeds show checked bug control potential, and because of their relative selectivity, neem items can be suggested for some projects on crop bother the executives (Schmutterer 1990). Neem item action has been surveyed against 450-500 bug bother species in various nations all over the planet, and from that, 413 bug species are supposedly helpless at different con-centrations (Schmutterer and Singh 1995). In India alone, neem movement has been surveyed against 103 types of bug bugs, 12 nematodes, and a few pathogenic organisms (Singh and Kataria 1991; Arora and Dhaliwal 1994). A few ongoing surveys on the capability of neem in bug oversee ment incorporate those of Singh (1996, 2000), Singh and Raheja (1996), Naqvi (1996), Saxena (1998), and Dhaliwal and Arora (2001). Most works have zeroed in on azadirachtin lavishly from neem seed removes which go about as both solid enticed-subterranean insects and bug development controllers. Azadirachtin influences the physiological exercises of bugs (Mordue (Luntz) and Blackwell 1993) and doesn't influence other biocontrol specialists. Further, neem items are biodegradable and nontoxic to non-target living beings (Senthil-Nathan 2013).
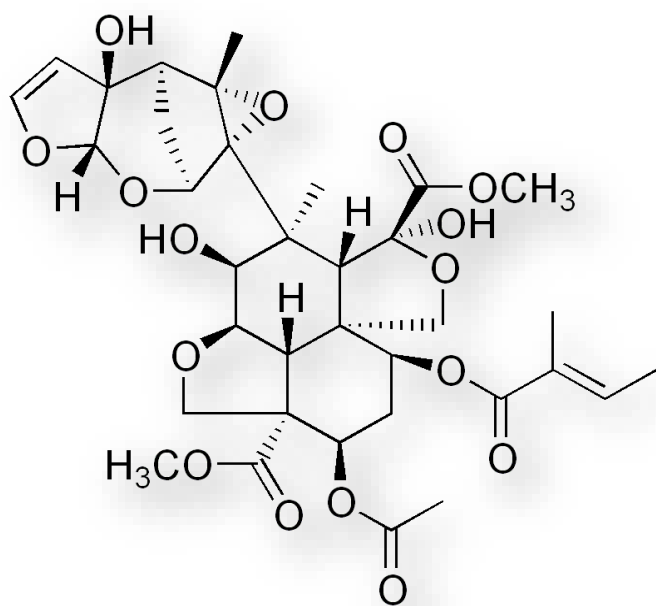
Fig 1. Structure of Azadirachtin

In a few Asian nations, various examinations have estimated neem action alone or in combi-country with laid out insect poisons and other biocontrol specialists of harming bug bothers in farming yield framework (Abdul Kareem et al. 1987; Senthil-Nathan et al. 2005a, 2006). In Indian field preliminaries did, neem not set in stone to be successful against some bug species like green leafhopper, yellow stem drill, rice nerve midge, rice leaffolder, and grass-container (Dhaliwal et al. 1996; Nanda et al. 1996; Senthil-Nathan et al. 2009).

VI. MELIA AZEDARACH

The advancement of botanicals as eco-accommodating pes-ticides, microbial showers, and bug development regu-lators has been a main pressing issue in the midst of the presence of other control estimates like helpful bugs, all of which request a joining of managed bug bother control (Ascher et al. 1995). Plant-based insect poisons are grown normally from plant synthetics separated for use against genuine bug bothers. Because of worries about the biological progression of manufactured pesticides and their likely harmfulness to people, nontarget ben-

eficial bugs, and a few homegrown creatures, there is a recovered interest in normal items to control bug bothers. From this end, the advancement of biopesticides is by all accounts a logi-cal decision for additional examination. Meliaceae and Rutaceae species have gotten much attention because of the way that they are a rich wellspring of triterpenes known as limonoids (Connolly 1983).

The antifeedant and bug development directing impacts of M. azedarach separates are known for some bugs (Connolly 1983; Saxena et al. 1984; Champagne et al. 1992; Schmidt et al. 1998; Juan et al. 2000; Carpinella et al. 2003; Senthil-Nathan 2006; Senthil-Nathan and Sehoon 2006), the last option impact being the most fundamental physiological impact of M. azedarach on bugs (Ascher et al. 1995).

As recently referenced, the Meliaceae plant family has been known as an expected hotspot for insect spray properties. Likewise, a few concentrates from neem and other plant seeds and leaves have dominate loaned insecticidal properties against vectors and are simultaneously very eco-accommodating (Schmutterer 1990; Senthil-Nathan et al. 2005a, b, c). The effi-caciousness of these neem items on mosqui-toes was additionally illustrated (Chavan 1984; Zebitz 1984, 1986; Schmutterer 1990; Su and Mulla 1999; Senthil-Nathan et al. 2005d).

Unmistakably, plant-determined poisons are an important wellspring of likely insect poisons. Plants and other normal insect poisons might assume an essential part in mosquito control programs as well as in other significant bug control programs (Mordue (Luntz) and Blackwell 1993).

VII. Advantages of natural irritation the board

Natural irritation control strategies are non-dangerous to the wellbeing of both human and creature populace. 66.66% of the respondents of the review region were accounted for that natural bug the

board framework is minimal expense, help to create Chemicals free food, climate cordial and 83.33% respondents were referenced that the technique is not difficult to apply.

VIII. Issues of Homemade bio-pesticides

Custom made bio-pesticides are gotten from nature agreeable information sources and not having inconvenient impact to the climate or in human wellbeing. A few issues were perceived by the respondents of which not promptly accessible in the market followed by can't store for long time, work concentrated, absence of preparing, absence of information on explicit plan and awful stench.

IX. DISCUSSION

Various ways to deal with bother control are similarly prominent. In compound cultivating, a particular bug spray might be applied to rapidly kill off a specific bug (creature). Substance controls can significantly decrease bother populaces for the present moment, yet by unavoidably killing (or starving) normal hunter bugs and creatures, cause an extreme expansion in the vermin populace. Rehashed utilization of bug sprays and herbicides and different pesticides likewise empowers quick normal determination of safe bugs, plants and different living beings, requiring expanded use, or requiring new, more remarkable controls.There are additionally a few general difficulties with utilization of bio-pesticides. They will quite often be all the more sluggish acting [2] and might be unmistakable to the existence pattern of the bug. Different credits, for example, ingenuity in the climate have both an advantage and challenge that should be adjusted. For instance, a bio-pesticide that debases rapidly in the climate (benefit) may likewise have a short time span of usability or restricted field tirelessness [2] requiring various applications. Having a tight objective reach and quite certain method of activity should be visible

as both an advantage and a test [2]. While one advantage of explicitness is lower sway on non-target species, one test is that control of the predominant vermin on a given yield might require more than one item and might be all the more exorbitant. Additionally as noted, bio-pesticides fall on a continuum of expansiveness of explicitness: a few dynamic fixings are exceptionally explicit to a specific organic entity at a specific open door; others have a more extensive method of action. Bio-pesticides are particular sorts of pesticides got from such normal materials as creatures, plants, microbes, and certain minerals‖ [1].Some rejuvenating balms fill in as anti-agents, and their method of activity would be as a fragrance.‖ [4].There are right around 122 biochemical pesticide dynamic fixings enlisted with the EPA, which incorporate 18 flower attractants, 20 plant development controllers, 6 bug development controllers, 19 anti-agents, and 36 pheromones [2].Neem materials can influence bugs, bugs, nematodes, parasites, microorganisms, and, surprisingly, some infections. In spite of being gotten from regular and inexhaustible sources, the utilization of Neem items raises a worries because of its somewhat expansive range action.

Bug development guideline is one of various capacities given by the constituents of this plant oil. Among the detached Neem constituents, limonoids (azadirachtin) are successful in bug development administrative movement. Azadirachtin doesn't straightforwardly kill bothers, yet modifies the life-handling conduct in such a way that the bug can never again take care of, breed or go through transformation [5]. All the more explicitly, neem (azadirachtin) upsets shedding by repressing biosynthesis or digestion of ecdysone, the adolescent shedding chemical [6].

For all yield types, bacterial bio-pesticides guarantee around 74% of the market; contagious bio-pesticides, around 10%; viral bio-pesticides, 5%; hunter bio-

pesticides, 8%; and —other‖ bio-pesticides, 3% [7].At present there are roughly 73 microbial dynamic fixings that have been enrolled by the US EPA. The enrolled microbial bio-pesticides incorporate 35 bacterial items, 15 organisms, 6 non-suitable (hereditarily designed) microbial pesticides, 8 plant fused protectants, 1 protozoa, 1 yeast, and 6 infections [4].

X. CONCLUSION

Toward the finish of my review I can say that natural bug the board framework is an ecological well disposed, minimal expense, and sound strategy for bother control framework. Slowly ranchers getting mindful of this strategy and this bug the board framework are getting well known step by step due to its helpful elements. Bio-pesticides are a bunch of devices and applications that will help our rancher's change away from exceptionally harmful regular synthetic pesticides into a period of really reasonable horticulture. Obviously bio-pesticides are just a piece of a bigger arrangement; economical agribusiness is a wide and profound field. Be that as it may, assisting ranchers with moving from their present synthetic reliance to natural agribusiness and past requires devices for the change and instruments for another period. Bio-pesticides can and will assume a critical part in this process. There remain, nonetheless, genuine inquiries concerning the security of these items from both a human and biological system wellbeing point of view. Current guidelines don't go anywhere near far enough in assessing fundamental more extensive effects of bio-pesticides. By definition, green science is about consistent upgrades pointed toward diminishing or killing risk. Completely characterizing peril is troublesome. Indeed, even items hailed by green science and controllers the same as more secure for human wellbeing might end up having unanticipated negative natural wellbeing impacts-for instance, Spinosad, a green science grant winning bio-pesticide, is fundamentally more secure for people than different medicines yet is harmful to honey bees.

We should support bug the executives arrangements and guidelines to consistently develop and guarantee that multi-disciplinary groups, including green scientific experts, ecological wellbeing sciences and different sciences, approach these items foundationally to both find and refine them. Bio-pesticides offer useful assets to make another age of supportable agribusiness items. They are the most probable hotspot for options in contrast to the absolute most tricky substance pesticides presently being used that are under steadily expanding examination. Bio-pesticides may likewise offer answers for worries like bug protection from customary synthetic pesticides, public worry about results of pesticides on the general climate and eventually, on human wellbeing.

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Automobile Engine EGR Valve Quick Detection Device

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ABSTRACT

Under the background of the rapid development of the automobile industry and energy conservation and emission reduction, preventing automobile exhaust emissions is very important to control environmental pollution. While directly endangering human health, exhaust gas also has a profound impact on the human living environment. As an essential part of the exhaust gas recirculation device, EGR(Exhaust Gas Recirculation) valve is an electromechanical integration product installed on the engine to control the amount of exhaust gas recirculation of the intake system. Problems with the EGR valve will seriously affect the performance of the engine. This paper aims to develop a testing and quality control device for EGR valve to solve the problems of multi-parameter detection and field test of EGR valve, which can be portable and easy to operate and meet international standards.

Keywords : EGR, Automobile Engine, Troubleshooting, Detection Device

I. INTRODUCTION

The EGR (Exhaust Gas Recirculation) Valve is an electromechanical integration product installed on the engine to control the amount of exhaust gas recirculation of the intake system. The EGR system works by cooling down the exhaust gas in the engine exhaust pipe through the pipeline and radiator, then the exhaust gas enters the intake system through the

EGR valve, and will get into the cylinder mixing with the air for combustion. As some of the exhaust gas is involved in combustion, which can effectively inhibit the formation of hydroxide in the engine exhaust gas and lower the engine combustion temperature, the aim of reducing the engine exhaust emission can be achieved. The EGR valve lowers the combustor temperature by directing the exhaust gas caused by the engine combustion to the intake manifold to

participate in combustion so as to increase the engine efficiency, improve the combustion environment, and decrease the engine load to effectively reduce NO compound emissions and detonation and extend the service life of each component. Modern electronically controlled engine set position sensors to regulate the opening and closing of the EGR valve to prevent the amount of exhaust gas recirculation from having an excessive impact on engine performance.

This paper provides an EGR valve testing device whose principle is to use PWM （ Pulse Width Modulation)-promoted MOS(Metal Oxide Semiconductor Field Effect Transistor ） tube driver board to simulate the engine ECU control signal to drive and control the EGR valve tested, then the valve spool opening degree is controlled in the process of the SCM (Single-Chip Microcomputer) control module adjusting the PWM signal to regulate the duty cycle, and the data is transmitted to the touch-sensitive screen for display. In addition to some touching operation buttons, the touch-sensitive screen can also display information such as driving voltage, driving current, EGR valve spool opening degree and EGR valve response time, which can be used for comprehensive analysis of the EGR valve. This device is a touch-sensitive intelligent testing equipment for electronically controlled EGR valve, as well as a testing and quality control device for EGR valve to solve the problems of multi-parameter detection and field test of EGR valve, which can be portable and easy to operate and meet international standards.

II. EGR Valve Detection Device Hardware Indicators

The hardware part of EGR valve detection device mainly consists of touch-sensitive screen, Arduino Uno micro control board, MOS driver board, etc.

A. Touch-Sensitive screen

As a new type of computer input device, touch-sensitive screen allows users to carry out the operation by simply clicking on the text or pattern on the viewing screen, so that human-computer interaction no longer depends on the mouse and keyboard, bringing convenience and efficiency to the user. Combining with the specific requirements of the system and economic and practical considerations, we used BOE 10.4-inch LCD screen: BA104S01-300, with the advantageous size of 10.4-inch, resolution of 800 (RGB)×600, brightness of 350, and the LCD touch-sensitive screen. This product boasts a high-performance and high-rate processor based on ARMv7, which is a powerful embedded touch-sensitive screen. As shown in Fig. 1.

Fig. 1: Touch-Sensitive screen

B. Arduino Uno

Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (6 of which can be used as PWM outputs), 6 analog inputs, 16MHz crystal oscillator, USB connection, power jack, ICSP connector and reset button. Power supply, program download and data communication can be done by simply connecting to a PC via USB cable. The main features of this microcontroller are: the model is ATMEGA328P; operating voltage is 5V; input voltage

(recommended) is 7-12V; input voltage (limited) is 6-20V; 14 digital I/O pins; 6 PWM digital I/O pins; 6 analog input pins; DC current of 3.3V pins is 20mA; flash memory is 50mA ; SRAM is 32KB; EEPROM is 1KB; clock speed is 16MHz; LEED_BUILTIN is 13; 68.6mm long; 53.4mm wide, and weighs 25g.
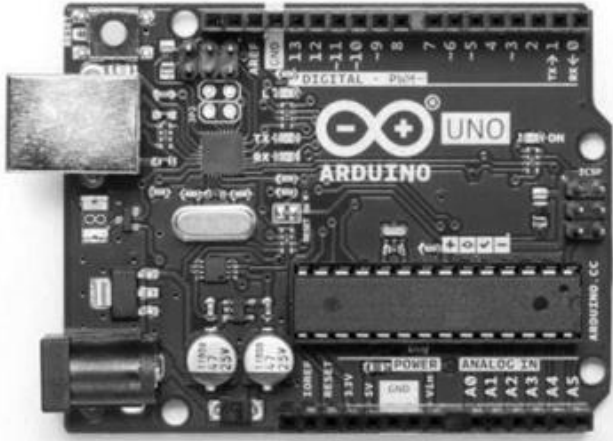
Fig. 2: Microcontroller

III. The Measurement and Control System Design of EGR Valve Detection Device

The measurement and control system of EGR valve detection device consists of measurement and control module, touch-sensitive screen control module, power drive module, power supply module, electrical signal conversion module, and human-machine data interaction module.

A. Structural composition of measurement and control system

The measurement and control module is the core part of the EGR valve detection device, and its core function is to control the input signal, collect the current data of the motor-drive circuit, achieve start-stop control of the system and the interaction function of data communication. The architecture diagram of the measurement and control system of the EGR valve feature extraction system is shown in Fig. 3.
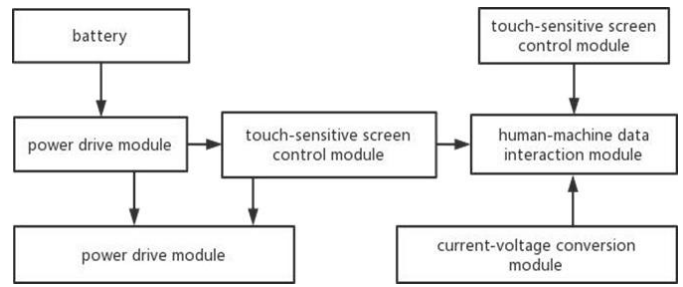
Fig. 3: Measurement and control system architecture of EGR valve feature extraction system

The human-machine data interaction module is mainly responsible for the data interaction between the EGR valve detection device and the outside world, which can transfer the EGR valve feature information data obtained by the detection device to the upper computer for storage, and then transmit it to the mobile device through the data cable for reading and analysis to extract the EGR valve feature information.

When touch-sensitive screen control module device starts on feature extraction operation, tester should click the switch button, input the pulse width, then the device starts to work, and the EGR valve spool opening degree changes. At the same time, the input pulse width and the corresponding valve spool opening degree are displayed on the control interface, which makes it easy for the tester to carry out the inspection of the EGR valve device. When the test is finished, the device stops working by clicking the switch button again. The touch-sensitive screen control interface is shown in Fig. 4.
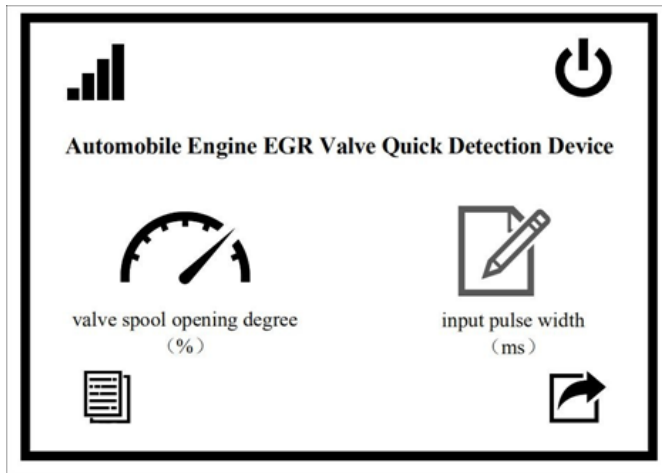
Fig. 4 : EGR valve testing device touch screen control interface

The power supply module consists of a battery pack, which can output 24 volts to power the motor equipment of EGR valve feature extraction system. At the same time, it ensures that the working current of the whole system does not exceed the safety threshold during normal operation, which provides guarantee for the safety of the system.

The motor power drive module implements the PWM signal to drive and control the MOS circuit of the EGR valve to complete the drive of the motor. The electric drive circuit current of the motor can be converted into analog voltage value through the electric signal conversion module, and the analog voltage value is amplified by the amplifier and transmitted to the main control chip for conversion, then the change of electric drive voltage can be obtained for the EGR valve feature extraction.

B. Workflow of the measurement and control system

The measurement and control system of the EGR valve detection device is responsible for the control of the equipment and the processing and transmission of data during the EGR valve feature extraction operation, which requires high stability, economy and convenience in the process of extracting EGR valve features. Before the feature extraction, the operator sets a specific input pulse width for the motor. When the system starts working, the measurement and control system keeps detecting the current level in the working circuit to prevent the circuit from being overloaded. In the event of a circuit overload, the system will automatically stop the motor and save the current data acquired and alert the operator.

IV. Algorithm Design for EGR Valve Detection Device

The key technology of the Algorithm design for EGR valve detection device is Arduino.

A. The key technology

Arduino is a software and hardware platform based on open source code. It is an open source electronic prototyping platform which is convenient, flexible and easy to operate, including hardware and software. Arduino is built on the open source code simple I/O interface version, and has a Processing/Wiring development environment like Java and C language.

Arduino can sense the environment by means of a variety of sensors and give the feedback and influence the environment by controlling lights, motors and other devices. The microcontroller on the board can write programme through Arduino's programming language, then compiles into a binary file, and burns into the microcontroller. Programming of Arduino is realized by using the Arduino programming language and the Arduino exploitation environment. Projects based on Arduino can contain mere Arduino, or they can contain Arduino and some other software running on a PC, and they communicate directly to achieve it.

B. Principle and flow diagram

The main flow diagram of the control system of the touch-sensitive intelligent EGR valve detection device is divided into frequency setting, manual or automatic control mode, core processing algorithm, and PWM control signal output. As shown in Fig. 5,

the main flow diagram of the system software is as follows.
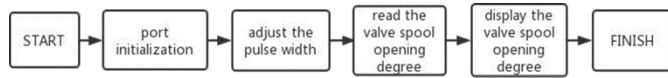
Fig. 5 : Main flow diagram of the software

Through the flow diagram, we can see that when the system starts to run, the ports of the SCM are firstly processed, including some parameter settings, the initialized assignment operation of IO port. After initialization, the control mode selection is carried out, including manual control mode and automatic control mode.

When in automatic control mode, the system first reads the valve spool opening degree feedback and displays the read-out value on the touch-sensitive screen. The valve spool opening degree setting value is read and then processed by the algorithm to make the IO port of the SCM output a pulse width to drive the EGR valve through the drive circuit.

When the control mode is in manual control which is relatively simple, the pulse width is completely determined by human factors. According to the feedback value of the valve spool opening degree, the pulse width of the SCM output can be changed manually through the touch-sensitive screen.

In the software design, the output pulse width of the IO port of SCM or the size of the duty cycle of PWM

pulses is controlled through the touch-sensitive screen . The pulse width output from the SCM goes through the driver to make the EGR valve start to work.

V. Summary and Prospect

In order to verify the effectiveness and accuracy of the EGR valve detection device, we applied the

feature detection algorithm to test the EGR valve. First, the EGR valve is driven and controlled by the PWM- promoted MOS tube driver board, and then the duty cycle of the PWM signal is adjusted by the SCM control module to determine the valve position based on the voltage data coming from the EGR valve. The accuracy of the device is then tested by comparing it with the calculated results displayed on the touch- sensitive screen.

The model detection results are very satisfactory, and the detection function of the device for the EGR valve is basically realized. The experimental results show that the system can effectively measure the valve spool opening degree. The experiments proved that the theory of measurement and control system and practical application results of the detection device are consistent. It can be seen that the device prototype has basically met the productization requirements in terms of performance indicators. In the future, we will increase the product performance testing items, expand the scope of application, and improve the advantages of promotion and application.

The study of the automobile engine EGR valve quick detection device can improve the EGR valve research system, solve the current problem of no technical EGR valve testing instruments in both service stations and repair shops and high maintenance costs, meet the needs of the application market, and lay the foundation for subsequent research. At the same time, the results of the study will advance future research on the inspection of automotive components and help raise the attention of this field for further development of research.

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A Review on Study of Shell and Tube Heat Exchanger

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ABSTRACT

Heat exchangers are used in a variety of industrial and technical settings. The design of heat exchangers is fairly sophisticated, since it necessitates an accurate study of heat transfer rate and pressure drop estimates, as well as considerations like as long-term performance and cost. Whenever heat transfer inserts are employyed, Along with the rise in heat transfer rate, the pressure drop increases as well. The pressure has risen. Energy conservation is critical for both industrial development and environmental impact reduction. Because of current energy prices, the need for energy conservation is rising. More resourceful gadgets can help reduce energy costs. In the refrigeration, automotive, chemical, and process sectors, heat exchangers are the most significant device. As a result, there is a demand in the industrial sector for heat exchangers that are less expensive, more efficient, and smaller. Inserts in channels are widely employed as part of a passive heat transfer augmentation technique.

Keywords: Shell and Tube Heat Exchanger, Parameters, Performance, Economic Evaluation.

I. INTRODUCTION

A heat exchanger is a device that allows heat to be transferred between two fluids that are at different temperatures. Due to its diverse structure and usage in heat transference processes for creating conventional energy, such as condensers, heaters, boilers, or steam generators, heat exchangers are widely employed in industry. They have enough surface area for heat transmission, and their mechanical and thermal properties allow for high pressure and high temperature operations[1].

The most popular and widely used basic heat exchanger configuration in industry is shell and tube heat exchangers in different construction modifications. The number of shell and tube passes involved in a shell-and-tube heat exchanger is

categorised further. For high-pressure applications, shell and tube heat exchangers are commonly employed. The secondary fluid flows through the shell and over the tubes' surface when the tube bundle is put within a shell. This design of heat exchangers is commonly employed in nuclear engineering, as in the case of steam generators, which transform feed water into steam from heat produced in a nuclear reactor core. The heat exchange surface must be larger to increase the amount of heat transferred and the amount of power generated. The fluid enters the tube side of the exchanger through the front header. The Stationary Header is a term that is occasionally used to describe it.In exchangers with several tube side passes, the rear header is where the tube side fluid departs the exchanger or is returned to the front header.Tube bundle—consists of tubes, tube sheets, baffles, and tie rods, among other things, to keep the bundle together.The tube bundle is kept in the shell[2].
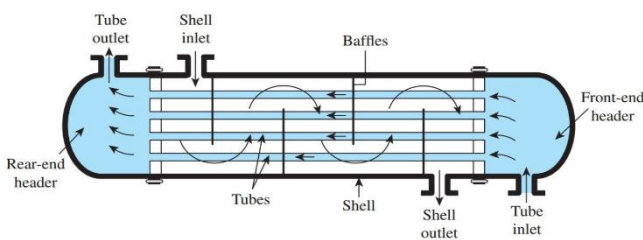
Figure 1: Schematic of heat exchanger[2]

In refrigeration systems, the vapour compression mechanism is commonly employed. The vapour compression cycle is used in this refrigeration system. The smooth execution of this cycle necessitates the inclusion of external labour.The Vapour compression refrigeration technology, which has a high coefficient of performance, is used in the majority of residential refrigerators. Components of the system include the compressor, condenser, expansion valve, and evaporator. The effect of all system components has an impact on the system's performance. By replacing the typical condenser with a micro channel heat exchanger, the performance of different condensers may be compared by varying the pressure and the

COP of a vapour compression refrigeration system. Varied condensers have different heat transfer rates as a result of pressure variations[3].

The performance of heat exchanger is depending on different parameter. The design of heat exchanger depends on the use, area availability, space required, and rate of heat transfer and depends on the working fluid. In order to increase the performance of heat exchanger different input parameters and boundary conditions were enhance or optimize. In order to increase the heat transfer rate different flow pattern were used. Here in this work tube type heat exchangers are selected for the present research it has a plain finned tube configuration[4].

II. LITERATURE SURVEY

The author of this work has recognised the numerous types of heat exchangers utilised in the process sector, as well as their benefits and drawbacks, and has ultimately established the crucial characteristics linked to heat exchangers. Double pipe heat exchangers, shell and tube heat exchangers, plate heat exchangers, spiral plate and tube heat exchangers, and air cooled heat exchangers have all been investigated by the author. Author also used CFD to simulate heat exchangers and calculate temperature and pressure distribution in heat exchangers, concluding that heat exchangers are made to meet the demands of processes such as cool heaters, and evaporators, and that process conditions play an important role in heat exchanger selection[5].

When compared to other heat exchangers, shell and tube heat exchangers offer a larger area of heat transmission. Shell and tube heat exchangers are commonly employed to transfer heat between two liquids with high densities. In this study, we experimented with nano fluids in a shell and tube heat exchanger. Nano fluid is made up of 100 nano meter nano particles suspended in a base fluid. Metals,

carbides, and oxides are the most common micro particles, whereas ethylene glycol, water, and oil are the most common base fluids. Many experiments have been carried out in order to improve the heat transfer rate in heat exchangers by using nano fluids.The use of nano fluids to enhance heat transfer rate is dependent on the type of nano particle used, its concentration in the base fluid, and the size of the nano particle. The focus of this study was on the evaluation of convective heat transfer coefficients, exchanger efficacy, and total heat transfer coefficients in shell and tube heat exchangers. The major goal of this study was to see how well the plate heat exchanger performed with these settings and a parallel flow configuration. Convectional fluid is commonly utilised as a working fluid in heat exchangers in industry. According to the findings, the heat transmission capability of nano fluids is greater than that of convectional fluids.As a result, utilising nano fluids as the working fluid in a heat exchanger will improve the heat transfer rate capabilities. Water was used as the working fluid at the commencement of the study. The nano fluids performed the best in the experiment, according to the results[6].
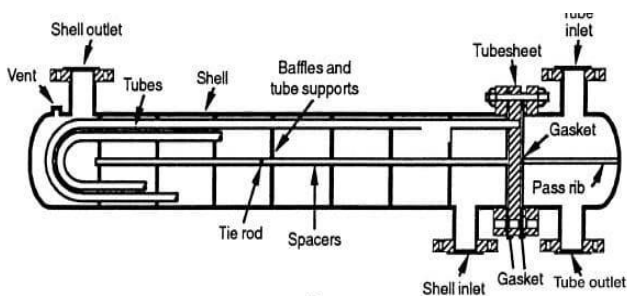
Figure 2: Internal Classificationof heat exchanger[6]

The author has included all of the shell and tube heat exchanger's design parameters in this work since they are important in the industry for heating, cooling, condensing, and pre-heating, and they are also frequently used in the refrigeration and air conditioning industries. The cost of a heat exchanger is mostly determined by the area required for heat transmission, and in this differential evaluation, the most cost-effective design of a shell and tube heat exchanger was chosen[7].

The author has addressed the performance of shell and tube heat exchangers in this work, since shell and tube heat exchangers play a critical role in industries for cooling and heating. Also, how the kind and direction of baffles affects the performance of shell and tube heat exchangers. More study on exchanger parameters such as tube diameter, working fluid, baffles, and shell diameter is needed. To make it more cost effective, a shell and tube heat exchanger will undoubtedly provide encouraging results[8].

The author of this paper investigated the baffles plates with different orientations used in heat exchangers to improve the performance of heat exchangers. He discovered that if segmented baffles are inclined rather than at 0° with sealing strips, the exchanger can provide better heat duty and improved performance, as well as less fouling and low pressure drop than an exchanger without such an arrangement[9].

The thermal performance, pressure drop, and direction of fluid flow are the main aspects to focus on while evaluating the performance of a heat exchanger in this study. The author of this research gives numerical calculations and simulations on baffles, such as single segmental and helical baffles. And it demonstrates how they affect pressure drop and heat transfer rate. This comparison shows that helical baffles are more effective than single segmental baffles because single segmental baffles form a dead zone, which reduces heat transfer rate and increases pressure drop, whereas helical baffles have fewer dead zones, resulting in lower pressure pressure drop and thus lower pumping costs increases the overall efficiency of the system[10].

Figure 3: BAFFLES[10]
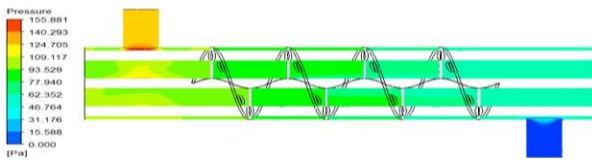
Figure 4: Pressure And Temperature Distribution In Heat Exchanger[10]

The author has looked at the basic design factors and equations for heat exchangers, as well as the relevance of heat exchangers in the chemical industry, in this study. Using computer numerical calculations and diagrams, the author has explored the design of two fluid heat exchangers. We may utilise the same design process for recuperator and regenerators, according to this research[11].

The author of this paper has developed an economic simulation model of heat exchangers for all flow patterns (co-current, counter-current, and cross-flow) using different inlet and outlet flow conditions obtained from static simulation, the NTU (number of transfer unit) method, and minimum heat capacity values, and then uses those values in economic simulation. For heat exchangers, he calculated the economic relationship between effectiveness and expenditure coefficient. He came to the conclusion that in cross flow, if the outlet flow conditions are known, the efficacy of the heat exchanger can be estimated using thermal calculations; otherwise, we can only use mathematical linear equations to determine the effectiveness of the heat exchanger. The same may be said for the other two flow patterns. As a result, using static simulation and thermal computation to get the results is a simpler procedure[12].

An increase or improvement in energy savings is always a major aim for the industrial sectors to attain. Because of the present energy prices, the need for energy conservation is growing. In the refrigeration, automotive, chemical, and process sectors, heat exchangers are the most significant device. In the industrial industry, there is a desire for cost-effective, more efficient, and smaller heat exchangers due to the danger of rising energy consumption. As a result, this article presents a detailed analysis of the experimentation as well as computations based on the experiment. This experimental examination of heat exchangers and their calculations aided in the development of some efficient and more effective new basics that may be utilised in the future to preserve heat and save energy. There is potential for growth in the future[13].

Heat exchanger design is a time-consuming process. Apart from the difficulties of long-term performance and economics, it necessitates a precise examination of heat transfer rate and pressure drop calculations. To keep the equipment as small as possible while yet achieving a high heat transfer rate with little pumping power. For heat transfer enhancement, such strategies are effective. Several strategies have been presented in recent years to obtain a desired heat transfer rate in an existing heat exchanger while using little pumping power, and are discussed in this work. All of the computations are specified using the classic Dittus Boelter equation, which states that when re grows, nu increases, and h increases as well. Because at larger flow rates, these values of the computations continue to rise with Reynolds number[14].

The heat transfer tube was analysed in this article using various parameters. The thermal analysis of shell and tube heat exchangers was performed in ANSYS utilising varied thermal loads and streams of water and steam. The computation was done in C code, which is useful for thermal analysis. Various materials have compared and contrasted different thermal materials. According to the findings, steel has a superior shell structure than cooper for tubes and baffles. The LMTD and surface area change as the water temperature rises. When the fouling factor of the oil increases, the total heat transfer coefficient decreases[15].

The technique for specifying a design is a feature of heat exchanger design. Heat transfer area and pressure drops, as well as ensuring that the anticipated design meets all requirements. This paper explains how to construct a shell and tube heat exchanger, which is the most common type of liquid-to-liquid heat exchanger. Design considerations in general and This document also includes illustrations of the design process. HTRI software is used to check manually calculated values in design calculations result. Following an examination of the literature, it can be determined that. As the fluid flow rate in the shell and tube heats up, the pressure drop increases.Pumping power is increased by using a heat exchanger.The genetic algorithm has a huge impact.when compared to the previous designs, there is an improvement in the optimal designs in comparison to classic designs Algorithm with genetics a programme for calculating the global minimum The cost of a heat exchanger is much lower, and offers a distinct advantage over other approaches in terms of obtaining several high-quality solutions As a result, the designer has additional options. It also shows that, in comparison to the genetic algorithm, the harmony search method can converge to the best solution with greater precision.Tube pitch ratio, tube length, tube layout, and baffle spacing ratio have all been identified as critical design elements that have a direct impact on pressure drop and produce a conflict between effectiveness and total cost.In summary, effective thermal design for shell and tube heat exchangers must be evaluated in order for industries to run at a low cost[16].

III. CONCLUSION

In this study, the many types of heat exchangers used in industry are addressed, as well as the criteria for selecting device based on performance, function and the economic aspect. Depending on the process parameters, they are built as condensers, evaporators, or heaters. After identifying widespread applications in industry, several researchers chose shell and tube heat exchangers as a key area to research. The performance of these heat exchangers was improved by altering various parameters using numerical and experimental simulations. Other parameters included baffles, baffle spacing, baffle angles, tube diameter, working fluid, and others. The results were encouraging, and the efficiency of shell and tube heat exchangers improved dramatically. According to their intended applications, shell and tube heat exchangers must be made less expensive and more efficient. There are several factors in shell and tube heat exchangers on which additional research may be done. Because of this, the attention may be mostly on baffles. And also the effectiveness of the heat exchanger in case of counter-current flow can be equal to 1 when we provide the ideal conditions because maximum possible heat transfer rate can be equal to the actual heat transfer rate since the temperature change not exceeds the pinch point condition, but in case of the parallel flow in shell and tube heat exchanger pinch point condition exceeds thus the effectiveness of the heat exchanger in case of parallel flow should be less than 1.

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Institutional Strengthening of Local Community Savings and Loans Groups: A Comparative Study of Mosque-Based and Non-Mosque-Based

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ABSTRACT

This study aimed to describe comparatively the institutions of mosque-based savings and loan groups and non-mosque-based savings and loan institutions. This study also described the institutional relationships of savings and loan groups and mosque institutions, implications, and forms of strengthening group institutions to be competitive, independent, and sustainable. Researchers collected data through observation, interviews, and focused group discussions. In analyzing the data, the researcher first did sorting, categorizing, and grouped according to the needs of the analysis. The results showed that the mosque-based savings and loan institution was formed on a close emotional relationship with fellow mosque congregations. Such groups are formed out of concern for helping fellow congregation members of the mosque. Meanwhile, non-mosque-based savings and loan groups were formed to submit a revolving fund loan to the management of the activity management unit. The relationship between savings and loan group institutions and harmonious mosque institutions makes mosque activities quite lively. Institutional strengthening of mosque-based savings and loan groups is related to strengthening worship; strengthening the understanding of Islamic teachings; strengthening religious social activities; strengthening social security; and strengthening productive economic business activities. Meanwhile, strengthening non-mosque-based savings and loan groups, in addition to strengthening forms such as mosque-based savings and loan institutions, also needs to strengthen group management.

Keywords: Institutional strengthening, savings and loan groups, local communities, mosques

I. INTRODUCTION

Savings and loan groups, like other groups, are social activities. By grouping, its members can interact with each other. The existence of the group is very important to build togetherness in sharing, as well as to increase the bargaining position in the community. Groups can access information and can access various resources. In groups, the members build togetherness, learn to make decisions, and learn to organize. Thus,

they can confidently be actively involved in their area for various activities.

Groups can be formed on various social backgrounds, both based on geographical similarities, activities, ideologies, values, and so on. The gathering of the congregation of the mosque at every prayer time and during the commemoration of major Islamic holidays which are held in the mosque becomes a strong reason to carry out the same activities, such as forming savings and loan groups, recitation groups, and others. The savings and loan group at the Al Hasanah mosque, Boidu Village, North Bulango District, Bone Bolango Regency is one of them. The group, which has been formed for a long time, has provided benefits for its members, as well as the congregation of the mosque in general. However, this savings and loan group is still weak institutionally. This group has the potential to be more independent and sustainable if it has adequate institutions and is run by its members consistently.

Research related to savings and loan groups, among others, by Ardiyati (2018) explains that women's empowerment activities through group savings and loans are proven to be able to provide various improvements. There was a reduction in poor families with the use of loans mostly for additional capital for their business activities. Changes in income in medium capacity but enough to change women's economic ability to be able to hold their own money, not too dependent on their husbands, changing from labor to having their own business, the majority of businesses are still done by themselves. There has been an increase in the ability of women to participate in development.

Another study by Mursalin et al. (2017) concluded several things. 1). The procedure for borrowing revolving funds from the Activity Management Unit (UPK) to the Women's Savings and Loans group (SPP) begins with the creation of a women's savings and loan group first. 2). The factors causing the occurrence of non-performing loans in the Revolving Fund Program by the activity management unit in the National Program for Community Empowerment (PNPM) *Mandiri Perdesaan* (MP) for women's savings and loan groups are socio-economic. The non-functioning of the group, namely that one of the members ran away, the members ran away with money, the management used the funds for other purposes and some died, is a social factor, while the failed or unproductive business is an economic one. 3) Settlement of non-performing loans in the revolving fund loan program is carried out through deliberation and consensus between the women's savings and loan groups, the Village Head, and the PNPM-MP UPK, so the settlement is based on an agreement between the parties but most of the settlement methods are carried out jointly and severally. between SPP group members because if one of the SPP groups does not complete the loan, the village/village cannot receive any more revolving loan funds from the PNPM-MP UPK.

Meanwhile, Qodriyati and Fakhruddin (2016) in their research explain that the form of SPP activities includes SPP members or beneficiaries making loans. Doing business by utilizing SPP funds as additional capital for business forms of members or SPP beneficiaries so that they can develop. SPP members or beneficiaries return the SPP funds, even though there are SPP members who are not appropriate and will no longer receive SPP loan funds from PNPM Mandiri in Rural Areas. Members or beneficiaries of SPP can develop their form of business. Empowerment indicators related to economic capacity, including income indicators for SPP members or beneficiaries have developed and increased. The indicators of ownership of SPP members or beneficiaries have increased both secondary and tertiary needs. Direct and indirect education costs, all members or beneficiaries of SPP

can meet them because the community is aware of the importance of education for their children.

Meanwhile, Alwi (2015) conducted research related to optimizing the function of mosques in empowering the community's economy, explaining that the role of mosques in the economic empowerment of their congregations has been exemplified in the history and traditions of Muslims since the time of the Prophet Muhammad and his companions, namely with the establishment of Baitul Maal wat Tamwil (BMT). The real condition of the function of the mosque today is still far from the example of the time of the Prophet. This real condition is exacerbated by the perception of some people who have not been able to accept the functioning of the mosque in many aspects of life, including the economic empowerment of the community and its congregation. Nevertheless, the economic empowerment of the mosque-based community has a pretty bright prospect because it is supported by the condition of the community which continues to transform towards modernity.

This study focuses more on strengthening local community savings and loan groups. Researchers in this study conducted a comparative analysis between mosque-based and non-mosque-based savings and loan groups. More specifically, this study explains the following, namely the institutional comparison of mosque-based and non-mosque-based savings and loan groups; institutional relations of savings and loan groups with mosque institutions; implications of savings and loan groups for worshipers and residents around the mosque; and strengthening group institutions to be competitive, independent, and sustainable.

II. LITERATURE REVIEW

Groups are individuals small enough for all members to communicate with relative ease. The members relate to each other with some common goals and have some kind of organization or structure between them. Groups develop norms or rules that identify what is considered desirable behavior for all its members (Devito, 1997). According to Sherif and Sherif in Ahmadi (2002), a group is a social unit consisting of two or more individuals who have held social interactions that are quite intensive and regular, so that between individuals there is already a division of tasks, structures, and norms that are unique to each other. that group.

A group is people who have a common goal and interact with each other to achieve a common goal, get to know each other, and invite them to be part of the group (Mulyana, 2011). A social group is a set or unity of people who live together, because of the relationship between them. These relationships, among others, involve reciprocal relationships that influence each other and also an awareness of mutual help (Soekanto, 2006).

Baron & Byrne (1979) stated that groups have two psychological signs. First, group members feel attached to the group or have a sense of belonging that non-members do not have. Second, the fates of group members are interdependent so that each person's outcome is related in some way to the other's outcomes. According to Walgito (2010), society has various kinds of social groups that differ from one another.

Meanwhile, savings and loans are transactions that collect funds in the form of loans and channel them back in the form of loans to members in need, this is done to reduce the movement of moneylenders who are detrimental to the community (Hasibuan, 2003).

The savings and loan group is an institution. Ostrom (1985) defines institutions as follows: Institutions are the rules that apply in society (the arena) that determine who has the right to make decisions, what actions may and may not be taken, what rules are

generally accepted in society, what procedures must be followed, what information should or should not be provided and what benefits individuals will receive as a result of their actions.

Institutions contain rules as defined by Ruttan and Hayami (1984), that institutions are rules within a community group or organization that facilitate coordination among its members to help them with the hope that everyone can cooperate or relate to one another to achieve goals. desired common goal. This definition is in line with Ostrom (1985) that institutions are rules and signs as a guide used by members of a community group to regulate mutually binding or interdependent relationships.

Nabli and Nugent (1989) view institutions as a set of constraints or controlling factors that regulate behavioral relationships between members or between groups. With this definition, most organizations are generally institutions because organizations generally have rules that regulate relationships between members and with other people outside the organization.

Pejovich (1999) states that the institution has three components, namely: i). Formal rules, including constitutions, statutes, laws, and all other government regulations. Formal rules shape the political system (government structures, individual rights), the economic system (property rights in conditions of scarcity of resources, contracts), and security systems (judicial, police) ii). Information rules, including experience, traditional values, religion, and all factors that influence the form of individual subjective perceptions about the world in which people live; and iii). Enforcement mechanisms, all of these institutions will not be effective if they are not accompanied by enforcement mechanisms.

Deliarnov (2006) states that institutions as norms and conventions are more defined as arrangements based on consensus or patterns of behavior and mutually agreed norms. Norms and conventions are generally informal, enforced by families, communities, customs, and so on.

Soekanto (2006) explains that social institutions have several functions, including 1) Guiding community members, on how they should behave or behave in dealing with problems in society that mainly concern the needs concerned. 2) Maintain the integrity of the community concerned. 3) Guide the community to establish a social control system, namely a monitoring system from the community on the behavior of its members. Gillin and Gillin (1954) describe the general characteristics of social institutions, namely: a). An organization of thought patterns and behavioral patterns that are manifested through community activities and their results. Social institutions consist of customs, codes of conduct, customs, and other cultural elements. b). A certain degree of immutability is characteristic of all social institutions. Belief systems and various actions will only become part of social institutions after a relatively long time. c). Social institutions have one or more specific goals.

III. METHODS AND MATERIAL

This study took place in North Bulango District, Bone Bolango Regency, which focused on mosque-based savings and loan groups, as well as non-mosque savings and loan groups as a comparative study. Data collection is done to find data, both primary data and secondary data. Secondary data is obtained from documentation data and reports or publications obtained from related agencies and supporting tools in the field. Primary data collection was carried out through observation, interviews, and Focused Group Discussion (FGD) methods.

In analyzing the data, the researcher first did sorting, categorizing, and grouped according to the needs of

the analysis. Data sorting is done by completing and transforming the raw data written in field notes so that it becomes a systematic report, complementing the collected information with other supporting sources. The second step is to categorize the data. This is an action to group the edited information. The third step in the form of grouping is carried out based on the aspects studied, the level, and the type of information that can be collected. The data is then linked to the main problems studied. Thus, the problem that is the focus of the study can be analyzed to produce a conclusion to be used as material for making a savings and loan group strengthening program. The data that has been collected is analyzed qualitatively and the results are presented in an analytical descriptive manner. According to Nazir (2005), the purpose of descriptive research is to make a systematic, factual, and accurate description, picture, or painting of the facts, characteristics, and relationships between the phenomena being investigated.

IV. RESULTS AND DISCUSSION
Institutional Comparison of Mosque-Based Savings and Loans Groups and Non-Mosque

This study compares the savings and loan group institutions based on mosques with savings and loan institutions that are not related to mosques. Mosque-based savings and loan institutions are formed from the close emotional relationship of fellow mosque worshipers. Savings and loan groups that are formed like this are driven by ties of brotherhood to help each other and lighten the burden of fellow mosque worshipers when there is an urgent need.

> We are all members of this group, when we first formed one of the congregations that had an accident since there was money, finally, we were fellow worshipers to help in a perfunctory way. From that experience, we anticipate first

forming a group, so that anyone who has an urgent need can borrow from the group's cash, said Rini, a member of a mosque-based savings and loan group.

Mrs. Rini's statement above shows that there is empathy from the congregation of the mosque to help fellow worshipers who are experiencing economic difficulties when they face urgent needs. This feeling of empathy is a social capital that strengthens group institutions to survive and be sustainable. This strength is supported by the values of faith that lighten the burden of others who are experiencing difficulties will get a worthy reward from God almighty

Mosque-based savings and loan groups are brought together by very strong solidarity because of the values of faith and devotion to God almighty. Each member of the group has strong values of faith and militancy to help each other among fellow group members by hoping for the pleasure of God almighty.

Meanwhile, the other savings and loan group that is the comparison in this research is the savings and loan group with a non-mosque basis. Research on non-mosque-based savings and loan groups focused on women's special savings and loan groups (SPKP). This type of savings and loan group was formed in line with the implementation of the National Community Empowerment Program (PNPM). In each village, several savings and loan groups were formed whose membership was exclusively for women. In contrast to the mosque-based savings and loan groups which were formed out of concern for helping fellow mosque worshipers, the SPKP was formed to apply for a revolving fund loan to the management of the Activity Management Unit (UPK) based in the sub-district.

Each group in the SPKP consists of 10 or more people who then get a revolving loan from the UPK PNPM

Mandiri Rural management with varying nominal for each group. The amount of funds given to each group depends on the needs and ability of each individual in the group to return.

> "Our group's initial application received a loan of IDR 10,000,000, - (ten million rupiahs), with 10 members. So, each member gets IDR. 1.000.000,- (one million rupiah) with a one-year payback period. After our first loan was paid off, the second loan also received Rp. 10,000,000,- (ten million rupiah)", confessed Mrs. Ice, a member of SPKP.

The SPKP group was able to survive because of the awareness of each member to get further loans when the loans were paid off. Loans by each member are paid monthly to the group leader and forwarded by the group leader to the UPK management. If the group has paid off its loan, it can re-apply for a loan to the UPK management. Thus, it is clear that there are transactional and contractual motives that make this SPKP group sustainable. Groups like this gradually disband themselves when there are group members who feel that they no longer have any interest in the existing group. When there are group members who feel that way, then the loan repayments start to get stuck, which has an impact on other group members. In turn, there was a delay in returning loans from the group to the UPK management. That's when the group disbanded by itself.

Institutional Relations of Savings and Loans Groups and Mosque Institutions

The institution of a mosque-based savings and loan group with a mosque institution has a harmonious relationship where the mosque institution led by the chairman of the mosque management and the savings and loan group led by the chairman of the savings and loan group are members of the same mosque. The chairman of the mosque's board of directors is also a member of the savings and loan group, meanwhile, the head of the group and its staff, namely the secretary and treasurer, are also members of the mosque congregation.

> "All mosque administrators here, including the chief, are members of the savings and loan group. Likewise, the group administrators are also active at all times in the mosque", said Mr. Ali Yusuf, a member of the group.

The savings and loan group institution and the mosque institution are one unit because they uphold the same values, namely faith, and devotion to Allah s.w.t. Their presence has the same mission, namely helping the congregation to overcome the problems they face and increasing their faith and devotion to God almighty Institutional savings and loan groups and mosque institutions, thus, their presence is very strategic for people.

Implications of Savings and Loans Groups for Congregations and Residents Around the Mosque

Mosque-based savings and loan institutions, cannot be denied, have a very important role in overcoming the problems of the economic needs of the congregation which are very urgent and sudden. When any of the pilgrims experience economic urgency, the group's cash can be loaned to him. Of course, this loan must be returned immediately when it has economic space, because as anticipation if other pilgrims are also experiencing urgent financial problems. This loan is returned without interest, because the original intention of this savings and loan group was to help pilgrims who need money that is very urgent and critical, such as illness, accidents, and others.

The presence of this savings and loan group has been very beneficial for the congregation of the mosque. The cash capital of this savings and loan group comes from the monthly mandatory savings of loyal members, which are then redistributed to members without interest. This is to avoid the practice of usury.

"Congregants who borrow money from the group treasury do not charge interest. If the loan is IDR 1.000.000,- (one million rupiahs), then the IDR is returned intact. 1.000.000,- (one million rupiah) for 10 (ten) months", subject to IDR 100.000,- (one hundred thousand rupiahs) return every month", said Marni's mother, a member of the savings and loan group.

Residents also feel the benefits of the presence of a savings and loan group. For residents who happen to be members of the mosque, when they have a very urgent need and need a loan, they can immediately apply for a loan in that group, with the condition that they must first register to become a member of the savings and loan group. However, if you are not a mosque member, you can apply for a loan on behalf of your family who is members of the savings and loan group.

Strengthening Group Institutions to Be Competitive, Independent, and Sustainable

Efforts to strengthen savings and loan group institutions must continue to be carried out, both for mosque-based groups, and savings and loan groups that are not tied to mosques. The strengthening of savings and loan institutions is carried out in connection with the following mosque functions.

According to Alwi (2015), there are at least 5 mosque functions as described in the early days of Islam that can be developed today, namely: 1). The mosque is the temple of Allah, meaning that the mosque is a house of worship to Allah which is the core of the mosque's administrators' activities. This function is a function that is certainly running at the forefront of the activities carried out in the mosque. 2). The mosque is Bail al-Ta'lim, meaning that a mosque is a place for religious education, a da'wah center and a place for the transformation of religious understanding in the form of recitations, studies, and formal education carried out by mosques such as the establishment of Majlis Ta'lim, TPA and *Madrasah Diniyah*. 3). The mosque as Bait al-Maal, namely the mosque becomes the center of the implementation of socio-religious activities, especially in the role of organizing the implementation of *maliyah* worship such as ZISWA for the benefit of the community around the mosque which comes from the mosque itself. 4). The mosque is Bait al-Ta'min, meaning that the mosque can provide social security for its congregation. In early Islamic society, the prophet Muhammad gave a special place to the suffahs and ensured their lives through an active community role in the mosque. 5). The mosque is a Bait Al-Tamwil, meaning that the mosque can generate funds from its business activities. So that the mosque can develop and independently meet its financial needs.

For this mosque-based savings and loan group to be competitive, independent, and sustainable, institutional strengthening must continue to be carried out. The strengthening of the group referred to revolves around the function of the mosque as stated by Alwi (2015), above, namely: 1) strengthening worship; 2) strengthening the understanding of Islamic teachings; 3) strengthening religious social activities; 4) strengthening social security; 5) strengthening of productive economic business activities. Meanwhile, to strengthen the SPKP group, in addition to strengthening related to the five things above, it is also necessary to strengthen group management, considering that the SPKP group

manages revolving funds which are a bit complicated, so management knowledge is needed.

V. CONCLUSION

Mosque-based savings and loan institutions are formed from the close emotional relationship of fellow mosque worshipers. Savings and loan groups that are formed like this are driven by ties of brotherhood to help each other and lighten the burden of fellow mosque worshipers when there is an urgent need. In contrast to mosque-based savings and loan groups which were formed out of concern for helping fellow mosque worshipers, non-mosque-based savings and loan groups were formed to apply for revolving fund loans to the management of activity management units based in sub-districts.

The relationship between savings and loan group institutions and harmonious mosque institutions makes mosque activities quite lively. Mosque-based savings and loan institutions have a very important role in overcoming the problems of the economic needs of the congregation which are very urgent and sudden. Institutional strengthening of mosque-based savings and loan groups is related to strengthening worship; strengthening the understanding of Islamic teachings; strengthening religious social activities; strengthening social security; and strengthening productive economic business activities. Meanwhile, strengthening non-mosque-based savings and loan groups, it is necessary to add strengthening group management, considering that savings and loan groups manage revolving funds which are a bit complicated, so management knowledge is needed.

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The Portraits of Fisher Households in South Coast of Gorontalo: An Empowerment Approach

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ABSTRACT

This study aimed to describe the portrait of fishermen's households on the southern coast of Gorontalo using a community empowerment approach. Specifically, the researchers analyzed the ownership of fishermen, fishermen's problems, how to empower fishing communities on the southern coast of Gorontalo. Researchers in collecting data were divided into primary data and secondary data. Researchers obtained primary data using several methods, namely participatory observation, interviews, and Focused Group Discussion. In analyzing the data, the researchers did it qualitatively and the results were presented in an analytical descriptive manner. The results showed that the fishing communities on the southern coast of Gorontalo depend on their livelihood by utilizing coastal and marine resources, while only a small part of them have a sideline from farming. To raise the dignity of the fishing community from poverty, the community empowerment approach is very important. Several fishing community empowerment programs that can be implemented on the southern coast of Gorontalo are procurement of community fishing boats; strengthening human resource capacity; fishery technology development; development of fisherman information systems and market access; strengthening of fishermen's institutions; development of fishery supporting business facilities and infrastructure; and access to capital.

Keywords: Fisher Household, Empowerment, Poverty, Marine Resources

I. INTRODUCTION

Many fishing communities in the southern part of Gorontalo are trapped in a very deep poverty rut. This condition is exacerbated by circumstances including very traditional fishing gear, many of which do not even have the fishing gear so they only rely on income as fishing laborers, do not have adequate skills, and so on. In short, the fishing communities on the South Coast of Gorontalo are still far from being empowered.

Research related to poverty and powerlessness of fishing communities has been widely studied by

previous researchers. Tambunan et al. (2020) concluded that fishermen's powerlessness was caused by low education and lack of alternative jobs. Meanwhile, the vulnerability of fishermen in dealing with emergencies is caused by not having assets. Zulkifli et al. (2021) explain that fishermen's poverty starts in the catchment area. Each traditional fisherman has his fishing area and boundaries. The boundaries of the fishing area are marked by the presence of a lever, which also functions as a catch for incoming fish, some of which have been owned by previous generations.

Nazar et al. (2021) analyzed the root causes of poverty in coastal communities with a socio-ecological system approach, finding that an increase in community income followed by the provision of adequate educational, health, and worship infrastructure ultimately improves welfare and the community gets out of poverty. Goso and Anwar (2017) conclude that poverty that occurs in traditional fishermen is caused by three very influential factors, namely: i) the quality of human resources; ii) Economic factors; iii) institutional factors.

In contrast to previous studies, this study attempts to answer the following issues: ownership in fishing communities; fishing community problems; and the idea of empowering fishing communities.

Imron (2003) defines fishermen as a community group whose lives depend directly on marine products, either by catching or cultivating. They generally live on the edge of the beach, a residential area close to the location of their activities.

Tain (2013) explains that based on its constituent factors, poverty in fishermen's households can at least be grouped into three forms of poverty. The first is structural poverty. This poverty is suffered by a group of fishermen because the condition of the existing social structure makes them unable to participate in using the available sources of income, as well as due

to a policy arrangement that is more favorable to the capital owner group (big fishermen). Forces outside the small fisherman's household make them marginalized and live in the shackles of poverty. So, the problem is the inequality of access to resources due to the existing social structure. Second, cultural poverty sees poverty as occurring due to cultural factors such as laziness which originates from local values which are not conducive to progress. This poverty cannot be separated from the values adopted by the fishermen's household concerned in living their lives. Third, natural poverty occurs when natural conditions do not support them to carry out productive economic activities or unproductive production behavior due to the nature of the resources concerned.

Firth (1984) describes the characteristics that mark the life of poor fishermen, namely: a). Income is daily and uncertain every day b). The level of education is low which makes it difficult for the fishermen to find other jobs c). The nature of the product is perishable and must be marketed immediately, causing fishermen to have a high dependence on traders or catch collectors. d). A large amount of capital spending in the fisheries business causes fishermen to prefer to engage in small-scale fisheries. e). Poor fishing families are generally very vulnerable and easily fall into a bad debt trap.

Imron (2003) explains that dependence on middlemen is one of the many problems faced by fishermen. As a result, the bargaining position of fishermen is very low, so the catch sold by fishermen is also priced lower than the market price. Thus, the income received by fishermen is also low. Although in some places there are already fish auction places, it is hoped that this will be able to control the price of fish, but in practice, the existence of fish auctions is a burden for fishermen, because of the levy fees they do, even though the auction is not running. Various efforts have been made by fishermen to increase their

income. Unfortunately, their efforts to escape poverty often trap them in deeper poverty. This happens because there is no access to financial institutions so the need for funds can only be obtained through the owners of capital, who are none other than middlemen. As a result, they no longer have the freedom to sell fish to the middlemen they want, so their catch is bought at a lower price.

Fishermen in terms of ownership of fishing gear can be divided into three groups, namely: a). Labor fishermen are fishermen who work with other people's fishing gear. b). Skipper fishermen are fishermen who have fishing gear operated by someone else. c). Individual fishermen are fishermen who have their fishing equipment and do not involve other people in their operation (Mulyadi, 2005. Kusnadi (2003) stated that labor fishermen are the dominant poor community in fishing villages. This poverty factor encourages them to be involved in the network. complex debts in the community.

Classification of fisherman groups based on ownership of fishing facilities (Fishing Law): 1). Cultivating Fisherman. Cultivating fishermen are people who provide their energy in the business of catching marine fish, working with other people's fishing facilities. 2). Landlord or Owner. A person or legal entity who with any rights has power or ownership over a ship or boat and fishing equipment used in a fishing business operated by another person. If the owner does not go to sea, he is called a skipper or entrepreneur. If the owner simultaneously works at sea to catch fish, then it can be called a fisherman who is also the owner of the ship.

In line with that, Wahyuningsih et al. (1997) classified fishermen based on capital ownership into three parts, namely: 1). skipper fisherman. This fisherman is a fisherman who owns boats and fishing gear and can convert working fishermen into assistants in their efforts to catch fish in the sea.

There are three kinds of skipper fishermen, namely marine skipper fishermen, land-based fishermen who control their business from the mainland, and people who own boats, fishing gear, and money but are not real fishermen, called *tauke* (*toke*) or *cakong*. 2). Labor fishermen. Fishermen who do not have the means of production and capital, but who have labor are sold to skipper fishermen to help in the fishing business at sea, as laborers. 3). Individual fishermen Poor fishermen, these fishermen only have small boats for their own needs and simple fishing gear, therefore they are called individual fishermen.

Imron (2003) revealed that modern fishing businesses use more sophisticated fishing technology than traditional fishing businesses. The measure of modernity is not solely due to the use of motors to move the boat but also depends on the size of the motor used and the level of exploitation of the fishing gear used. The difference in the modernity of fishing gear technology will also affect their operational cruising capabilities. These differences have implications for the level of income and ability or socio-economic welfare of both large and modern fishermen or small and traditional fishermen, usually each of which is a relatively similar socio-economic category with different orientations and behaviors.

Mulyadi (2005) explains that the income of working fishermen is determined on a profit-sharing basis and is rarely received by a fixed wage/salary system received by fishermen. In a profit-sharing system, the part that is divided is the income after deducting the exploitation costs incurred during operation plus the cost of selling the results. In this case, including the cost of fuel oil, ice, and salt as well as food costs for the crew and the payment of user fees. In general, other costs that still include exploitation costs such as repair costs are the responsibility of the equipment and boat owners.

II. METHODS AND MATERIAL

The type of data obtained in this study consisted of primary data and secondary data. Primary data was obtained by using: (i) participatory observation method, namely the method with a participatory observation approach by studying and observing directly in the field; (ii) interviews, using an in-depth and independent question guide to respondents, to collect and complete data; and (iii) focused group discussion) (Sugiyono, 2009; Moleong, 2007).

The primary data source was the fishing community which is the subject of the research, while the secondary data was obtained from documentation data and reports or publications obtained from related agencies and supporting customs in the field). After all the data was collected, data analysis is carried out. The data that had been collected was processed systematically, starting from writing interviews and observations, editing, classifying, reducing, presenting data, to concluding.

Patton and Bogdan in Moleong (2007) define data analysis as a process of organizing and sorting data into patterns, categories, and basic units of description so that working hypotheses can be formulated as suggested by the data.

The data that had been collected was analyzed qualitatively and the results are presented in an analytical descriptive manner. The research data was first sorted, categorized, and grouped according to the needs of the analysis. Data sorting was done by completing and transforming the raw data written in field notes so that it becomes a systematic report, complementing the information collected with other supporting sources. The second step was to categorize the data. It was an action to group the edited information. The third step in the form of grouping was carried out based on the aspects studied, the level, and the type of information that could be collected. The data was then linked to the main problems studied. Thus, the problem that was the focus of the study could be analyzed to produce a conclusion to be used as material for making fishing community empowerment programs.

III. RESULTS AND DISCUSSION

Fishermen Ownership on the South Coast of Gorontalo

Boats are the main tool for fishermen to catch fish. Fishermen will not be able to go to sea without this main tool. This very important tool is not owned by all fishermen. The results show that fishing vessels on the southern coast of Gorontalo are only owned by a small number of investors, while the majority of fishermen are only fishermen. The fishing boats on the southern coast of Gorontalo are not all owned by local investors, there are also boats whose owners are outsiders. The financiers only provide boats and are managed by fishing laborers on the southern coast of Gorontalo.

Alpharesy (2011) states that fishing communities, marine fisheries households, are distinguished between entrepreneurs and fishery workers. For entrepreneurs, household income comes from three sources, namely from the fishing business, wages for fishery workers, in this case by family members, and from other sources, such as agriculture, trading businesses, and other businesses, or sideline businesses. For fisherman worker households it is the same but there is no special post for fishery business. In line with that, Mubyarto (2002) classifies fishermen in the marine fisheries business, there are three types of fishermen, namely: entrepreneur fishermen, mixed fishermen, and full-fledged fishermen. Entrepreneur fishermen are capital owners who concentrate their investment in fishing operations. The mixed fisherman is a fisherman who also does other work besides his main job as a fisherman. Full fishermen are old or traditional fishermen.

The results of the study stated that the wage system between fishing workers and ship owners was mutually agreed upon between the two parties, namely the distribution of catches divided into three, consisting of 1) for ship owners; 2) working capital; 3) labor. The timing agreement for the distribution of the work is different for each ship, namely once every 6 months, some once a year. There is also profit-sharing done after reaching the target, for example, every time it reaches the target of 500 baskets, the distribution of results is carried out immediately.

The distribution of wages with a profit-sharing system has become a fisherman's culture on the southern coast of Gorontalo. Likewise, the distribution time is so long, it turns out not to be a problem for them. To meet the daily needs of the family, these fishing workers still get a daily distribution of fish. The fish from the daily distribution are sold individually and the proceeds are used for daily family shopping at home.

According to the fishermen's confession, being a fisherman is not always a burden, when compared to boat owners. Shipowners do not need to be tired of going to sea, just waiting for the money to come by itself. These fishing workers have the desire to have their boats, but because conditions do not allow them, they persist as laborers. Wages from work are spent on family needs, some are spent paying for children's schooling, some are spent for consumptive purposes, such as building houses, buying furniture, and so on. From the results of the study, it was found that there were only 2 fishing workers who changed their status to become ship owners, namely the owners of *KM Amugerah* and *KM Putra Laut*. The two owners of these boats managed to change their status from fishing workers after going through a hard struggle. Now the owners of these two ships no longer go to sea, they just have to arrange their crew every time they go to sea and when they come back from the sea.

In addition to fishing workers who work on large-scale fishing boats, there are also small fishing boats that can only accommodate three to five fisherman workers. Equipped with improvised equipment, such as a trawl, a deep engine, and a trawling machine to pull the trawl, this type of boat is used to catch tuna. The research data shows that the *pajeko* boat only lasts three to five days at sea. In addition, there were also types of fishing rods that used small boats. Fishermen of this class usually go to the sea in the morning and return home in the afternoon, or go home in the afternoon and return at night. This last type of fisherman, although the boats are usually owned by themselves, their economic condition is not better than that of other fishing classes.

Fishermen Problems

The fishing communities living on the southern coast of Gorontalo, like coastal communities in general, have complex problems. They are only able to work as fishermen, small fishermen, small-scale fish processors, and small traders because they have very little investment capacity. Those who become small fishermen are only able to utilize the resources in the coastal area by fishing, the catch tends to decrease due to competition with large ships and the quality of coastal resources continues to decline.

Another problem faced by small fishermen on the coast is that the fish caught are easily damaged, thereby weakening their bargaining position in selling. The fishing business is also seasonal and erratic, that is, there is a time lag that can be caused by weather factors or the influence of the season. This causes fishing communities in coastal areas to find it difficult to get out of poverty and debt bondage, both for traders and ship owners. This fact is in line with Mulyadi (2005) who states that the factors that cause fishermen's poverty are: 1) Problems related to ownership of fishing gear; 2) Access to capital, especially regarding credit requirements; 3)

Requirements for exchange of catches that are not in favor of fishing workers; 4) Fish storage facilities; 5) Capture concession rights; 6) destruction of the coastal community organization system.

The results of the study found that in addition to the problems mentioned above, other problems faced by fishermen are as follows. Low education; Education for fishing communities is not a priority. This has been passed down from generation to generation. From a young age, fishermen's children were introduced to looking for marine products, as a result, they missed school. Children for fishing communities are a family resource that helps their parents work. Usually, the children of fishermen go to sea with their parents, fish, or look for other marine resources. According to Muflikhati (2010), for traditional fishermen, the level of education is not too important for them to work fishing in the sea because working as a fisherman is a rough job that relies more on muscles and experience, so no matter how high the level of education of fishermen is, it will not affect their skills. they are at sea. The problem of the importance of education is usually only felt if a fisherman wants to move to another more promising job. With low education, it will be difficult for traditional fishermen to choose or get a job other than being a fisherman.

The quality of human resources is low; The low level of education of the fishing community has implications for the low level of human resources. The knowledge of small fishermen on the coast is limited to the expanse of the sea and waves and traditional fishing. Small fishermen have never thought of processing their caught fish into more economic value or even taking advantage of existing resource opportunities to improve the economy. Kusnadi (2003) revealed that the low quality of human resources of fishing communities which are reflected in the form of poverty is closely related to internal and external factors of the community. The

internal factors of the fishing community are rapid population growth, lack of courage to take risks, complacency, and so on. The external factors that lead to poverty in lower-class fishermen's households are, among others, the production process which is dominated by shipowners.

Low technology utilization; The fishing community, in general, is not able to process the existing resources optimally because of the inability to utilize technology. The data from the field research shows that fishermen in the research location only catch fish using trawls and traditional fishing rods. Similarly, the boat used is a traditional boat. As for fishing workers who work on larger boats, the fishing gear used is still on a simple scale.

The weather is erratic; The erratic weather factor is a problem for fishermen. When the weather is extreme, fishermen do not go to the sea. This condition forces fishermen to spend their savings to meet the needs of their families. Even when their savings run out, fishermen are forced to owe money to their closest relatives or neighbors. This makes it difficult for fishermen to get out of poverty. Fauzi (2010) stated that the fisheries sector is experiencing serious problems related to climate change and its impact on the sustainability of capture fisheries and aquaculture. Gradual changes in temperature increases that occur globally will result in changes in biophysical aspects such as extreme weather changes, sea-level rise, changes in food networks, and physiological changes in reproduction that will have an impact on the socio-economic aspects of fisheries.

Availability of fuel oil; The availability of fuel oil is also a problem for fishermen on the southern coast of Gorontalo. The unavailability of fuel oil specifically for fishermen forces fishermen to buy retail fuel oil at a very expensive price, IDR 10,000 per liter. The price of this expensive mineral fuel, causes the working capital to also be higher.

Ice factory availability; Ice factory for fishermen is an important factor that is included in the production component. Although fishermen can catch large quantities of fish, if there is no ice, it will not be profitable for fishermen. So far, the unavailability of sufficient ice causes the fish caught by fishermen to be damaged quickly so that they do not have an adequate price for fishermen.

Empowering Fishing Communities

For fishing communities, coastal and marine resources are the main basis of their livelihood. The results showed that the fishing communities on the southern coast of Gorontalo depend on their livelihood by utilizing coastal and marine resources, while only a small part of them have a sideline from farming. Sujana (1992) suggests that the total income from fishing businesses is around 71.58% of the total income of fishermen's households. The income from employment in the agricultural sub-sector is relatively small at 7.61%. Likewise, from the industrial, services, trade sectors, only about 0.55%.

The income of fishing communities directly or indirectly will greatly affect their quality of life, because income from marine products is the main source of income, even the only one for them, so the size of the income will greatly affect their lives, especially in their ability to manage the environment. where they live.

Fishery resources can potentially be used to improve the standard of living and welfare of fishermen, but in reality, there are still quite many fishermen who have not been able to increase their catches, so the income level of fishermen does not increase (Sujarno, 2008). The income of fishing communities depends on the utilization of the potential of fishery resources in the ocean. Fishermen's income is highly dependent on the number of catches which fluctuates according to the season. During the famine season, it is not uncommon for fishermen to get no results at all. On the other hand, during the fish season, the catch can be abundant so the income received is also large (Muflikhati, 2010).

Based on the analysis of the problems and potentials of fishing communities, several empowerment programs are formulated to realize the independence of fishing communities. Procurement of community fishing boats; Community fishing boats will be very helpful for small fishermen to increase their catch because so far they have only used small boats that can only be used for fishing on the coast. Community fishing boats are also very helpful in overcoming the problems of small fishermen who have only been fishing laborers for large boat owners. The presence of community fishing boats plays a very important role in liberating fishermen from the clutches of capital owners.

Strengthening human resource capacity; The problem of low education and low human resources in coastal communities needs serious attention from various parties to awaken the empowerment and independence of fishing communities. Strengthening the human resource capacity of fishing communities can be done by increasing management capabilities and knowledge of fisheries technology to increase productivity and competitiveness through training, counseling, and mentoring.

Fishery technology development; The development of fishery technology for fishing communities is very important to be more effective and efficient in time, energy, and working capital for fishing communities in catching fish. It is time for the traditional care that fishermen use in catching fish to improve to make fishing communities, especially small fishermen and fisherman workers, empowered and independent. The traditional fishing equipment used so far has made it difficult for small fishermen and fishing laborers to compete with capital owners.

Fishermen's information system and market access; the existence of an information system and market access will make it easier for fishing communities to sell products to local, regional, and national markets through partnerships with the business world and supporting service providers. Strengthening fishermen's institutions; Strong fishing community institutions are very important so that the process of technology and information transfer, production, distribution, and marketing processes are well institutionalized by local conditions. Development of fishery supporting business facilities and infrastructure;

The development of fishery supporting facilities and infrastructure will determine the success of fishermen. Based on field research data, fishing communities on the southern coast of Gorontalo have difficulty getting fuel oil and storage facilities for their catch. The fishing community also complained about the difficulty of getting ice to preserve the caught fish. The presence of fisherman's fuel oil and ice factory in the fishing community will greatly help overcome the problems of the fishing community. Access to capital; The provision of business capital for fishing communities through the distribution of aid funds and soft loans to developing productive socio-economic activities is very helpful for fishing communities who have often been trapped in debt to moneylenders and ship owners. The availability of business capital also has the potential to foster an entrepreneurial spirit among fishing communities.

IV. CONCLUSION

The fishing communities on the southern coast of Gorontalo are classified into fishing entrepreneurs as boat owners, labor fishermen who work for investors or ship owners, and fishing rods fishermen who use small boats to fish on the coast. Fishing communities utilize coastal and marine resources to meet their daily needs, from building housing on the coast to

making a living based on coastal and marine resources. Although coastal and marine resources are so abundant, the problem of fishermen's poverty has not been fully resolved until now. This is due to many complex problems faced by fishing communities, namely: low education; low quality of human resources; low technology utilization; erratic weather factors; unavailability of special fuel oil for fishermen; the problem of storing fish and ice cubes to preserve fish.

The empowerment approach can be used to raise the dignity of fishing communities from poverty and powerlessness. Several fishing community empowerment programs that can be implemented on the southern coast of Gorontalo are procurement of community fishing boats; strengthening human resource capacity; fishery technology development; development of fisherman information systems and market access; strengthening of fishermen's institutions; development of fishery supporting business facilities and infrastructure; and access to capital.

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Sustainability of Vernacular Houses in North-Eastern Part of Madhya Pradesh

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ABSTRACT

Homes made up of Mud with with sloping roofs covered with 'khapra'(country made tiles) is the characteristic of houses in rural area of Madhya Pradesh .These traditional rural houses are the best examples of environmental design response to regional climatic conditions. This study emphases the evolution of basic simple structural form achieved by using locally available material, articulation of spaces and sustainability. These beautiful houses are gradually being replaced by costly modern building materials.

Keywords: Vernacular Housing ,Sustainability North Eastern Madhya Pradesh

I. INTRODUCTION

India is a nation with great diversity of climate affecting the housing pattern. The term vernacular means "domestic, native, indigenous".[1] Vernacular architecture is the Vernacular Architecture is the art of developing buildings using locally available structures and shelter. Frank Lloyd Wright described vernacular architecture as "Folk building growing in response to actual needs, fitted into environment by people who knew no better than to fit them with native feeling".[2]Vernacular architecture is the reflection of cultural , social , environmental and historical aspects of a particular region . Global warming and limited energy resources compelled us to rethink , study and analyse vernacular architecture .The following study was conducted in a village of north eastern Madhya Pradesh, India. This was done to gather the information from the inhabitants themselves, about the material used and techniques used for the construction.

II. METHODS AND MATERIAL

To study venacular architecture, village Dhangava from North East part of Madhya Pradesh is selected.

Spatial planning

The dwellings are composed of simpler structural pattern. A typical unit is mostly rectangular in shape.The pattern is repeated . Fig 1.
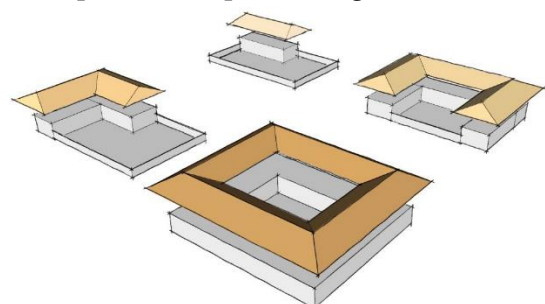
Fig 1 : Articulation of spaces derived from simple structural unit

Most of the dwellings are single storeyed, sometime introduction of attic is observed .The staircase to approach the attic is also made up of mud as seen in fig 2.Rest of the dwelling includes kitchen , living area and cattle shed .Average height of the rooms was 3- 3.5 meters .The houses are painted in light blue colour.

Fig 2 : Staircase constructed with mud blocks leading to attic

The walls are made up of sun dried mud blocks . The walls had very few fenestrations.The dwellings are composed of simpler structural pattern. Limited window area on external side and there are more wide fenestrations oriented towards courtyard formed internally.These openings are protected by overhanging roofs (Fig 3)

Fig 3: Wall protection by overhanging roofs

A low width varandah is observed at the entrance of house is used for social interaction. Varandah is protected by large overhanging roof. These overhanhings are supported by wooden brackets. Fig 4

Fig 4 : Structural simplicity of overhangings

A. Building Material

The dwellings were constructed with locally available timber (saal),sun dried mud blocks ,bamboo and countrymade roofing tiles (Khapra) (Fig 5 A, B)

a

Fig 5 A : Roofing Tiles (Khapra) preparation

Fig 5 B : Prepared roofing Tiles (Khapra)

Walls

The walls are made of sun dried mud blocks (Fig 6) with thickness varying from 30- 40 cm The mud blocks are prepared locally by mixing rice husk in local soil . The construction of homes are made by dwellers themselves as seen in.Fig 6.

Fig 6 : Self made homes with wall thickness 30-40 cm

Roofing

Pitched roofs with principal rafters framing made up of roughly sawn and iregular sized timber of saal .These are fixed with very primitive type of joinery.For common rafters and framing bamboo is used. Country made tiles are placed in interlocking manner for roofing . These tiles are manufractured locally and known as ' khapra' in local language .

Flooring :

Flooring is made of mud and cow dung .

Discussion :

Vernacular architecture is a proven model of sustainable architecture, regarding both environmental, economic and social aspects.Buildings consumes 40% of energy worldwide.[3] Global warming , environmental issues and limited energy sources compelled us to rethink about better solutions of creating homes.Traditional buildings all over the world have been designed to cope up with the local climate.These dwellings remain warm in winters and cool in summers and are comfortable to users.These were also economical and sustainable.To produce sustainable designs.

Vernacular architecture can be integrated with the contemporary architecture.in some places like Andaman & Nicobar this type of architecture was incorporated to promote tourism. Other examples are

LIC housing by Charles Correa, The Indian Institute of Management in Bangalore by B.V. Doshi, in India are few examples of integration of vernacular and modern. Architects like Louis Kahn, Lourie Baker, B.V. Doshi, Shirish Beri, Revathi and Vasanth Kamath, Auroville Earth Institute bt Satprem Maini are few Indian examples of such vernacular and modern integration . Vernacular architecture is evolving various parts of the world to produce sustainable designs.[4]

India is a nation with great diversity and has variety of climate patterns.Climatic conditions plays prime role deciding the building strategies.Composite climate is hot-dry in summer, warm-humid in monsoon, and cold-sunny in winter and hence building design is challenging in such type of climate.The village under study falls in zone of composite climate .This village is selected as 90% of population here still use old traditional method of house construction.

Typology:

The simple rectangular structural pattern is repeated for addition of spaces to mitigate the growing requirements of the users.It does not require any itricate or complex joinery.A native can easily construct his house which involves very less emboided energy. Though single storyed few of the houses are with attic.This attic acts as barrier for direct solar heating from roof during summer. These attics are used for storage purpose.

Walls :

The walls are coloured with lime mixed with indigo, to give a light blue colour. Light colouring distributes light evenly and also minimizes heat absorption by the walls.The wall has Limited windows which reduces the heat exchange to the minimum. smoke from the kitchen goes out through the interlocking earthen tiled roofs and the gaps between roof and walls. Oerhangings also protects

the mud wall from detotiating by sun and rain .The wall is made up of sundry mud blocks .In vernacular construction local building materials has a great contribution.In our study mixture of mud + straw + cow dung is used for the preparation of mud blocks. The wall using sundry mud blocks is constructed only upto 1 meter height at a time and allowed to mature for 1-2 weeks .The process is repeated till required height is achieved . During the process to protect the opening a wooden lintel is introduced .The wall width is 30 - 40 cm .The thickness of mud wall increases the time lag and provides good thermal insulation.

Sun-dried mud is extensively used building materials since ancient times .It is extensively used for vernacular construction in rural areas where it is easily available in abundance.They store thermal mass and has optimal heating transfer features for heating in the summer and cooling in the winter. The thickness of mudwall increases the time lag and provides good thermal insulation keeping the interior cool in summer and warm in winter .Many studies 4 5 show better indoor conditions in the traditional houses than the modern houses.[5,6]

However in few other studies it is observed that vernacular aarchitecture fails to provide a comfortable environment under extreme weather conditions. [7,8] These mud blocks can be a good economic option for developing countries like India on account of low cost of material and low energy requirement in processing, manufacturing and handling soil .Most of these constructions last for decades However as mud blocks are non resistant to moisture they may get deteriorate by termites and algae .The wall surfaces of mud wall are rough.

The walls on external side has few fenestrations to avoid sun gain during summer. Smoke from kitchen goes out through the gaps between between roof and walls.

The roofs are made from locally made tiles -khapras. For preparation of khapras locally avialable soil mixed with rice parry is used .Initially a tile is prepared and kept for natural drying . The rice parry used in mixture prevents cracking of tiles while drying . These tiles are then burnt in furnace (bhatti).These tiles are Easy to customise, long lasting, environmentally friendly,f ire resistant, economic and easy to maintain. Heaviness , fragility and less resistance to wind are downsides of these tiles.

In between wall and roof attic is made . The attic is used for storage purpose and also provides good thermal insulation. The roofs projections protect the wall and opening from sun and rain. Mardhari village in Bandhavgarh, Sarekha village in Kanha, a mud structure is supported by a timber framework.

These houses are built by the users themselves and doesnt require any advanced technology, machinaries and skilled labour. These traditional houses in Madhya Pradesh are gradually replaced by concrete houses.

III.CONCLUSION

Modern housing types has resulted in unsatisfactory thermal and other environmental issues with very high embodied energy .The current study emphases the importance of Vernacular architecture for achieving better ecological, sustainable housing maintains harmony with nature . Traditional housing may be comparatively less durable and have relative short life .It requires frequent repair as compared to modern buildings ,but can be managed at Individual level,as repairing doesn't demand very complex methods . Extensive study of Traditional techniques,material with practical applications with some modification can offer us the better eco-friendly and Sustainable housing pattern to cope up with requirement of modern era.

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Gait Analysis for Surveillance

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ABSTRACT

Gait refers to the patterns of movements the limbs make when walking. Human gaits refer to the variety of ways in which an individual can move, either naturally or as a result of training. The gait of each individual is as unique as their voice. On the basis of this knowledge, Machine Learning (ML) algorithms have been developed for gait recognition. Computer Vision (CV) techniques have facilitated the development of a wide range of approaches for identifying people by their movements in videos using both natural biometric characteristics (the human skeleton, silhouette, changes during walking) and abstractions. A gait recognition system identifies the human body based on its shape and the way it moves. A machine-learning system can recognize a person even if their face is hidden, turned away from the camera, or concealed behind a mask. An algorithm analyzes a person's silhouette, height, speed, and walking pattern to identify him or her. Gait recognition technology acquires data from multiple sources, such as video cameras and motion sensors. Data from these sources are then processed by a number of algorithms. Gait is recognized, data is processed, contours and silhouettes are detected, and individual features are segmented, according to the algorithm. After this, the feature extraction algorithm takes effect - this is what differentiates one gait from another. There are many different algorithmic requirements, and these algorithms can vary. Some algorithms, for example, are designed to process video information, while others employ sensor data. Because each gait is distinct, the identification algorithms are always confronted with new data. The system will assess future data better if it detects more gait variants. Assume the program compares two gaits that are highly similar. The algorithms for pattern recognition and silhouette segmentation have been trained to separate the tiny details and enter them into the database. This enables for more accurate gait categorization and improved results in the future.

Keywords : Gait Biometric, Gait Recognition, Gait Verification, Gait Analysis, Gait Representation, Pattern Recognition, Feature Extraction.

I. INTRODUCTION

There are two types of traditional gait recognition techniques: model-free and model-based.

Gait characteristics or gait features are extracted in model- free (or appearance-based) gait identification algorithms by distinguishing a person's presences from the surroundings. In model-free approaches, these presences are transformed into gait properties like as contours, silhouettes, and depth. Gait identification was first focused on elements such as silhouettes and contours in model-free techniques. The accuracy of model-free gait detection systems, on the other hand, is dependent on silhouette features. The characteristics of silhouettes are linked to a subject's surroundings or situations, such as their movements, directions, clothing, camera viewpoint, walking surface, and lighting environment. To deal with the viewpoint problem, a number of model-free techniques have been developed. A GEI is a two-dimensional image formed by integrating all spatial-temporal silhouettes of a subject walking during a short period of time. In several model-free techniques, the GEI is commonly used. On model- free datasets, the LSTM was used in some model-free gait recognition studies (sequential silhouette images).

Before feature extraction operations, gait information is reduced into a predefined structure in model-based techniques. These buildings are made to seem like human skeletons or body parts. Because of new technologies like the Microsoft iris, which helps user to generate human skeletons from films, many gait recognition studies have recently focused on model-based methodologies. A Microsoft Iris was designed to be used as a controller at first (XBOX-360). From a video stream, a Xbox and associated SDK can build a 3D skeleton stream. A skeleton flow is a collection of frames that depict a subject's bodily joints as three-dimensional points in space. Bone data from Iris sensors is used in several model-based gait detection systems.

II. LITERATURE REVIEW

In their work Vision-Based Gait Identification: Jasvinder Pal Singh, Sanjeev Jain, Sakshi Arora, and Uday Pratap Singh conducted an extensive evaluation of current research exertions in the domain of vision-based gait detection systems in their Survey paper. Several Renaissance authors contributed to the field of gait analysis, according to the text. The kNN classifier has become the most often used classification approach by writers in recent years of study. Despite the fact that deep learning requires a bigger dataset to perform, it has recently been tested in gait detection and has showed great results. In this paper, feature extraction strategies in both model based and model free gait detection are thoroughly examined. According to the paper, a vision-based and sensor gait database has been developed since 1998. OUISIR and CASIA, the two biggest gait datasets, account for the bulk of factors that impact gait recognition performance. Researchers determined that 38 percent of studies on vision-based gait identification from 2012 to July 2018 used the CASIA-B dataset to evaluate their proposed gait recognition algorithm. Soft biometrics and clinical diagnostics are two areas where gait has been studied. These discussions covered how gait analysis may help with soft biometrics (such gender categorization and age prediction) as well as clinical analysis (such as lower limb disorder, Parkinson patient diagnosis, etc.). More research in many application fields, notably clinical diagnostics, may be necessary to build an automated system for early diagnosis of gait-based ailments. Following an assessment of the state-of-the-

art in gait-based person recognition, it was found that further work is required to achieve accuracy in a variety of covariate circumstances. Only when walking under typical conditions does accuracy exceed 90%, but performance declines as a result of vision shifts, appearance changes, and occlusion. These are the unresolved scientific issues that researchers can delve deeper into.

In their article Re-identification and recognition of gaits Piya Limcharoen, Nirattaya Khamsemanan, and Cholwich Nattee propose a gait detection and re-identification approach based on the regional LSTM learning model for 2-second walks. A 2-second freestyle walk is what the suggested approach is designed to manage. It is based on the idea that each part of the body has its own rhythmic movement while walking, with certain motions having more distinct features than others. A novel LSTM model is being developed to extract relevant information from sequential data of each body part. This process gradually obtains unique qualities of a bodily region, which maintains the regional movement's rhythm. The proposed technique then combines the output of all 22 regional LSTM models to form a gait-embedded vector. By combining all 22 areas into one feature, the proposed model distributes weights to different regions. As a result, in the process of recognition and re-identification, not all regions may be given equal weight. Experiments reveal that the proposed regional LSTM learning model greatly surpasses existing strategies in all three commonly used human recognition and re-identifiable tests: On both balanced and unbalanced datasets, Cumulative Matching Characteristics (CMC) curves and top-k accuracy, Receiver Operating Characteristic (ROC) curves, and Precision-Recall (PR) curves were calculated. This indicates that the proposed regional LSTM learning model has strong ranking performance (CMC test), can successfully differentiate a subject's gaits from those of others (ROC test), and has a high relevance ability (PR test). Because participants in the

exhibit are not part of the training set, the experimental findings suggest that, unlike traditional gait recognition, the suggested regional LSTM trained model may be used effectively for facial detection and re-identification without object labelling. This indicates that the proposed regional LSTM approach can assist authorities in tracking down and re-identifying a key witness, especially one who is unknown.

In their paper Gait Recognition using a Bilateral Intensity Transformer Network that is Robust Versus Clothing and Carrying Status, Xiang Li, Yasushi Makihara, Chi Xu, Yasushi Yagi, and Mingwu Ren present a unified joint intensity transformer network for gait detection that is resistant to changes in apparel and carrying status. Combined intensity metric training has never been implemented into such a deep learning system before. A JIMEN, a joint density converter, and a DN are all components of the JITN, which is a three-part integrated CNN-based architecture. In addition, based on the gait recognition challenge, it is constructed with varied loss functions. Experimental findings employing four publicly accessible datasets demonstrate that the proposed technique outperforms existing state-of-the-art methods. For the validation and identification tasks, they employed two different network designs with contrastive or triplet losses, which might be prohibitive when memory is limited (e.g., an embedded system). Researchers were ready to train a cohesive model that utilizes less memory by combining the verification or identification loss in a multi-task environment. The proposed technique combines cross-view gait recognition with joint intensity adaptation to cope with clothes and carrying status, as well as a spatially transformation to cope with the significant spatial displacement caused by viewing angle changes.

III. SCOPE AND METHODOLOGY

The Gait-based recognition system are inconspicuous, non-invasive, and undetectable. This makes the system excellent for smart visual surveillance monitoring system. Gait recognition is a significant use in visual surveillance because it can recognize a person from a great distance. The system is based on a vision-based gait library and recognizes single user gait patterns with all of the system's registered gait signatures. The verification mode compares the claimed user's identification to the already registered or enrolled user's identity in the system. In such a system, a 1:1 connection is achieved to determine if the asserted identity is real or not. Gait features or gait features can be determined by separating a person's look from the surroundings. The feed for our method is a brief stroll conducted using a device. The recommended approach focuses on consecutive motions of each area of the body by creating models for each component of the body. All of the data is then merged to create a gait-embedded matrix for the rest of the body. In this method, various weights are assigned to different areas to reflect varying degrees of uniqueness.

IV.CONCLUSION

Gait recognition is a significant use in visual surveillance as it can recognize a person from a great distance. Gait analysis may be used in security monitoring to detect potentially dangerous or suspicious behaviour. However, gait recognition has applications beyond security. This technology, for example, might be included into the smart home ecosystem. Gait analysis does not involve any interaction with the individual and is highly customizable for implementation in public spaces. When paired with gait data, other biometrics can boost recognition robustness and reliability even further. A notable example is the combination of face and gait recognition.

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Nectar Water - A Bio-Pesticide

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ABSTRACT

Crop protection has depended significantly on synthetic chemical pesticides for the last 60 years. Inadequate use of broad-spectrum chemical pesticides to improve agricultural productivity has resulted in a number of negative consequences, including the development of resistance in target pests, the killing of beneficial organisms, the presence of harmful residues in food, feed, and fodder, and a hazardous impact on human health. The growing public awareness about the possible negative effects of synthetic agrochemicals encourages a quest for technology and products that are less harmful to the environment. As a result, different eco-friendly pest management strategies are required. Pest management agents based on live microorganisms or natural items are known as bio-pesticides. They have demonstrated pest management capability and are utilised all around the world. Bio-pesticides are formulations derived from naturally occurring compounds that control pests through non-toxic and environmentally acceptable techniques. The use of bio-pesticides has the potential to significantly assist agricultural and public health initiatives.

Keywords : Nectar Water, Bio-Pesticide, Organic Fertilizers, Cow Dung

I. INTRODUCTION

Agriculture is harmed by the destructive actions of several pests such as bacteria, fungus, weeds, and insects, resulting in lower yields. Since the 1960s, the most frequent form of pest management has relied heavily on the application of synthetic organic pesticides. Crop output grew as a result of the effective adoption of green revolution technologies, which included the use of synthetic chemical pesticides in pest control programmes. However, over-reliance on chemical pesticides and their indiscriminate usage have a number of negative environmental consequences. Recognizing the negative impacts of chemical pesticides such as pesticide resistance, pest revival, secondary pest outbreaks, pesticide residues in produce, soil, air, and water resulting in human health dangers and ecological imbalances, alternative approaches must be developed. As a result, the necessity of the day is to maximise output from diminishing natural resource availability while minimising environmental impact.

As a result, alternative, ecologically friendly pest management strategies are required. As a result, bio-pesticides containing eco-friendly, plant or microbial derived components that have broad insecticidal effects while causing minimum environmental damage have been progressively produced. Bio-pesticides are less harmful than chemical pesticides in general, are typically target specific, and do less harm to birds, insects, and mammals. Furthermore, even when employed in an open field, they degrade fast, lowering the danger of environmental contamination or lingering toxicity.[1]

Microbial pesticides, plant pesticides (botanical pesticides), and biochemical pesticides are the three primary types of biopesticides. Surprisingly, almost 90% of microbial pesticides are based on a single entomopathogenic endospore generating bacteria. Given the tremendous microbial richness, there are several chances for discovering and altering possible biopesticides to protect the environment from the fatal effects of agrochemicals on nontarget creatures, including humans.[2]

Bio-pesticides may be broadly categorized into three major groups:

1) Microbial Pesticides:

Microbial bio-pesticides are formulations that include pathogenic microorganisms (Bacteria, Fungi, Viruses, or Protozoans) for the pest of interest. Bio-fungicides (Trichoderma), bio-herbicides (Phytopthora), and bio-insecticides are examples of microbial pesticides that may manage a wide range of pests (Bacillus thuringiensiandBaculovirus). The most well-known microbial pesticides are strains of the bacterium Bacillus thuringiensis, also known as Bt, which may control certain insects in cabbage, potatoes, and other crops. Bt releases a protein that is toxic to some insect pests. Other microbial insecticides work by displacing pest organisms. Bacillus thuringenesis, Bacillus sphaericus, Psudomonas fluorescence (Bacteria), Trichoderma viride, Beauveriabassiana (Fungi), and

Baculo virus are the most often employed microbial insecticides.[3]

2) Biochemical pesticides

Biochemical pesticides are naturally occurring compounds derived from bacteria, plants, and animals that use non-toxic ways to control pests. Conventional pesticides, on the other hand, are synthetic substances that typically kill or inactivate the bug.

Plant growth regulators, for example, are biochemical insecticides that interfere with growth or mating, whereas pheromones repel or attract pests. Historically, several plant species have been studied for their insecticidal and repellant qualities for human benefit. In general, many plants contain a diverse range of secondary metabolites such as phenols, flavonoids, tannins, alkaloids, and sterols, the efficacy of which varies depending on the pest species. Botanicals refer to plant biochemicals as a group.[4]

3) Plant Incorporated Protectants

Plant-incorporated protectants are created by inserting a gene that provides resistance to a specific pest into a crop plant. The gene for Bt pesticidal protein, for example, was inserted into the genetic DNA of the cotton plant. This transgenic plant generates biodegradable protein that has no negative impact on animals or humans, reducing the need for dangerous pesticides [1].

II. REVIEW OF LITERATURE

According to the Deshpande technique, the planter must include at least 15 kg of dirt from the root of a banyan tree into each acre of farmland he desires to cultivate. Because the amount is so small, I call it Angara, which is the name of the sacred ash from our temples. The use of Angara causes a progressive rise in the number of soil-dwelling organisms. My goal, on the other hand, was to see a quick growth in their numbers. I was certain that our forefathers had

devised a method to do this. So I returned to the Vedic classics. I was not disappointed, since Arya Chanakya delivered a really perfect shloka to conclude the quest. Coat the seed with honey and ghee (clarified butter) if it is in stick form; if it is in bulb form or has a hard cover, coat it in wet cow dung. If you are a farmer, you will understand how tough and hard the technique outlined in this shloka looks to be! It's no surprise that generations of farmers ignored the motto. I, on the other hand, spent months attempting to decipher the mantra's wisdom. This was followed by field trials that required unrelenting efforts, achievements, and failures. My perseverance eventually paid off. I was successful in putting the mantra into action, and so the word Amrutpani was formed.[5]

Prof Sripad A. Dabholkar introduced Amrut Jal as part of what is known as NatuEco Farming Technique. However, most gardeners I speak with are blissfully oblivious of this magical potion. I hope that this message reaches as many Organic Terrace Gardeners and farmers as possible, so that everyone may benefit from nature's simple yet powerful gift. I first learned about Amrut Jal via the Urban Leaves blog and decided to give it a shot in our yard. We first tested it on a dried-up flower plant that had ceased blossoming. What do you think? With around fifteen days, the plant began to grow blooms, and by a month, it was completely covered in them. Amrut Jal has been a fixture in our garden since then.

Just as we require food to replenish our bodies' nutritional levels, organic soil requires something to maintain their nutrient levels. Amrit-Jal is a liquid organic fertiliser that improves the nutritional content of organic farming soil. This page covers everything about Amrit-Jal, from its ingredients to its production process. Prepare Amrit-Jal and add it to the soil that has been prepared for organic farming every fifteen days. You may further improve the

results by adding a handful of wood ash to the soil every three months[6].

N Selvaraj, B Anita, B Anusha, and M Guru Saraswathi contributed. In a slightly different method, TNAU Agritech Portal Organic Farming discussed the preparation and use of this Nectar water in the study Organic Horticulture Creating a more Sustainable Farming. In addition to all of the items used here, butter has been included as a component.[7]

III. INGREDIENTS FOR NECTAR WATER

1) Cow dung

Cow dung contains billions of microorganisms per gramme. When fermented for three days, they proliferate and hasten disintegration. The microbial activity is at its peak on the fourth day, following which it begins to decline. Fresh cow dung provides not just plant nutrients, but also millions of soil-friendly microorganisms. They reproduce when they are adequately nourished. And when you feed these bacteria to the soil, it springs to life[8]. They not only enhance soil structure, but they also begin to break down available nutrients into a form that plants may easily absorb. Making Amrut Jal is essentially a procedure of enhancing the amount of previously present microbial life in fresh cow excrement from Indian breed cows.. Dried cow dung (Gobar) is widely utilised as a fuel for fires and a source of energy in rural India. Environmentally friendly Gobar Gas Plants would help conserve the ozone layer and avoid global warming in rural India.[9], [10]

2) Cow urine

Cow urine includes a total of 24 nutrients. Cow urine, like salt, adds flavour to compost and makes it appealing to bacteria. It's unfathomable that cow urine has such restorative properties[11].
Cow urine advantages demonstrate its numerous applications.

Cow Urine Composition: 95 percent water: Urea (2.5%) : Minerals, Hormones, Salts, and Enzymes (2.5%)

USAGES: It is utilised in a variety of ways, including:
1. Cow urine as an antimicrobial agent
2. Cow urine's effect on leukemia
3. Antimicrobial activity of cow urine
4. Cow urine's effect on wounds
5. Cow urine's anti-cancer properties
6. Immune modulation
7. The effect of cow urine fertilizer on pasture quality
8. Development of a disinfectant based on cow urine[12], [13]

There will be no need for chemical fertiliser if cow urine is applied on the field continuously for three years.

3) Sugarcane syrup

Sugarcane syrup can be replaced with 6 overripe bananas, 50 grammes of plain black jaggery, or 6 pieces of overripe jackfruit or other ripe sweet fruits. Sugarcane syrup includes sucrose, which is a kind of sugar that contains carbs. The primary goal of sugarcane syrup is to provide nourishment for bacteria found in fresh cow manure. As a result, it serves as food for microorganisms found in cow manure. The addition of sugarcane syrup or black jaggery provides energy to the microorganisms, causing them to grow and hence be useful[14].

1. The addition of sugarcane syrup accelerates fermentation.
2. It serves as a food source for millions of germs found in fresh cow dung.
3. It aids in the provision of energy to microorganisms.

4) Water

Water is the primary component of this bio-pesticide. The term "Nectar Water" implies that the major component of this solution is water. Water serves as a solvent in this case, allowing all of the elements to be blended together. This solution is left to cure for 2-3 days. Furthermore, water is the only source of nutrients required for bacteria. This nectar water is prepared, diluted with water, and then used as a foliar spray[15]. Chemical farming requires 80-90 times more water than farming that uses even less than typical organic farming. Water will be the most pressing issue in the planet's future, which we are only now realising.It is predicted that the next world war would be fought for water rather than politics or oil. Serves as a solvent. Minerals required for growth are provided. This is a dilution agent. Water is used to drench nectar water in soil, and nectar water is utilised for foliar spray[16].

IV. MANUFACTURE PROCESS OF NECTAR WATER OF A BIO-PESTICIDE

Here is step by step recipe for creating nectar water:-
1. Take 2500 ml litres of water.
2. Add one 250 ml of cow urine and add it to water.
3. Mix 250 gram of fresh cow dung and fifty ml of sugarcane syrup together.
4. Add above prepared mixture to cow-urine and water.
5. Stir this solution thrice in a day.
6. Stir it clock-wise for twelve times.
7. Now, stir it anti-clockwise for twelve times.
8. A concentrated solution will be ready by fourth day.
9. Add one part of concentrated solution with ten parts of water.
10. Nectar water is ready.

V. APPLICATIONS

Applications:
1. Nectar water is best used on the fourth day for watering the plants. However we also use it on 3rd and 5th days. We use it in almost all gardening activities.[17]

2. Watering the plants using nectar water on a weekly basis keeps the soil alive and rich in nutrients. [17]

3. Spraying filtered Nectar water once a week or once a fortnight helps in lowering the chance of pest infestation. It is also an excellent foliar spray.

4. Seed treatment using Nectar water by soaking for 24 hours before sowing them helps in better germination rate and stronger plant.

5. Root treatment of saplings for 30 minutes before planting them helps develop a stronger and more disease resistant plant.

6. Dried leaves or dried sugarcane bagasse is soaked in Amrut Jal and then used as mulch for plants.[18]

7. We all know that Nectar water is the heavenly drink which refreshes the gods and has the power to resurrect the dead. In the same manner Nectar Water invigorates the living soil and converts a dead soil into a living one.

8. Sugarcane, turmeric, ginger etc. should be planted after dipping into Nectar water.

9. When the soil is damp it should be drenched with Nectar Water.

10. While planting seedlings of crops such as chilli, tobacco or fruit trees, the small amount of water which is needed to wet the area around the plants, Nectar water is used.

VI. CONCLUSION

It is a total and complete organic farming with assured yields. Healthy soils, healthy plant life and healthy yields. Improves the condition of humus- helpful to soil bacteria and other helping soil insects and pathogen.

Restores natural taste, colour and flavour of the yields.

The cooking quality of rice and other cereals improves very much.

Reduces incidence of pests and diseases. Reduces the need of pest control measures. Poison-free pest control methods.

Poison-free fodder, produces and food.

Removes environmental pollution and ecological disturbance.

The plants are not subjected to shocks due to chemical fertilizers and chemical pesticides.

Leads to sustainable Agriculture

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Targeting Drug to MACROPHAGES for Enhance Healing Efficacy of Enclosed Drug : AIDS

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ABSTRACT

Targeted drug shipping to the macrophages seems to be an appealing proposition to enhance healing efficacy of enclosed drug. Thus, macrophages may be exploited as Trojan horses for centered drug shipping. Nanocarriers can migrate throughout the specific membrane barriers and launch their drug shipment at sites of infection. Macrophages play a key function in protecting in opposition to overseas pathogens, recuperation wounds, and regulating tissue homeostasis. Driving this versatility is their phenotypic plasticity, which permits macrophages to reply to subtle cues in tightly coordinated ways. However, whilst this coordination is disrupted, macrophages can resource the development of severa diseases, which includes cancer, cardiovascular disease, and autoimmune disease. The central hyperlink among those problems is aberrant macrophage polarization, which misguides their purposeful programs, secretory products, and law of the encircling tissue microenvironment. As a end result in their crucial and deterministic roles in each fitness and disease, macrophages have received large interest as targets for drug shipping. Here, we speak the function of macrophages withinside the initiation and development of diverse inflammatory diseases, summarize the main capsules used to alter macrophages, and evaluate drug shipping structures designed to goal macrophages. We emphasize techniques which are authorised for medical use or are poised for medical investigation. Finally, we offer a prospectus of the destiny of macrophage-centered drug shipping structures. Destruction of CD4 T cells is taken into consideration to be the principal reason of immunodeficiency manifested through opportunistic infections in HIV-1-inflamed humans, as properly as in SIV-inflamed macaques. We recommend that monocyte/ macrophage lineage cells additionally play an crucial function in the pathogenesis of AIDS, primarily based totally on our current work with the SIV/rhesus macaque animal model. We recommend that harm to CD4 T cells is crucial and simply apparent, however harm to monocyte/macrophage lineage cells, despite the fact that much less obvious, may also offer the lacking

hyperlink to are expecting the onset of opportunistic infections and development to AIDS.

Keywords : Drug Targeting , Macrophages , CD4+ , AIDS , HIV, microphage

I. INTRODUCTION

DRUG TARGETING

A drug target is a molecule in the body , usually a protein , that is intrinsically associated with a particular disease process and that could be addressed by a drug to produce a desired therapeutic effect. The therapeutic response of a drug depends upon the interaction of drug molecule with cell on cell membrane related biological events at receptor sites in concentration dependent manner .

In Targeted drug delivery system a special form of drug delivery system where the medicament is selectively targeted or delivered only to its site of action or absorption and not to the non-target organs or tissues or cells . It is a method of delivering medication to a patient in a manner that increases the concentration of the medication in some parts of the body relative to others . This improve efficacy and reduce side effects [2] .

II. TARGETED DRUG DELIVERY TO MACROPHAGES

The improvement of a success drug transport providers faces numerous demanding situations like drug solubility aspects, efficient focused on, in vivo stability, and hemolytic in addition to cytotoxicity aspects. Nanotechnology-primarily based totally drug transport structures are establishing themselves as promising applicants to satisfy out the want for brand new shipping with numerous advantages, together with progressed solubility and bioavailability of hydrophobic pills, excessive drug payload, prolonged drug half-life, progressed healing index, managed launch of bioactive together with decreased immunogenicity, and toxicity . Targeted drug transport structures pledge to increase the healing windows of medication through escalating their transport to the goal tissue in addition to the goal-- non-goal tissue ratio, which leads to discount withinside the minimal powerful dose of the drug and the related drug toxicity. Due to constrained range of receptor webweb sites on any given tissue, focused shipping is especially an appealing technique for bioactive with slim healing window and/or lively at very low concentration. The most important strategies for the focused drug transport are lively and passive strategies. Passive concentrated on takes place because of extravasation of the nanocarriers on the diseased site in which the microvasculature is leaky. Examples of such sicknesses in which passive concentrated on of nanocarriers may be done are tumor and infected tissues. Localized sicknesses together with most cancers or infection now no longer handiest have leaky vasculature however additionally overexpress a few receptors that may be used as goals. Therefore, nanotherapeutics also can be actively focused to those webweb sites. Ligands that specially bind to receptors, preferentially overexpressed at goal webweb sites, had been coupled to the floor of lengthy circulating nanocarriers. Ligand-mediated lively binding to webweb sites and cell uptake are especially precious to therapeutics that aren't taken up without difficulty with the aid of using cells and require facilitation with the aid of using fusion, endocytosis, or different approaches to get entry to their cell lively webweb sites. Active concentrated on also can beautify the distribution of nanotherapeutics withinside the tumor interstitium.

More recently, lively concentrated on has been explored to supply pills into resistant most cancers cells. Examples of concentrated on ligands and their goals are indexed . For a extra unique evaluation at the diverse strategies of drug concentrated on inclusive of lively in addition to passive concentrated on, Macrophages (Greek: makros manner massive and phagein manner eat) are cells produced with the aid of using the differentiation of monocytes in tissues. Macrophages feature in each non-unique protection (innate immunity) in addition to initiate, unique protection mechanisms (adaptive immunity) in vertebrates. These are specialised phagocytic cells that assault overseas substances, infectious microbes, and most cancers cells via destruction and ingestion [1]. Currently, it's miles a chief opinion that there are numerous activated varieties of macrophages however those had been categorized specifically into corporations certain as i) pro-inflammatory or classically activated macrophages (M1), and ii) antiinflammatory or rather activated macrophages (M2). The M1 macrophages are immune effector cells which might be competitive in opposition to microbes and might engulf and digest affected cells tons extra readily, even as the M2 macrophages feature in wound healing, tissue repair, and turn-off immune device activation with the aid of using generating anti inflammatory cytokines [2] .

III. MACROPHAGE MATURATION AND DEVELOPMENT

Macrophages contain an critical factor of the innate immune device to sell the transition from innate to adaptive immune responses, and they're additionally critical goals of HIV/SIV contamination. Tissue macrophages originate from the intravascular pool of monocytes [3] derived from the bone marrow [3]. From the bone marrow, monocytes originate from stem cells that go through as a minimum 3 cycles of differentiation (monoblast, promonocyte, and monocyte) earlier than they're launched into the

circulation. The circulating half-lifestyles of monocytes below everyday instances has been tested to be seventy one h in human [4], forty two h in rats [5], and 17.four h in mice [6]. The accumulation of macrophages in tissue webweb sites of contamination is derived from the circulating pool of monocytes and is followed via way of means of an boom withinside the turnover rate (i.e., mobileular division) of peripheral blood monocytes [3, 6]. Most research approximately monocyte kinetics were accomplished the usage of radioisotopes that had been confined via way of means of the want of specialised equipment [3, 5–7]. More currently, the thymidine analog, BrdU, has been used correctly to screen the kinetics and turnover costs of unique mobileular populations, which includes monocytes, via way of means of making use of glide cytometry analyses [8]. Such research have proven that inflammatory mediators launched from the infected tissues have the capacity to stimulate monocytopoiesis withinside the bone marrow and result in monocyte launch from the bone marrow [8].

IV. AIDS PATHOGENESIS: CURRENT STATUS

Loss of CD4 T cells

Destruction of CD4 T cells after HIV contamination is a broadly common mechanism related to the incidence of opportunistic infections and cancers that characterize development to AIDS [9, 10]. Several mechanisms that purpose this CD4 T mobileular depletion were postulated which includes via way of means of widespread apoptosis of uninfected CD4 T cells and direct cytophatic impact of CD4 T cells via way of means of HIV contamination or via way of means of cytotoxic T cells. Regardless of the suitable mechanism of CD4 T mobileular destruction all through HIV/SIV contamination, it's far clean that a profound decline withinside the ranges of CD4 T cells starts early all through the extreme virus contamination phase, which recovers in part withinside the blood, after which maintains to say no

for the duration of the lengthy and variable continual degree of contamination. Immune activation
HIV/SIV-related continual immune activation has emerged currently as an critical idea to assist provide an explanation for HIV pathogenesis [11]. This is primarily based totally specifically on a constant affiliation among disorder development and the statement or generalized immune activation in HIV-inflamed people and SIV-inflamed macaques. This immune activation includes the extended frequency of activated T and B cells. Using the SIV-inflamed macaque model, our information additionally tested that NK cells are similarly activated as compared with the T and B cells [12]. Increased T mobileular turnover and excessive ranges of proinflamatory chemokines and cytokines had been additionally determined all through this popular immune activation. Although a virtually described mechanism approximately the purpose of this popular immune activation has but to be tested, a microbial translocation idea has been proposed [13]. The breakdown of the mucosal barrier and mucosal immunity that arise with depletion of CD4 T cells outcomes withinside the translocation and publicity of the systemic immune device to microbial pathogens and merchandise including endotoxin. This leakage of microbes and microbial merchandise then induces a popular, nonspecific and polyclonal immune activation. It isn't clean whether or not HIV contamination at once reasons or simply correlates with microbial translocation to effect development to AIDS, and extra research are had to deal with this issue.

V. ROLE OF MACROPHAGES IN AIDS

Acquired Immune Deficiency Syndrome (AIDS) Macrophages additionally play a selected position in HIV contamination. CD4+ T cells and cells from the macrophage lineage are taken into consideration because the maximum vital goal cells for HIV-1, and play an vital position in viral staying power and the formation of the viral reservoir. While the fundamental viral reservoir in handled HIV-1 contamination is made from CD4+ T cells, the distribution and traits of the macrophage reservoir continue to be in large part unknown.Macrophages, which explicit CD4 in aggregate with the coreceptor C-C chemokine receptor kind 5 (CCR5) and function objectives for HIV-1 contamination. Although the CD4+ T cells withinside the lamina propria are taken into consideration the fundamental goal for HIV-1 Infection of macrophages positioned withinside the lamina propria of the intestinal, penile urethral and vaginal mucosa.

The HIV can input the macrophage thru binding of gp120 to CD4 and 2d membrane receptor, CCR5 (a chemokine receptor) [2]. The ability of macrophages emigrate in organs and to live on in tissues makes them capacity conveyors of HIV-1 contamination [3,4]. Indeed, efficient HIV-1 contamination takes place independently of mobile DNA synthesis in macrophages [5]. The meeting and budding of viral debris arise in cytoplasmic vacuoles in macrophages [6]. An opportunity access route, macropinocytosis has additionally been proven to be concerned withinside the access of HIV-1 into macrophages Effect of pro- and anti inflammatory stimulations on macrophage susceptibility to HIV contamination.

We first decided the expression tiers of CD4 and CCR5 that could account for mobile susceptibility to HIV-1/Ba-L. Control expression tiers have been $87,500 \pm 16,800$ and $12,300 \pm 3500$ MEF, for CD4 and CCR5 respectively (mean $\pm$ SEM, n = 5). Due to interindividual versions in antigenic density, outcomes are hereafter expressed as a percent of untreated mobile expression level. Almost all examined stimulations dwindled each CD4 and CCR5 quantitative expression. GM-CSF, IL-four, IFN-γ, TNF-α, and LPS even caused an nearly whole abolishment of CCR5 detection. On the alternative hand, IL-10 upregulated each CD4 and CCR5

membrane expression tiers, while M-CSF had no impact. CD4 and CCR5 expression carefully paralleled every different (r = 0.907), confirming their co-[removed]Hewson et al., 2001, Singer et al., 2001, Staudinger et al., 2003) on a extensive panel of stimulations. Virology .

We assessed the permissiveness of differentially activated macrophages to HIV contamination via way of means of an finishing factor titration approach (Fig. 1B), the handiest approach which lets in evaluation of the actual susceptibility to contamination with out interferences bobbing up from replication level. IL-four and the pro-inflammatory molecules IFN-γ, TNF-α, and LPS reduced the susceptibility to contamination via way of means of a issue of at the least one log, suggesting the induction of green antiviral activities. TGF-β and PGE2, via way of means of barely growing the susceptibility to HIV contamination (2- and 5-fold, respectively), can also additionally facilitate mobile contamination however this impact is of low magnitude. Other stimulations had nearly no impact.

Receptor-primarily based totally processes for Macrophage concentrated on Macrophages are promising objectives for carbohydrate-primarily based totally therapeutics as they explicit carbohydrate binding receptors, Which internalize the transport device thru receptor-mediated Endocytosis [14]. One such carbohydrate binding receptor Is the macrophage mannose receptor, an endocytic protein That is fantastically expressed on macrophages [15]. Basically Mannose receptors (MR), a 175-kDa trans-membrane protein Consisting of 3 extracellular regions, i.e., C-kind lectin Carbohydrate-reputation domains (CRDs), NH2-terminal Cysteine-wealthy domain (Cys-MR), and a fibronectin II Domain [16,17] are expressed solely at the floor of Alveolar macrophages that could understand mannose terminal Molecules with excessive affinity [18]. The Cys—MR interplay With

splenocytes outcomes from the binding of sulfated carbohydrates. It has additionally been pronounced that sulfate moiety on four-SO4 GalNAc makes sturdy hydrogen bonds with the cystein organization On mannose receptors [19]. Macrophage galactose-kind C-kind lectin ½ (Mgl1/2) are Another organization of C-kind lectin receptors which have been Associated with M2 macrophages differentiation particularly in Parasitic infections. However, Mgl1 and Mgl2 had been detected As a selected gene signature in an in vitro version beneathneath stimulation with B16 melanoma-conditioned tumor medium [20]. Zhang-Hoover et al. explored the glycosylated drug transport motors as a way to get right of entry to alveolar macrophages, a mobile Implicated withinside the pathogenesis of pulmonary conditions [21]. Approximately 60% of the preliminary alliance of human Immunodeficiency virus (HIV) with macrophages is arbitrated via way of means of macrophage mannose receptor (MMR), due to the fact 1/2 of of the carbohydrates on gp120 are terminally mannosylated as evidenced via way of means of the inhibitory impact of mannan, D-mannose and soluble mannose-binding lectin, however now no longer the D-galactose [22,23]. Pruthi et al. advanced the amphotericin B-loaded mannose functionalized multi-walled carbon nanotubes, AmB-mannosylated MWCNTs (AmBitubes) for macrophages concentrated on. Amphotericin B launched from AmBitubes became frequently determined to be amassed in liver and spleen that can be because of the mannose receptor-mediated uptake of AmB-loaded mannose-appended MWCNTs via way of means of the macrophages synthesized glycopolymers from carbohydrate functionalized monomer precursors through reversible additionfragmentation chain transfer (RAFT) polymerization to show off excessive affinity closer to carbohydrate receptors. The fluorescently categorized glycopolymers have been used to decide macrophage-precise concentrated on in vitro and in vivo. Mannose and N-acetylglucosamine containing glycopolymers have

been proven to especially goal mouse bone marrow-derived macrophages (BMDMs) in vitro in a dose-structured way compared to a galactose-containing glycopolymer (30- and 19-fold better uptake, respectiveeachly) [24]. The mannose glycopolymer exhibited improved uptake in M2-polarized macrophages. This carbohydrate-precise uptake became retained in vivo, as alveolar macrophages confirmed sixfold better internalization of mannose glycopolymer, compared to galactose, following intratracheal management in mice. Mannose receptor has been utilized in gene vaccine through concentrated on human dendritic cells and macrophages through the phagocytic pathway [25]. Dectin-1, a non-opsonic b-glucan receptor, expressed in macrophages, is critical for the phagocytosis of yeast via way of means of macrophages through the popularity of b-glucans, a mobile thing of yeast [26]. In current years, siRNA shelled with b-glucans for concentrated on dectin-1 receptors of macrophages has been effectively designed for the remedy of systemic infection via way of means of oral management [27]. Various research have proven that the folate receptor beta (FR-b), displaying a excessive affinity for folic acid (FA), is especially expressed via way of means of activated macrophages [28-29]. Therefore a folate-primarily based totally nanodevice will likely supply the healing dealers to activated macrophages with out affecting ordinary cells and tissues. Recently, Rollett et al. organized FA floor-changed human serum albumin (HSA) nanocapsules for precise mobile internalization via way of means of FR-b-superb macrophages. The internalization of the FA-changed nanocapsules became determined threefold better in FR-b-superb macrophages than in macrophages now no longer expressing FR-b, displaying that the binding/internalization of drugs have been being mediated thru folate receptors [30]. In this look at, the authors claimed that the sonochemical approach became used first time for the guidance of HSA nanocapsules warding off poisonous cross-linking chemical compounds and emulsifiers

utilized in different pronounced strategies however for folic acid floor change, N-(3-dimethylaminopropyl)-N-ethylcarbodiimide hydrochloride (EDAC) cross-linking agent became used. In our opinion one of these look at can be supplemented with hemolytic toxicity, cytotoxicity on different macrophage mobile lines, and stability. Further research together with internalization assessment the usage of different mobile kinds to affirm specificity, in addition to floor change with different concentrated on moieties to beautify specificity of macrophage internalization would possibly facilitate adoption of this approach for the guidance of nanocapsules of different polymers. Most lately pronounced scavenger receptors (SRs) are structurally unrelated membrane receptors which are fantastically expressed via way of means of phagocytes (macrophages, microglia, and dendrite cells). They broadly understand and uptake macrophages having a poor charge. Scavenger receptors are archetypal multifunctional and teleogically historic pathogen receptors, capable of bind concentrated on ligands of each pathogen and selforigin and understand the changed low-density lipoprotein (LDL) via way of means of oxidation and acetylation [31,32]. In this component lately, Wang et al. pronounced that the scavenger receptors and caspase-nine have been actively participated withinside the apoptosis caused via way of means of the acid and taurine-functionalized MWCNTs. The taurine-functionalized MWCNTs (tauMWCNTs) confirmed much less cytotoxicity and apoptotic impact to RAW 264.7 cells compared to acid-handled MWCNTs [33]. In some other current look at, Graversen et al. pronounced that the hemoglobin scavenger receptor CD163 in macrophages fantastically multiplied the anti inflammatory efficiency of dexamethasone. The in vivo efficiency of conjugated dexamethasone became approximately 50-fold than that of non-conjugated dexamethasone [32]. Thus scavenger receptors additionally appear like

really well worth similarly exploration in contrast with different higher regarded receptors.

VI. NOVEL HYPOTHESIS: DAMAGE OF MONOCYTE/MACROPHAGES DICTATES PROGRESSION OF HIV INFECTION TO AIDS

In conjunction with declining stages of CD4 T cells, HIV additionally seems to have an effect on monocyte/macrophage lineage cells, which can also additionally have an excellent extra profound effect at the development of HIV contamination to AIDS. This speculation relates to and is supported with the aid of using the characteristic of innate immunity, namely, to function the primary line of protection to steer clear of disease correctly whilst faced constantly with environmental pathogens. Monocytes and macrophages play a major position withinside the innate immune responses, and therefore, withinside the case of HIV contamination, intact macrophages could preclude or restrict get right of entry to of opportunistic pathogens from getting access to purpose contamination, no matter the CD4 T mobileular harm resulting from HIV contamination. Our speculation is that harm to the monocyte/macrophage lineage is unbiased of CD4 T mobileular harm with the aid of using the HIV virus. More importantly, large macrophage harm can be a key component that in the end permits opportunistic pathogens to pass each strains of protection and consequently, purpose infections which might be indicative of AIDS development. Therefore, a excessive monocyte turnover price manifested with the aid of using destruction of tissue macrophages can be an correct marker that predicts AIDS development in HIV-inflamed individuals. The assisting speculation is defined in a simplistic schematic diagram that compares the stability among CD4 T cells and macrophages for the manifestation of opportunistic infections . We hypothesize that the lack of innate barrier characteristic, despite renovation of absolute mobileular wide variety, isn't a end result of a easy lower withinside the wide variety of macrophages however a end result of a greater complicated stability among the to be had wide variety of purposeful macrophages in the course of an lively dying process and the replenishing process. In different words, if a threshold wide variety of macrophages had been required to dam the doorway of a non-stop publicity to opportunistic pathogens that usually exist withinside the environment, a large turnover of macrophages due to their dying may want to lower the wide variety of to be had macrophages temporally, although absolutely the wide variety of macrophages stays the same. This green mechanism of the bone marrow device to preserve the wide variety of circulating monocytes, despite chronic, large destruction of macrophages, demonstrates the critical position of the monocyte/macrophage mobileular lineage withinside the renovation of day by day immunological homeostasis.

This may also give an explanation for why harm on this arm of the immune device turned into now no longer mentioned previously, while CD4 T mobileular harm turned into greater with no trouble apparent. It remains possible that a purposeful illness of macrophages will be prompted by a lower the wide variety of CD4 helper feature. Givenbthe reality that macrophages also are plentiful withinside the gastrointestinal tract, it will likely be crucial to decide the impact of macrophage disorder withinside the intestine at the sickness course of HIV infection. As antigen presentation is taken into consideration to be some other crucial feature of macrophages, its illness may additionally have implications on T mobileular disorder. Finally, the excessive macrophage turnover may also play an crucial position withinside the chronic inflammatory cytokine typhoon frequently discovered in the course of AIDS progression. Although this speculation is primarily based totally in general on our latest paintings on monocyte/macrophages withinside the SIV/macaque model, it's miles crucial to emphasise that similarly

research could be essential to demonstratebthe vital position of innate immunity, such as macrophages for AIDS sickness progression .

VII.CONCLUSION

Nano- and microcarrier structures play an critical function in the concentrated on of drug(s). Carriers offer sustained drug delivery to the lungs, make bigger period of action, lessen the healing dose, enhance affected person compliance, and decrease the adverse consequences of exceedingly poisonous drugs. However, there's a want to discover the receptors which are gift completely on macrophages. The identity of such receptors might also additionally similarly facilitate drug concentrated on to numerous parts/organs/cells of frame possessing distinct sort of macrophages. Further studies efforts are favored to make sure the protection of long-time period in vivo applications. There is an vital requirement for carefully designed comparative toxicology as well as toxicokinetic research for all varieties of nanocarriers for their in all likelihood medical use. Any synthetic, biodegradable polymeric nanocarrier, which shall achieve achieving the 'Generally Regarded As Safe' (GRAS) status, will take delight of overwhelming healing attractiveness in phrases of protection and efficacy.

VIII. DECLARATION OF INTEREST

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Survey on Voice Assistance for Laptop

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ABSTRACT

Voice control is a significant developing component that ease day to day life of humans. The voice assistance is generally being utilized in cell phones and workstations. Artificial Intelligence based Voice assistance are the working frameworks that can perceive human voice and react by means of coordinated voices. The voice assistance receives the sound from the receiver and further convert that into message, it passes to GTTS (Google text to speech). GTTS it's main purpose is to converts text to an audio file and , the audio is further been played using play sound package.

Keywords: Voice Assistance, API, GTTS

I. INTRODUCTION

The Subject 'Voice assistance for Laptop ' is chosen because of the on-demand of the domain Machine Learning. and Artificial Intelligence are the future and destiny of IT's and Industries which might be paving a path for automation by the use of intelligence. Python combined with Machine Learning and Artificial Intelligence makes the product efficient and time-saving for Customers or users.

Several Machine Learning and Artificial Intelligence products are useful for different respective domains which pave a different direction for industrial automation, medical automation, and home automation. Artificial Intelligence improves the clips makes us think more about the ideas which make the developers curious to develop a new product. Voice Recognition is interesting to develop with all required API and Datasets.

II. LITERATURE REVIEW

Voice and Speech Recognition has a long history with many new inventions. Voice recognition, web usage, search have become common place on any smartphone or desktop. The results of the paper literature are based on the three authors of the AI-based Voice Assistant Program: Evaluation from Collaboration and a vision of trust. Farzaneh Nasirian, One-Ki Daniel Lee ,Mohsen Ahmadin were the authors of the books published on the above mentioned topic in 2019. As the voice assistant model used in the textbook is based entirely on Artificial Intelligence and Natural Language Processing. Data sets are specifically designed to reduce latency problems. The quality of collaboration and Technical Discovery analysis is key to the analysis that helped their paper make something new. The Conceptual Framework model they used here is TAM - Technology Acceptance Model. No type of automation is used in their model, emotional analysis, and composite analysis combined with the paper to

increase the analytical speed of the assistant in the larger expansion is improved.

No Data is oficially trained in the literature reference, as it obtained from the datasets from third- party websites such as Google, Bing,Yahoo and YouTube. These reviews has helped our paper to improve at great extent and made it to be its successor.

The main aim or intension of the Paper, 'Laptop Assistance' is to operate laptop using voice commands. It brings greater utility and shows among the small scale association to update their proficiency. The voice of the client assumes a compulsory part in deciding the work to be handled.

No human interaction is the main aim of this paper. Voice assistants, It has a history of vital innovations. It has become a quality feature for smartwatches, smart glasses, phones, and other devices. It derives to consider a review to present ideas and principles about an application program that understands natural language voice commands and completes tasks for the user. Many instances in everyday life filling a variety of roles that uses Natural language processing can be found. The first recognition technology was "Audrey", a method designed by Bell Laboratories in the 1950s. Audrey, which had mostly occupied an entire room, was able to recognize only 9 digits, spoken by its developer, but it did so with an impressive 90% accuracy.

It was essential and in short supply technology-wise, 10 years later, IBM enhanced and displayed their ShoeBox Machine. It was able to understand 16 different spoken words, including digits '0' - '9', also calculating commands such as '+' or ' - '(Plus or Minus). Shoebox instructed an adding machine to calculate and print answers to simple mathematical problems, It was operated by speaking into a microphone, which converted voice sounds into electrical impulses. The drawback was it could only understand English by an appointed speaker. These restraints proved to be intricate. Hidden Markov models were narrated in a sequence of statistical papers by Leonard E. Baum and other writers in the second half of the 1960s. One of the first applications of HMMs was speech identification, starting in the

mid-1970s. The HMM modified the development of a viable speech recognition software. Using HMM speech recognition began to use a statistical method for measuring unknown sounds being words. The potential to understand a limitless number of words became impending due to the method allowing the number of understandable words to go up to a few thousand.

The first approachable voice command system was launched by Apple Inc. They had also released the virtual assistant Siri in 2011. Siri is available on all Apple mobiles and now it's also available on iPad and other apple smart products. Siri is an assistant which uses Natural Language Processing to understand and answer questions and outsource solicitation to web services which will be then implemented by the user. Similarly, the HAL chatbot was developed by Zabaware Inc, Hal uses a natural language interface with animated characters using speech synthesis. Users can converse with the chatterbot via typing or a speech identification engine. The bot uses NLP algorithms to communicate with users stating to organize the data given to it. IBM has invested a huge amount of assets and has developed Watson, Watson is a question- answering computer system capable of answering questions posed in natural language. It communicates with the user by using similar methods of Natural language recognition. Its primary aim is to give fellowship and to copy human interaction as precisely as possible

III. DIFFERENT TECHNOLOGIES REQUIRED

In the paper of Voice assistance for Laptop, the main programming language used to implement idea is Python, the library speech recognition used to recognize the voice input given by the user or client, this recognized speech is then converted to text using the pyttsx3 library.

Voice commands related to web search is implemented using the web browser library, commands related to operating system uses the os library to access the system's resources, commands that require sending mail or viewing a mail requires the use of smptplib module, urllib.request is used to process the commands that requires the use of URLs,

subprocess is used to facilitate the commands that requires the use of client's or user's computer command line input, commands that require the use of mouse or keyboard requires the use of PyAutoGUI in code.

IV. METHODLOGY

A Voice Assistance is a very interesting task to be perform and Python Programming can be solely implemented for this

paper. Python has the best user readability code, python is been selected as the preferred language in all criterias. PyCharm and Spyder IDE are suitable for the paper's usability environment but a new environment with suitable packages and APIs can be integrated into the Spyder IDE. Datasets are gained from the Google APIs for the resources that need to be processed. No database is created manually as the paper asks a huge number of datasets for the precise working of the voice assistants.

Adaptable and easy to understandas python is preferred as the main language. At first, User give a voice command as an input, pyttx3 is used to convert voice to text and later after the conversion the text is read for a query in the python program

- Request asked by the user gets split into separate command with the goal that our voice assistant is easy to understand
- Once inside the commands list, our request is looked and compared with other requests.
- Commands list then sends these command back to the Voice assistance.
- When the voice assistance gets those commands, then, at that point, it knows what to do straightaway.
- Later it performs task which user has requested

V. CONCLUSION

Voice Assistance paper is meant to bring the high-scale utility and conventions for the small-scale industries for automation. Since the voice assistant has many versatile objectives and features such as speech-to-speech operation, automatic login authentication, it is intentionally preferred by profitable companies. As the functionality and the code is reliable, it makes the user experience to the next level. Upgrading the software is much more convenient and consumes less amount of internet data as chrome-driver is smaller in size. The percentage rate of capturing, surfing, automating, time consumption is increased when many bugs at testing stages were resolved. The paper attracts the physically inactive or blind perks for its unique automation features as it serves them in various aspects.

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Water Leakage Detection and Monitoring System Using IOT

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ABSTRACT

The water supply shortage has increased in recent years due to overpopulation, climate change and obsolete water facilities, where deteriorated pipes cause most of the water leaks. The problem is not the size of the leak, but the time it takes to detect it. This paper presents the implementation of a system installed in the hydraulic facilities of a residence, to detect water leaks. The system consists of a water sensor installed by a water reservoir of interest, a microprocessor to interpret the data and evaluate. The design of a water level sensor device that can detect and control the level of water in a certain water tank, the system firstly senses the amount of water available in the tank by the level detector part and then adjusts the state of the water pump in accordance to the water level information. There has been wastage of water daily through the pipeline leakages due to its full water were never arrived to the taps. The aims of our proposed work are to develop a real-time prototype pipeline leakage alert system whether it is a water leak or not, an alert message send to IoT Application to avoid leakage.

Index Terms – NodeMCU, Water Flow Sensor, Buzzer, IOT.

I. INTRODUCTION

With the growth of the world population, the demand of fresh water has increased causing serious problems in the field of water supply. Therefore, control of water has become a considerable issue today. With the growth of the world population, the demand of fresh water has increased causing serious problems in the field of water supply. Therefore, control of water has become a considerable issue today. Scientists, technicians, politicians, and generally, many other inhabitants of the planet become increasingly educated on the subject. The threat of pollution hovers over and limits water supplies. The shortage of this vital liquid requires great attention. The proportion of fresh water found in rivers, lakes, and underground sources comprise only 3% of the total amount of water on earth. In addition, the water found needs treatment for human consumption, to eliminate particles and organism harmful to health, and ultimately must distribute through pipes to homes safety.

This work focuses on the issue of distribution, more specifically, on the issue of "water leaks" in

residential areas. In a developing country like India, loss of water in domestic sector on account of leakage is approximately 30 to 40% of the total flow in the distribution. This leads to high risks in public health, money invested and on the valuable natural resource. India had an irrigation efficiency of ˜36 percent in 1993-1994 and projected that efficiency would have to increase to 60 percent by 2050 to bring a balance in the demand and supply of water. Even those slow leaks that only because mold damage require expenses to repair. The more water spilled (or splashed) the more money the repairs cost to residents. For this reason, it's crucial to have some system installed in residences to detect water leaks. Current digital water leak detection systems can locate multiple water leaks to within 1-meter resolution over a complex network of cables running several kilo meters.

II. Methodology

The water leakage detection system can be deployed in the already existing plumbing with flow rate sensors attached in the path of the water flow. The sensor does not obstruct the water flow but just collects the data of flow rate. Actuators like solenoid valve is needed to control the water flow in the event of a leak.

The proposed system uses a microcontroller which constantly reads the data from multiple flow rate sensors thereby constantly monitoring the water flow. It compares the flow rate by calculating the difference in data from subsequent sensors and takes the necessary action. If the difference is greater than the Set   threshold , microcontroller sends alert information to the user. This minimizes the water wastage. On the other hand, if the difference is less than the threshold, it sends the sensor data to the cloud for data logging and the process continues as shown in Fig. 1. Online data logging allows the user to keep track of the water usage and take necessary decisions to conserve the water.

The Microcontroller constantly monitors the flow rate when the system is in On State. The Leak detection algorithm works in such a way that, whenever the Flow rate difference between two consecutive sensors is greater than a calibrated threshold value, a leakage is detected by the microcontroller. Fig. 7 shows the leakage scenario in the system. The Flow rate difference is also logged into the Cloud through GPRS module as in Fig. 8. Whenever a Leakage is detected an alert or notification is triggered and message is sent to the concerned authorities.
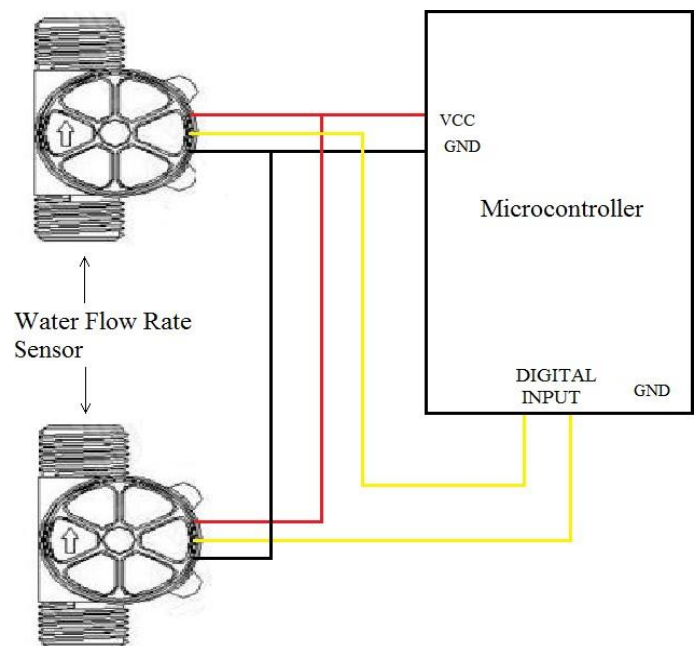

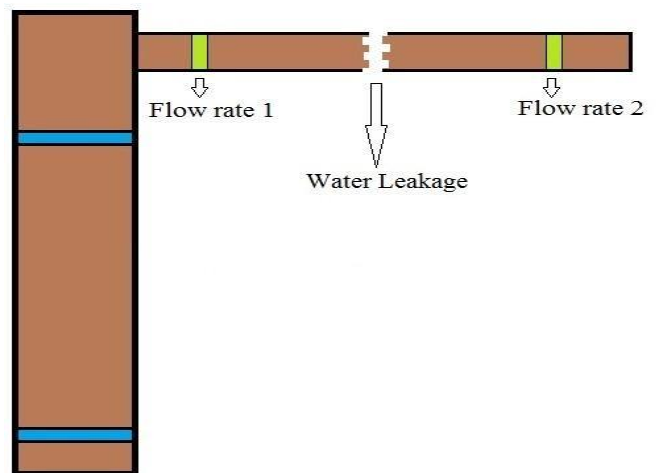Fig 1. Microcontroller Connected to flow Sensor

Fig. Leakage Scenario

The automatic water cut-off system is very useful to stop the leakage of water at various points if a leakage is detected. The Monitoring system detects the leakage of water and sends an alert signal.

All the flow rate measurement sensors pertaining to a particular area are connected to microcontroller for as show in Fig. 6. Couple of microcontrollers is connected to the Network such that we can monitor and control water supply for the whole region. Each Flow rate sensor sends the amount of water passing through it to microcontroller. The microcontroller collects the data from flow sensors and sends the values to the Cloud using GPRS [7] connected to the internet. The flow rate measurements are logged into a sensor cloud which can be utilized for later use. This method is commonly known as data logging.
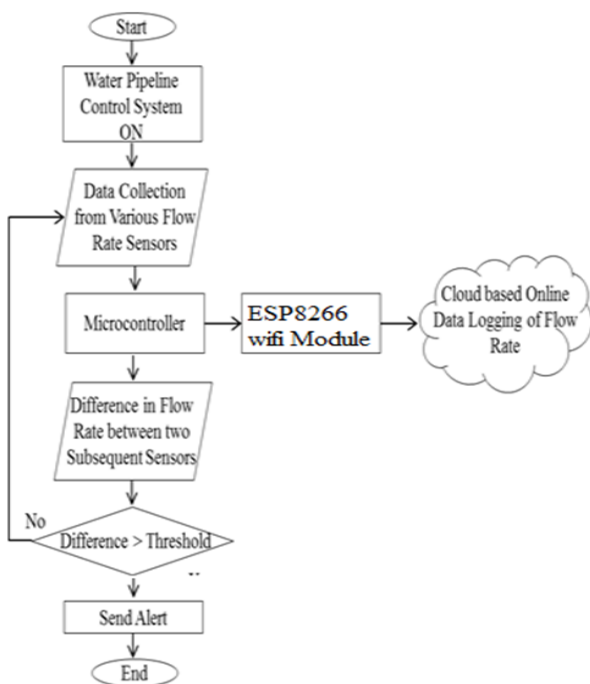
Hardware Component

1. NodeMCU Microcontroller

NodeMCU is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif, and hardware which is based on the ESP-12 module. The term "NodeMCU" by default refers to the firmware rather than the dev kits. NodeMCU board as shown in fig 1. The firmware uses the Lua scripting language. It is based on the eLua project and built on the Espressif Non-OS SDK for ESP8266. It uses many open source projects, such as lua-cjson, and spiffs.

NodeMCU is an open-source Lua based firmware and **development board** specially targeted for IoT based Applications. It includes firmware that runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module.
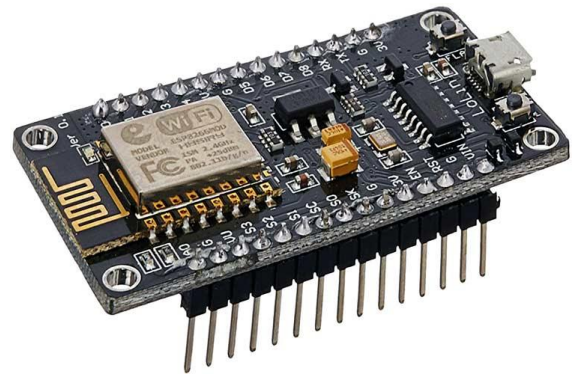
Fig1. NodeMCU Controller

2. Water Flow Rate Sensor

Water flow sensor consists of a copper body, a water rotor, and a **hall-effect sensor**. When water flows through the rotor, rotor rolls, its speed changes with different rate of flow. ... This one is suitable to detect flow in water dispenser or coffee machine.

Water flow sensor consists of a plastic valve body, a water rotor, and a hall-effect sensor. When water flows through the rotor, rotor rolls. Its speed changes with different rate of flow.The hall-effect

sensor outputs the corresponding pulse Signal.The water flow sensor as shown in fig 2.
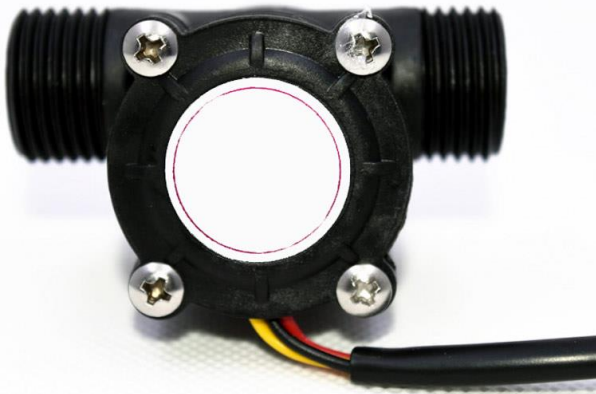

Fig 2. Water Flow Rate Sensor

3. Buzzer

A buzzer or *beeper* is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of *buzzers* shown in fig 3 and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.


4. Internet of Things

The Internet of Things (IoT) describes the network of physical objects "things" that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet. The internet of things, or IoT, is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers (UIDs) and

the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.

An IoT ecosystem consists of web-enabled smart devices that use embedded systems, such as processors, sensors and communication hardware, to collect, send and act on data they acquire from their environments.
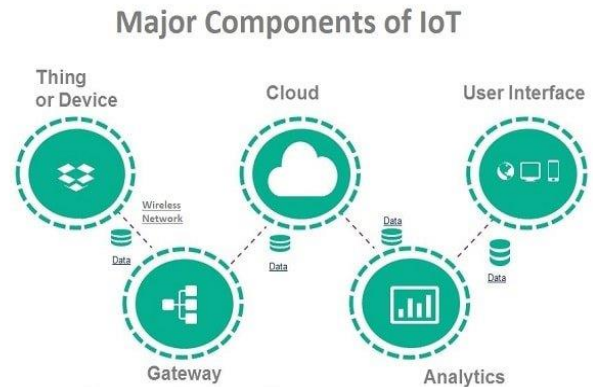
III. RESULTS AND DISCUSSION

A prototype was developed with help of three flow rate sensors in series in the water pipeline. The prototype is tested at various conditions of water flow. Positive results were obtained using the prototype built.

Water Flow controller is turned ON initially such that water flows through the water pipelines. The Flow rate data of both the sensors is obtained by the microcontroller periodically. The Microcontroller also uses water leakage detection algorithm to calculate the flow rate difference between three consecutive sensors. The difference is also logged into the Cloud for triggering the leakage detection. Once the leak is detected notification is sent to authorities for fixing of damaged pipelines. In addition to Water flow is stopped when leak is detected.

IV. CONCLUSION

Water for domestic purposes is always very essential and it is mandatory to prevent it from getting wasted due to any pipeline leaks. Hence the designed prototype is an effective solution for monitoring the flow of water as well as detecting for leaks in the pipelines. The smart water leakage detection system can help in water distribution process by remote activation of solenoid valves. Usage of cloud logging technique enables the data acquisition and analysis in any point of the pipeline. This makes the system cost efficient and simple.

The system is capable of detecting leaks between any sensor nodes rather than the exact location of the leak. The sensors require lengthy wiring for power supply and data transmission. This reduces the area under observation. The sensors and actuators can be powered by batteries or solar panel. Wireless transceivers can be fitted to acquire the data from the sensor and send command signals to actuator. This sensor network based system may increase the system cost, but it adds the advantage of monitoring a huge area with minimal human power.

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Identification of Person's Decision to Refuse Covid-19 Vaccination Based on Vaccine Safety Perception, Role of Social Media and Knowledge

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ABSTRACT

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This study aims to determine the decision to vaccinate against COVID-19 seen from the perception of vaccine safety, the role of social media and knowledge. The object of this research is the people who live in DKI Jakarta. This research was conducted on 150 respondents using a quantitative descriptive approach. Data were collected and processed using the SEM method through PLS. The results of this study indicate that the perception of vaccine safety has a positive and significant influence on the COVID-19 vaccination decision. Meanwhile, the role of social media and knowledge has a negative and insignificant impact.

Keywords: Security Perception, Knowledge, Role of Social Media, Personal Decision, COVID-19, Vaccination

I. INTRODUCTION

The spread of the Corona virus that caused COVID-19 has had a tremendous impact on at least two scopes, namely actors (level of analysis) and aspects (aspects or issues). First, the spread of this virus has had a massive impact on every level of actors, ranging from individuals, communities, the wider society, companies or private parties, countries and even globally. Second, the disease outbreak and the spread of COVID-19 have clearly had an impact on various aspects of life, which are mainly health problems, as well as social, economic, and political aspects. So, it can be stated that this situation has given birth to security threats for humans (human security) as well as for the country (state security) and more broadly, global security. As a pandemic, COVID-19 has tested the resilience of humans and also countries in overcoming crisis situations. Not only faced with threats to health issues that are the main focus, but the social and economic situation is also two things that are seriously affected (Deutsch, 2020).

In tackling COVID-19, the Government of Indonesia appealed to the public to do 3M, consist of Wearing Masks (Memakai Masker), Washing Hands (Mencuci Tangan) and Maintaining Distance (Menjaga Jarak). As a reinforcement of the basic strategy, four strategies have been made, including (Wibowo, 2020): 1) Mask movement. 2) Tracing. 3) Independent isolation education and preparation. 4) Hospital isolation carried out if self-isolation is not possible

But in fact, since the first case until February 10, 2021, the spread of COVID-19 in Indonesia has increased due to the lack of public awareness of implementing 3M, even though it is the main key in handling COVID-19. Nielsen and UNICEF worked together to conduct a survey to determine the level of public awareness in preventing COVID-19.

In addition to the implementation of the 3M policy, the Government of Indonesia rolled out the COVID-19 Vaccination program which is expected to be decisive in overcoming the pandemic contained in presidential regulation no. 99 of 2020 concerning Vaccine Procurement and Vaccination Implementation in order to overcome the COVID-19 Pandemic. The Food and Drug Administration as an organization representing the Government in implementing operational technical policies in the field of Drug and Food supervision in accordance with the provisions of laws and regulations in Indonesia, took policy steps by implementing emergency use authorization (EUA) or approval of use in emergencies for the COVID-19 Vaccine.

The basis for determining the type of vaccine in the implementation of COVID-19 vaccination in Indonesia is determined by the Government through the Decree of the Minister of Health Number HK.01.07 / MENKES / 9860 / 2020. The types of vaccines stipulated in the Government decree that can be used for vaccination implementation in Indonesia are vaccines produced by PT Biofarma (Persero), AstraZeneca, China National Pharmaceutical Group Corporation (Sinopharm), Moderna, Pfizer Inc. and BioNTech, and Sinovac Biotech Ltd. The government guarantees that the vaccine to be used is still in the stage of implementation of the third phase of clinical trials or has completed the third phase of clinical trials and ensured safety and effectiveness levels above those required, which is at least 50%.

The government has been vigorously campaigning for various policies in tackling COVID-19, but the spearhead of success in tackling COVID-19 is the high participation of the community. The pros and cons of any policy issued by the government are natural in a country based on democracy. However, some people's rejection of policies made by the government is suspected to be an obstacle in countering the spread of COVID-19 in Indonesia, such as vaccination rejection.

The COVID-19 vaccination program in Indonesia has started in early 2021 as a government step to overcome the pandemic, but nevertheless the rejection of vaccination participation continues. The survey conducted during a webinar held by the Padjadjaran University Alumni Association for health workers regarding COVID-19 vaccine knowledge was obtained by 20% of health workers who were not willing to be given the COVID-19 vaccine. Various reasons were revealed behind the rejection, as many as 30% of health workers refused vaccination because they were unsure of the safety of the vaccine, 22% of health workers were pessimistic about the effectiveness of the vaccine, 12% were afraid of the side effects caused after vaccination, 13% of health workers did not believe in vaccination, 8% because of the halalness of the vaccine and the remaining 15% for other reasons. The survey involved health worker respondents spread across four teaching hospitals in Aceh, Bandung, Mataram and Ambon (Tempo.co, 2021).

Rejection of COVID-19 vaccination shows the still strong anti-vaccine phenomenon in Indonesia and also in the world in general. One of the reasons for the rejection of vaccines in Indonesia is concern about the permissible of the ingredients of vaccine. Structural problems also prompted the emergence of this anti-vaccine movement. In addition, the lack of trust in the pharmaceutical industry is also an important factor that encourages the emergence of doubts about vaccines (vaccine hesitancy) and the anti-vaccine movement in general. According to Sociologist of Sebelas Maret University Surakarta Tri Kartono (2021), the rejection of COVID-19 vaccination in Indonesia is suspected because of the possibility that people do not want to be vaccinated because of the demonstration effect, which is to follow people around them.

The reasons for the rejection of COVID-19 vaccination that has been presented above are in line with research on vaccination refusals that have been widely done in order to find out the factors that influence a person to refuse vaccination activities, the findings in these studies are as follows: 1) Belief: Islamic Religion, because of the belief that vaccines are haram because they contain prohibited elements (Padmawati et al., 2019, Rivani et al., 2019, Sulistiyani et al., 2017, Syiroj et al., 2019). 2) Belief in natural immunity and belief in alternative therapies (Sulistiyani et al., 2017). 3) Concerns about vaccine safety: side effects and components of the vaccine (Syiroj et al., 2019, Yufika et al., 2020). 4) Issues of trust and misinformation: distrust of the government, trust in social networks, misinformation and lack of knowledge (Rivani et al., 2019). 5) Social demographics: low level of education, lack of knowledge, (Padmawati et al., 2019, Yufika et al., 2020).

Based on the above description, this article will explain the factors that influence a person to refuse COVID-19 vaccination based on research that has been done to people living in the DKI Jakarta area as a research object to analyze and test the influence of vaccine safety perceptions, the role of social media and knowledge of one's decision to refuse COVID-19 vaccination.

From the above factors, 55 people have been conducted online about the most influential factors for refusing COVID-19 vaccination. Of the 55 respondents who participated in the survey, 65.5% were willing to receive the vaccine while the remaining 35.5% rejected the vaccine.

Table 1. Pre-Survey Questioner

The Factors	Percentage (%)
Religion	26.3%
Confidence	52.6%
Alternative medicine	63.2%
Vaccine Safety Perception	89.5%
Sentiments to the Government	57.9%
Social Media	73.7%
Knowledge	73.7%
Vaccine Permitted (Halal) Perception	47.4%
Perception of the Benefits of Vaccines	73.7%

Source: Pre-Survey Questionnaire (2021)

The results of the pre-survey showed that vaccine safety perception factors, social media, knowledge and perception of vaccine benefits were selected by respondents as the dominant factors in influencing them to reject the COVID-19 vaccine.

HYPOTHESIS DEVELOPMENT

H1: Vaccine safety perception affects COVID-19 vaccination refusal decision

H2: The role of social media has an effect on the decision to refuse COVID-19 vaccination.

H3: Knowledge affects the decision to refuse COVID-19 vaccination.

II. RESEARCH METHODS

Research is carried out basically to find a truth and also solve the problem that is being studied. To achieve this goal, research must use appropriate methods and reveal with the purpose to be researched. This research is a causal relationship using descriptive research methods of quantitative research type with survey research. Survey research is research by collecting information from a sample by asking through questionnaires or interviews so that later describe various aspects of the population (Ahyar et al., 2020). The criteria for respondents who were sampled in this study were people living in the DKI Jakarta area who were eligible to receive the COVID-19 vaccine. In this study, a sample of 150 respondents who refused to receive the COVID-19 vaccine were taken. The number of samples used in this study refers to the Structural Equation Model (SEM) analysis method. In the SEM method according to

Bentler and Chou (1987) in Riadi (2018) the number of samples needed is at least 5 (five) times the number of indicator variables or the ratio of sample size to the number of parameters of 5: 1. The number of indicators in this study is 23 indicators.

III. RESULTS AND DISCUSSIONS

This study used a sample of 150 respondents who have characteristics as a community recipient of the COVID-19 vaccine in Jakarta. The respondent's profile will be explained by demographics based on gender, age, educational background and occupation.

Table 2.   Respondent Profile

Gender	Total Respondents
Male	41
Female	109

Age	Total Respondents
18 to 25 years	31
26 to 35 years	79
36 to 45 years	23
46 to 55 years	12
56 to 65 years	5
> 35 years	0

Educational Background	Total Respondents
Senior High School	38
Associate Degree	18
Bachelor Degree	86
Master degree	8
others	0

Occupation	Total Respondents
College student	15
Employees	72
Self-employed	24
Civil servants/ BUMN/ TNI/ POLRI	2
Professional workers	5
Taking care of the household	32
others	0

Source: Data Processing Results (2021) Based on Table 2, respondents were dominated by millennials who are 26 to 35 years or respondents born in 1980 to 1997, female, undergraduate educated and have a job as a private employee

Table 3. Description of Vaccine Safety Perception

Indicators	Mean	Min	Max	Std. Dev
I feel anxious about the effects that will be caused by getting COVID-19 vaccination	4.01	1	5	1.27
I have the right and authority to refuse COVID-19 vaccination	4.22	1	5	1.17
I don't know the benefits/uses of COVID-19 vaccination yet	3.43	1	5	1.13
Knowing the consequences if I don't get COVID-19 vaccine	3.47	1	5	1.28
Feeling comfortable with my body's condition if I have not been given organisms through the COVID-19 vaccine	3.73	1	5	1.38
I believe COVID-19 vaccination has an invisible adverse effect	4.15	1	5	0.91

Based on Table 3, the statistics of the average description of values against questions regarding indicators of vaccine safety perception. The highest

value of 4.22, stated on the indicator has the right and authority to refuse COVID-19 vaccination. While the lowest value of 3.43 is on the indicator does not know the benefits / uses of COVID-19 vaccination.

Table 4. Social Media Description

Indicators	Mean	Min	Max	Std. Dev
Through social media I get the information such as benefits & side effects regarding COVID-19 vaccination	4.01	1	5	1.27
Explore every information about COVID-19 vaccination received through social media	3.73	1	5	1.38
Coming to the conclusion that information about COVID-19 vaccination circulating on social media is something that I think is less encouraging and the information is wrong.	4.15	1	5	0.91

Source: Data Processing Results (2021)

Based on Table 4, the average description statistics value to questions regarding social media perception indicators. The highest value of 3.73 is on the indicator of exploring every information about COVID-19 vaccination received through social media. While the lowest value of 3.56 is on the indicator through social media that get detail information such

as benefits & side effects regarding COVID-19 vaccination.

Table 5. Description of Knowledge

Indicators	Mean	Min	Max	Std. Dev
I have known about the dangers of coronavirus since it was first discovered.	3.61	1	5	1.12
I have understood the messages conveyed through mass media / social media about COVID-19 vaccination and the effects it will caused	3.39	1	5	1.43
I protect myself from exposure to the coronavirus through health protocols rather than having to fight the disease through COVID-19 vaccination.	3.59	1	5	1.22
I compare the good and bad impacts on myself if I refuse COVID-19 vaccination	3.05	1	5	1.30
I judge that refusing COVID-19 vaccination is the right decision	2.95	1	5	1.32
It's not a problem for me to refuse COVID-19 vaccination	3.01	1	5	1.12

Based on Table 5, statistics the average description of the value against questions regarding knowledge indicators. The highest value of 3.61 is on the indicator of knowing about the dangers of the coronavirus since it was first discovered. While the lowest value of 2.95 is on the indicator assessing that refusing the COVID-19 vaccination is the right decision.

Table 6. Description of the Decision to Refuse Vaccination

Indicators	Mean	Min	Max	Std. Dev
There is a lack of information that I did not understand about COVID-19 until I decided to refuse vaccination	3.08	1	5	1.26
I tried alternative medicine to increase the body's resistance in fighting the virus instead of getting vaccinated against COVID-19	3.07	1	5	1.40
I started hanging out with people who refused COVID-19 vaccinations which was actually against government policy and society decisions in general.	2.80	1	5	1.31
I enjoy to gather with these people because it provides satisfaction and freedom of opinion regarding personal health rights regulated by the applicable laws in Indonesia.	3.37	1	5	1.21
I think rejecting COVID-19 vaccination is more of an inner satisfaction and provides a pleasant experience than my disappointment with a government that cannot control the pandemic.	2.90	1	5	1.30
I still receive every new information about the possible risk of exposure to the coronavirus due to refusing COVID-19 vaccination even though I ultimately ignored it.	2.82	1	5	1.28
I am getting used to declaring rejection of COVID-19 vaccination in front of the public	3.28	1	5	1.30
I don't care about other people's views on me for refusing COVID-19 vaccination and I think the rejection of it is the freedom to argue about everyone's health.	3.21	1	5	1.38

Based on Table 6, statistics the average description of scores against questions regarding indicators of decisions against vaccination. The highest value of 3.37 is on the indicator of enjoying to gather with the people because it provides satisfaction and freedom of opinion regarding personal health rights regulated by applicable laws in Indonesia. While the lowest value of 2.80 is on the indicator of starting to get along with

people who refuse COVID-19 vaccination which is actually contrary to government policies and decisions of society in general.

Furthermore, the influence between variables is analyzed using partial least square (PLS) analysis techniques. Based on the variable operational definition in this study, the vaccine safety perception and knowledge construct was measured by 6 indicators, then the social media construct was measured by 3 indicators, and the decision construct to reject vaccination was measured by 8 indicators. The results of the model estimate as a reference for testing hypotheses in this study can be seen in the following figure:
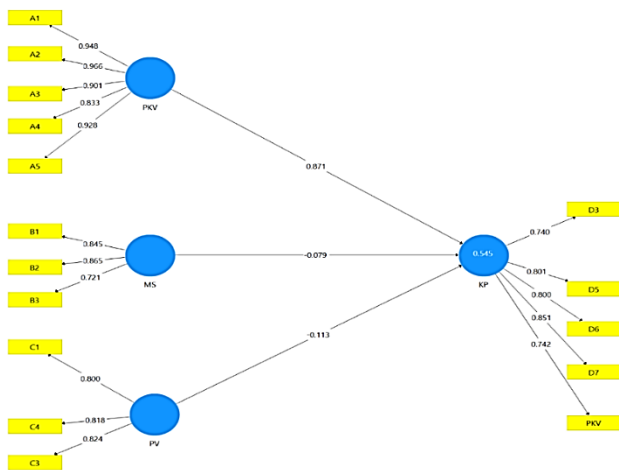

Figure 1. Estimated results of PLS Bootstrapping model

Based on Figure 1, the results of the estimated PLS model with the bootstrapping technique above, it can be seen that the PKV - KP path is significant because the p value is 0.05. The results of this direct influence significance test can be found in the following table:

Table 7. Partial Influence Testing Results

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
MS -> KP	-0.079	-0.073	0.097	0.819	0.413
PKV -> KP	0.871	0.865	0.083	10.547	0.000
PV -> KP	-0.113	-0.104	0.097	1.166	0.244

Source: Data Processing Results (2021)

Based on the results of the above hypothesis testing, the test results are obtained as follows: 1) PKV path → KP: Jalur which shows the relationship of vaccine safety perception influence on the decision to refuse vaccination, the p value obtained is 0.000 with a statistical T of 10.547 and a positive marked path coefficient of 0.871. Because the p value of the line < 0.05, T statistics > 1.96 and the coeffici path is marked positively, it can be concluded that the perception of vaccine safety has a positive and significant effect on the decision to refuse COVID-19 vaccination. 2) MS → KP lines: On a path that shows the relationship of social media influence on the decision to refuse vaccination, the p value obtained is 0.413 with a statistical T of 0.819 and a negatively marked path coefficient of 0.079. Because the p value of the > line 0.05, T statistics < 1.96 and the negatively marked path compefsien can be concluded that social media has a negative and insignificant effect on the decision to refuse COVID-19 vaccination. 3) PV path → KP: On a path that shows the relationship of the influence of knowledge on the decision to refuse vaccination, the p value is 0.244 with a statistical T of 1.166 and a negative marked path coefficient of 0.113. Because the p value of the path > 0.05, T statistics < 1.96 and the negatively marked path coefficient, it can be concluded that knowledge has a negative and insignificant effect on the decision to refuse COVID-19 vaccination.

The hypothesis in this study was tested based on the results of pls analysis. Testing the hypothesis using an alpha value of 5% then the statistical value used is 1.96. So that the criteria of the P Value must be smaller than 0.05 and the T-statistical value must be greater than 1.96. The following is a summary of the results of hypothesis testing based on the results of PLS analysis that has been done in this study.

Table 8. Hypothesis Test Results

Hypothesis	Description	Coefficient Path	T Statistics (O/STDEV)	P Values	Result
H1	Vaccine safety perceptions have an effect on the decision to refuse COVID-19 vaccination.	0,871	10,547	0,000	Hypothesis accepted
H2	Social media has an effect on the decision to refuse COVID-19 vaccination.	-0.079	0.819	0.413	Hypothesis rejected
H3	Knowledge affects the decision to refuse COVID-19 vaccination.	-0.113	1.166	0.244	Hypothesis rejected

Source: Data Processing Results (2021)

H1: Vaccine safety perception has a positive and significant effect on the decision to reject the Covid-19 vaccine

The results of the vaccine safety perception hypothesis test for the decision to refuse the COVID-19 vaccination were obtained a p value of 0.000 and a statistical T of 10.547 with a positive marked path coefficient of 0.871. From these results, it was concluded that the perception of vaccine safety had a positive and significant influence on the decision to refuse COVID-19 vaccination and hypothesis 1 was accepted.

This means that the higher the perception of vaccine safety to the decision to refuse COVID-19 vaccination, the higher the rejection made in administering the vaccine. Respondents felt that there was no guarantee from vaccination organizers that the vaccine provided could provide protection against transmission and immunity against COVID-19. The results of this study are in line with research conducted by Purnamiasari (2015) which stated that the perception of immunization safety has an influence on parents in refusing immunization in their children.

H2: The role of social media has a negative and insignificant effect on the decision to reject the Covid-19 vaccine

The results of the social media hypothesis test on the decision to refuse the COVID-19 vaccination were obtained a p value of 0.413 and a statistical T of 0.819 with a negative marked path coefficient of 0.079. From these results, it can be concluded that social media has a negative and insignificant effect on the decision to refuse COVID-19 vaccination and hypothesis 2 is rejected. This means that the higher the influence of social media obtained by respondents, the lower the decision to refuse COVID-19 vaccination.

Before information about the Covid-19 vaccine discourse was officially reported by the government, the tendency of hoax types was more to far-fetched or false news so that the types of hoaxes that appeared more varied, for instances, false content, fake content, manipulated content and misleading content. These issues can be detrimental to the government because with the presence of noise in the form of fake news, of course the socialization will be ineffective because the message conveyed cannot be understood as

expected. Yet, respondents were not affected by the information about vaccines that obtained through social media. It did not make respondents feel confident to refuse vaccinations. The results of this study are in line with research conducted by Al-Regaiey, et al (2021) which states that social media has a negative and insignificant effect on research on the influence of social media on parents' behavior on vaccination in their children.

H3: Knowledge has a negative and insignificant effect on the decision to reject the Covid-19 vaccine
The results of the knowledge hypothesis test on the decision to refuse the COVID-19 vaccination were obtained a p value of 0.244 and a statistical T of 1.166 with a negative marked path coefficient of 0.113. From these results, it can be concluded that knowledge has a negative and insignificant effect on the decision to refuse COVID-19 vaccination and hypothesis 2 is rejected.

This means that the higher the knowledge that respondents have, the lower the decision to refuse COVID-19 vaccination. Respondents have sufficient knowledge about vaccines and with that knowledge feel confident to vaccinate. The results of this study are in line with research conducted by Noorma, et al (2018) which stated that knowledge has a negative and insignificant effect on the research of factors related to parental rejection of measles rubella vaccine in the working area of lempake health center in North Samarinda subdistrict.

IV. CONCLUSION

The conclusions obtained from the results of this study are as follows: 1) Vaccine safety perception has a positive and significant effect on the decision to refuse COVID-19 vaccine. 2) Social media has a negative and insignificant effect on the decision to refuse COVID-19 vaccine. 3) Knowledge has a

negative and insignificant effect on the decision to refuse COVID-19 vaccine.

V. SUGGESTION

This research requires targeted and broader continuous research so that emerging weaknesses can be corrected and refined. Suggestions for academics who will conduct further research: 1) In the next researcher is expected to be able to examine the other factors than vaccine safety perception, social media, and knowledge such as factors in the author's presurvey (religious factors, perception of vaccine benefits, and confidence) or other factors that are not included in the author's pre-survey. 2) The Government is expected to be more active in providing information and education related to the Covid-19 vaccine to the public and clarification of unproven news that is widespread on social media and the surrounding community. Moreover, the society are be able to increase skepticism and sensitivity to various information, and be diligent in re-examining the various news received, as well as improving literacy especially digital literacy and become wiser person to understand the information from media and more critical in sorting the contents and be able to analyze it so that the vaccine program can be addressed effectively.

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Network Traffic Classification: Analysis and Applications

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ABSTRACT

The fast take-up of advanced administrations and Internet of Things (IoT) innovation brings about exceptional numbers and broadening of digital assaults, with which usually utilized rule-based Network Intrusion Detection Systems (NIDSs) are battling to adapt. Accordingly, Artificial Intelligence (AI) is being taken advantage of as second line of protection, since this philosophy helps in extricating non-clear examples from network traffic and along these lines in distinguishing all the more unhesitatingly new sorts of dangers. Digital protection is anyway a weapons contest and insightful arrangements face reestablished difficulties as assaults advance while network traffic volumes flood. Network traffic order is a fundamental device in digital protection for the acknowledgment and interference of digital insider dangers. Network Traffic arrangement is the initial step to recognize different applications and conventions that is accessible in the organization. The center part of organization interruption recognition is an organization traffic examination that researches the organization conduct in light of traffic portrayal.

Keywords : Network traffic classification, Types of network traffic classification techniques, Machine Learning techniques, Artificial Intelligence Technique, Cyber Security.

I. INTRODUCTION

Recently, Artificial Intelligence (AI) and Machine Learning (ML) based methods like Artificial Neural Networks, Clustering, and Ensemble Learning are progressively engaging for building programmed network danger or irregularity discovery frameworks. This is generally because of the remarkable capacity of brain models to find stowed away examples in huge measures of information, which helps supporting order exactness, as currently exhibited in a few examination regions including discourse acknowledgment [1], PC vision [3], and remote and portable systems administration [2]. Be that as it may, in spite of the fast advancement of AI-based ways to deal with Network Intrusion Detection (NID), existing arrangements (for example[4]) remain very touchy to little changes in individual highlights of organization traffic streams, which weaken their viability notwithstanding constant programming refreshes and developing traffic scenes, as we uncover. In particular, since these strategies gain from elements of individual examples, preparing them on little subsets of painstakingly created highlights,

accidentally mislabeled examples, or uneven datasets adversely impacts on their speculation capacities, in this way delivering the discovery of new malignant organization movement extremely challenging. Moreover, current NIDSs acquaint application inactivity due with their intricacy, while their models are generally fixed, along these lines requiring retraining for each new errand. As an initial step to handle these issue, in this paper, we examine different traffic order draws near (directed, semi-regulated, unaided) and give outline to a bunch of patterns followed by different specialists for arranging network traffic.

Network Traffic grouping (NTC) is the hidden advances to distinguish different applications and conventions that is accessible inside the organization. Characterizing the organization traffic as an application or convention; they are stepped or hailed and afterward the different tasks can be performed like observing, disclosure, inconsistency location, control, and enhancement with the rationale to further develop network execution. It has critical impacts in network security and the board for example, nature of administration (QOS) control, interruption location, and legitimate block attempt [5]. Remote organizations have restricted data transfer capacity; so to properly coordinate different applications inside the organization; QoS control frameworks utilize traffic order module [6]. NTC is the essential development in the organization traffic investigation and particularly for sifting traffic to recognize any noxious action in the organization. Different NTC procedures have been planned and made all through the most recent twenty years.

II. Related Works

Roughan et al. [1] applied ML calculations, Nearest Neighbors (NN), Linear Discriminate Analysis (LDA) and Quadratic Discriminant Analysis (QDA) to characterize IP traffic in view of the factual mark

approach. Characterization results show that three-class order has the base mistake rate. The mistake rate increments when more applications are blended, which makes sense of the greatest blunder rate in seven-class order. This implies the proficiency of the classifier diminishes when it manages various applications.

Alina et al. [2] applied a solo ML procedure to group the progressions of web traffic into a bunch of groups. Then directed ML calculation is utilized to classify the new traffic. "The creators utilized the factual properties of the organization traffic streams, for example, bundle size, between parcel appearance times, and bundle lengths)". The properties of the initial ten parcels were considered. The organization streams are assembled by applying k-implies calculation. Then, the C4.5 choice tree is utilized to the yield of k-implies clusterization to contribute as contribution for the directed ML way to deal with arrange new and obscure traffic. Web traffic order assists with breaking down the organization traffic for distinguishing "possible interruptions, dealing with the organization assets like Bandwidth prerequisite, issue analysis, and so forth".

Moore and Zuev [3] concentrated on the most proficient method to sort network traffic by application utilizing the regulated ML Naive Bayes strategy. This study was revised and improved by, by utilizing the Bayesian brain network technique. More exact outcomes were accomplished contrasted with the past work.

Hardeep et al. [4] played out a general examination of two unaided AI calculations, for example, K-implies and the Expectation-Maximization (EM) calculation to bunch the web traffic reliant upon the closeness measure between them. The component choice channel in light of relationship is utilized to dispense with the irrelevant elements from the applicant highlight set to acquire the most appropriate elements

for web traffic order. "The trial result showed that the K-implies calculation outflanked Expectation-Maximization with the exactness pace of K-implies is 88% while that of EM is 84%".

One of the earliest concentrate, for example, [5] utilized unaided strategies by applying the Expectation Maximization (EM) calculation [6] to bunch the traffic with comparative attributes into various application groupings. The gathered highlights depend on full stream. The EM calculation is applied to bunch the organization traffic into various gatherings and make classifier rules in light of the groups. The futile and inadequate highlights are disposed of and eliminated from the information and the it is rehashed to advance course. Albeit the grouping results are limited by recognizing

specific applications, this strategy could be utilized as an initial step to characterize obscure traffic to provide some insight about the application bunches in rush hour gridlock.

Fan et al. [7] utilized SVM and K-means to bunch web traffic into various classes subject to stream boundaries. The creators applied two ML calculations. One is a managed; Support Vector Machine (SVM) and the other is a solo ML calculation; K-implies. Data Gain trait choice is performed for choosing the most significant elements. The exact outcomes exhibited that the ML-based traffic portrayal methodology accomplishes a precision of 98% and subsequently reasonable for different programming characterized applications (SDN). Moreover, the SVM based model accomplished preferable exactness and accuracy over the k-implies calculation and the proposed model is all the more computationally proficient.

The proposed approach by Zander et al. [8] utilized ML methods in light of measurable stream properties and used the unaided Bayesian classifier AutoClass [29] for application ID. The creators applied the EM calculation to recognize the most appropriate set from preparing information. AutoClass can ascertain roughly the quantity of classes, in the event that not

arranged beforehand. Their strategy is too in light of full stream to compute highlights.

Jun et al. [9] introduced a NTC model in light of measurable stream qualities and IP bundle payload. The unaided ML approach is utilized to order streams into a couple of use based classes to distinguish obscure applications. The creators fostered another group accumulation procedure by combining equivalent traffic bunches according to their payload content. "Their work moreover introduced another sack of-words model to understand the substance of payload traffic groups". The traffic groups are treated as a record described by a pack of code-words. The result of the group agglomeration is a few amassed bunches. The exploratory consequences of the proposed traffic bunches collection uncover that; it outperformed the K-implies approach by 20% and the proposed strategy accomplishes 89% exactness.

Zhang et al. [10] proposed an original procedure named Robust factual traffic grouping (RTC) by collecting both regulated and solo ML methods to distinguish zero-day applications."The introduced work contains three primary modules; obscure disclosure, a pack of streams (BoF) based traffic order and framework update". The goal of the primary module is to thusly perceive new instances of zero-day assaults from a great deal of unlabelled traffic datasets. The resulting module requires zero-day traffic tests and pre-marked preparing models are taken as contribution to shape a classifier for RTC. The zero-day traffic is coherently broke down by advancing new classes from recognized zero-day traffic in the third module; which is a framework update and that adds to the framework's information. For the managed section; an arbitrary woodland calculation is utilized to utilize BoF based techniques and k-implies bunching is carried out for the unaided part. Many analyses were led on various continuous organization datasets to show the introduced framework performed through and through in a manner that is superior to the conditions of the workmanship traffic arrangement techniques with a

genuine positive pace of 94%. "These near techniques are arbitrary backwoods, the BoF-based strategy, the semi-managed strategy, and one-class SVM".

Other distributed examinations, for example, [11] and [12] likewise meant to research the presentation of ML, however by taking advantage of the initial not many parcels. Albeit this method is viewed as quicker and less tedious than abuse on a full stream premise, the capacity of this classifier decays if the

starting parcels are lost.

Crotti et al. [13] proposed the convention finger impression strategy, and ordered network traffic applying a calculation in view of standardized limits. The proposed strategy depended on three attributes of the gathered IP bundles (between appearance time and appearance request of the parcels as well as their length). Their review results accomplished high exactness for distinguishing three sorts of utilizations utilizing the initial not many parcels as [14]. By the by, the adequacy of the technique weakens on the off chance that the classifier doesn't know about the areas of the client and server, assuming the start of the stream is missed, assuming the primary parcel is lost or on the other hand on the off chance that bundle reordering is excluded.

Mama et al. [15] gathered the organization traffic into k-subsets reliant upon the likeness measure between the examples. This philosophy applied ghostly bunching (SC) to bunch the crude organization traffic into k-subsets of comparable traffic highlights. Then in the following stage, a profound brain network calculation is applied to learn significant highlights of preparing information for interruption recognition. This proposed approach is predominantly appropriate for enormous preparation datasets. Moreover, In crafted by Teng et al. [16] presented a versatile and cooperative interruption recognition component which appointed the various assignments to climate classes, specialists, jobs, gatherings, and articles as a gadget to design an interruption location model. "In this work, web traffic is characterized into various conventions TCP, UDP, ICMP, and, content to

recognize TCP assaults, UDP assaults, and ICMP assaults". The gathering of the two-class classifier is assembled in light of SVM and choice trees to recognize interruptions in the organization.

Goo et al. [17] introduced a strategy for gathering of traffic in view of the relationship model of organization stream. The proposed model includes two sections; "the closeness model and the availability model". In the introduced approach; the comparative streams are assembled while naturally registers the connection file of the organization streams. These assembled streams in the likeness model are taken as contributions to the network model. The gathering of traffic streams in the network model relies upon the availability record rather than same port, IP address, and convention.

III. Network Traffic Classification

A. Port-based classification

In the beginning of the web, grouping and ID of organization traffic was not an issue by any stretch of the imagination. Port based characterization included distinguishing an application in light of reviewing the parcel header and coordinating it with the TCP or UDP port number enrolled with the Internet Assigned Numbers Authority (IANA). Sadly, recorded improvements have uncovered the mistake and untrustworthiness of these customary procedures. The decreasing of this method comes from a few causes..

B. Payload-based classification

To beat the deficiencies of port-arrangement, an elective methodology; Deep bundle investigation (DPI) or payload based discovery was presented that gone past the review of parcel headers to payload content. "This system plays out the coordinating between the bundle substance and contrasts them and a deterministic bunch of amassed marks". Due to

adaptable systems administration climate, the string matching examples for DPI method requires a versatile, viable string matching answer for DPI applications. To involve DPI for network checking applications, QoS; because of its high precision, a bunch of streamlining methods are expected by utilizing compositional upgrades. Marks can incite high calculation cost in the event that it contains kleene conclusion. Accordingly, string designs which don't contain kleene conclusion and cutoff how much payload information to 256 bytes don't really influence the exactness of DPI.

C. Statistical classification

Measurable grouping is a reasoning based procedure that takes advantage of factual attributes of organization traffic stream to distinguish the application. This technique uses various stream level estimations, for instance, the span of the parcel, bundle between appearance time, bundle lengths, and traffic stream inactive time. These estimations are novel for explicit kind of uses; henceforth, this permits the classifier to separate various applications from one another. In the beginning phase, the measurable qualities of organization traffic were researched in a few investigations.

D. Behavioral classification

This approach inspects the entire organization traffic by investigating the organization traffic designs got by the end-point or target have. It recognizes the kind of utilization by really looking at the amount of hosts and the amount of ports. This method fundamentally utilizes heuristic data to recognize a specific application. "Conduct profiles of organization traffic are made as for correspondence instances of end-has and benefits".

IV. Analysis of Network Traffic Classification using AI Techniques

a. The essential of light-weight calculations with less computational expense and exactness is as yet required a dependable arrangement.

b. Meeting the traffic necessity is very simple with high transfer speed in a Local region organization (LAN), while to meet them on the Wide-region organization (WAN) with restricted transmission capacity is as yet a test.

c. The idea of the application changes every now and again and, surprisingly, various adaptations of a similar application have a test for traffic characterization.

d. Characterizing the traffic of new conventions, for example, P2P and their disseminating handling capacity makes it challenging to order conventions precisely and totally.

e. Application engineers frequently track down better approaches to muddle themselves to try not to be separated and recognized.

f. The classifier analyzers should manage the rising measure of traffic and transmission rates;

g. Scientists are searching for lightweight calculations with minimal computational expense;

h. The developing pattern of traffic encryption and convention epitome in the organization presents further challenges.

i. Application engineers keep on imagining better approaches to forestall traffic being sifted and identified.

V. Applications

a. Network Monitoring

In this day and age, the term network observing is far and wide all through the IT business. Network checking is a basic IT process where all systems administration parts like switches, switches, firewalls, servers, and VMs are observed for shortcoming and execution and assessed consistently to keep up with and improve their accessibility. One significant part of organization observing is that it ought to be

proactive. Observing execution issues and bottlenecks proactively helps in distinguishing issues at the underlying stage. Effective proactive checking can forestall network vacation or disappointments.

b. QoS Management

Accessibility and superior grade of administration are the primary signs of the supplier's presentation. Such issues as sluggish pages' downloads and faltering sound during video calls are exceptionally irritating for clients. These issues can be improved by overseeing QoE (Quality of Experience) with the QoS capacity of the Stingray stage.

QoS helps an organization gadget (switch or like) upgrade traffic to be adequate for the applications which are basically significant for clients. The help can powerfully apply different techniques for separation to traffic. It is for the most part material in IP communication, IPTV, video conferencing, and other postponement touchy administrations.

c. Network Security

Network security is a broad term that covers a multitude of technologies, devices and processes. In its simplest term, it is a set of rules and configurations designed to protect the integrity, confidentiality and accessibility of computer networks and data using both software and hardware technologies.

VI. CONCLUSION

This paper gives a basic audit of the field of organization traffic examination, and spotlights on the utilization of AI calculations to arrange web traffic. It shows the incredible interest of the analysts in this theme over every one of the phases of IP arrangement, other than featuring the issues related with grouping systems that have been utilized bountifully by specialists. Obviously AI calculations can be used very well around here. Nonetheless, this review shows that most of AI strategies which are utilized for IP traffic arrangement center around the utilization of administered and solo picking up (bunching), while a couple of purpose half breed procedures (semi-directed). Additionally, the majority of the proposed works depend on measurable elements removed from full streams or simply the first couple of bundles in quite a while, while a couple of exploration works have investigated the utilization of subflows where utilizing sub-streams is by all accounts the most suitable methodology for quicker acknowledgment and ideal identification. Along these lines, the following phase of this examination will research different grouping strategies utilizing AI calculations in view of measurable elements removed from subflows. The expanded number of safety dangers and wrongdoings directed in the internet demonstrates that there is a significant measure of organization traffic that is as yet unclassified, alongside unapproved access that passes all the security frameworks and guidelines with no discovery.

VII. SUGGESTION

This research requires targeted and broader continuous research so that emerging weaknesses can be corrected and refined. Suggestions for academics who will conduct further research: 1) In the next researcher is expected to be able to examine the other factors than vaccine safety perception, social media, and knowledge such as factors in the author's presurvey (religious factors, perception of vaccine benefits, and confidence) or other factors that are not included in the author's pre-survey. 2) The Government is expected to be more active in providing information and education related to the Covid-19 vaccine to the public and clarification of unproven news that is widespread on social media and the surrounding community. Moreover, the society are be able to increase skepticism and sensitivity to various information, and be diligent in re-examining the various news received, as well as

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Study of Cytological Criteria for Diagnosis

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ABSTRACT

In this paper, we studied about the cytological criteria for diagnosis of salivary glands.

Keywords : Salivary Glands, Aspiration Cytology, FNAC

I. INTRODUCTION

Aspiration of normal gland yields scanty material, acinar cell with well-preserved acini, and in cohesive lobules. Serous acinar cell has abundant, bubbly cytoplasm and small central or slightly eccentric rounded dark nucleus with small nucleolus. Ductal cell is less in number appear small cohesive, flat sheet or tubules cells have denser squamatoid cytoplasm, nucleus may be oval. Localized swelling of a salivary gland presenting as a mass may be caused by cyst, neoplasm, sialolithiasis, sialadenitis or systemic disease.

II. MATERIALS AND METHODS

The materials for the present work comprise of smears prepared from aspiration of masses from salivary glands attending the outdoor as well as admitted indoor patients of various department of Patna Medical College and Hospital, Patna. The clinical examination and investigation procedures were performed according to the performa available in the hospital.

CYTOLOGICAL CRITERIA FOR DIAGNOSIS

Cytological criteria for diagnosis include:

(1) Fibrillary chondromyxoid ground substance
(2) Epithelial cells single and in loose sheets.
(3) Small oval nuclei, bland nuclear chromatin well defined dense cytoplasm.
(4) Spindle shaped mesenchymal cells seen mainly in matrix.

Epithelial cell is small uniform in size, round to oval eccentric nuclei. In Papanicolaou stain epithelial cell cytoplasm stain green or reddish brown and matrix grey to pink. In MGG stain stromal cells have grayish cytoplasm, myxomatous area red, cartilage stain purple, epithelial cytoplasm is pale blue. In case of doubt immunoperxidase staining for inter mediate

filaments may be helpful for differentiation. A dirty back ground of mucous debris cohesive clumps and sheet of cell, together with small streams of cell within mucous variation in cell type intermediate, squamous, mucin secreting cells. Most are with abundant cytoplasm. These criteria are for low grade tumour, high grade tumour are easily recognized as malignant but are difficult to type. A definite diagnosis requires coexistence in smear of cell showing squamous differentiation and mucin secreting cells.

CYTOLOGY REVEALS

The aspirate of mucoid, murky fluid, back ground of amorphous and granular debris, oncocytes cell in cohesive, monolayered sheets, many lymphoid cells. Oncocytes with PAP stain shows dense cytoplasm organophilic and granulated. In MGG it is dense grey blue and homogenous.

A review of cytological slides and report from 52 histopathologically confirmed adenolymphomas at **Radium hemmet** showed. 1 case- no aspiration, 49 cases aspirates had cystic fluid mixed with amorphous material. In 7 cases lymphocytes and/ or amorphous material. 42 cases remaining showed oncocytes together with sometimes amorphous substance lymphocytes and/or cystic fluid; 2 were misdiagnosed as mucoepidermoid carcinoma derivation of squamous cell from oncocytes has been described by **Hamperl (1926**). Cohesive, multilayred clumps of oncocytic cells with small regular, nuclei, with absence of fluid, debris and lymphoid cells. Oncocytes may be cystic and their relationship to adenolymphomas is uncertain. Malignant oncocyte tumours have been described.

Highly cellular smear in a clear background cell is in cohesive clusters cells resemble normal serous cell i.e. with dense granular (oncocytic like) cytoplasm or finely vacuolated clear cytoplasm. Nuclei are mildly pleomorphic medium sized; some nuclei are bare lymphocyte like. Some cells are arranged around centre vascular core. In the study carried out at **Radiumhemmet 34** smears revealed acinic cell tumour, 26 of which has cell of acinic appearance without nuclear polymorphism or atypia. 4 smears showed oncocyte like cells, 8 of 34 smear showed nuclear polymorphism, hyper chromaticity and contained large nucleoli,3 to 8 tumour cells had foamy cytoplasm. All acinic cell tumours are considered malignant despite the benign appearing cells as they tend to metastasize.

III. RESULTS AND DISCUSSION

The primary purpose of FNAC is to procedure the clinicians with a reliable, rapid and inexpensive method of diagnosis of lesion observed on physical examination. The result of FNAC must be rendered in terms of surgical pathology provide a clear and concise diagnosis that will guide the clinicians in selecting optimal therapy. The interpretation of cytology sample obtained by FNAC varies greatly according to the target organ. Cell changes that may be of diagnostic significance in one anatomic setting may be unimportant in another. A thorough knowledge of clinical history and of the spectrum of pathology changes are essential pre-requisites for a successful application of this methods of diagnosis in clinical practice. Translating cytologic into histologic patterns of diseases mainly tumours is important in all areas of cytology. The pathologist is expected to render a definitive diagnosis, based on a combination of the clinical and X-ray presentation and the cell samples. The task is not easy.There are several fundamental difference between cytology and histologic diagnosis. Histologic material represents a two-dimensional cross section of a tissue or organ, where in the relationship of a tissue component to one another is easily recognized. The aspirated materials consist of whole cells and tissues fragments, not cut by knife, but usually in a state of disarray,

here the relationship of tissue components to one another is jumbled.

The sensitivity of cytological diagnosis in this series

$$Sensitivity = \frac{True + \mathrm{ve}}{True + ve + \mathrm{false - ve}} = \frac{55}{55 + 5} = \frac{55}{60} = 91.67\%$$ Was 91.67%.

And specificity

$$Specificity = \frac{True - ve}{True - ve + False + ve} = \frac{5}{5 + 0} = \frac{5}{5} = 100\%$$ Was 100%.

Table 1 : Fine needle aspiration cytology : diagnostic yields

	TOTAL NO.	PERCENTAGE
TOTAL NUMBER OF THE PATIENT	95	100%
TOTAL CYTOLOGICAL ASPIRATION	95	100%
NON-NEOPLASTIC	25	26.32%
NEOPLASTIC	65	68.42%
INCONCLUSIVE	5	5.26%
DIAGNOSTIC YIELDS	90	94.74%

Of the 95 cases of salivary gland masses presenting 25 cases of non-neoplastic (26.32%) and 65 cases (68.42%) of neoplastic and 5 cases of not aspirate that inconclusive. So, the diagnostic yields material of FNAC is 90 (94.74%). All the 95 cases were of origin salivary glands. 61 cases were of parotid origin and 34 cases origin from others.

Table 2 : Table showing cytological sub-classification of salivary gland tumours presenting as masses

TYPES OF LESION	TOTAL NUMBER	PERCENTAGE
ADENITIS	15	15.79%
ADENOMA	65	68.42%
MALIGNANCY	00	0.00%
BENIGN ASPIRATE (NORMAL)	10	10.53%
INCONCLUSIVE	5	5.26%
TOTAL	95	100%

Of the 95 cases of salivary gland masses the cyto-diagnosis report shows 15 cases (15.79%) to adenitis. There were 65 cases (68.42%) of adenoma, 10 cases (10.53%) of benign aspirate (normal) and zero case of malignancy and 5 cases (5.26%) of inconclusive.

IV. CONCLUSION

The sensitivity of cytological diagnosis in the present series is comparable to those of other worker. But the specificity is close to the other worker. This is due to true negative case is very low. **Ziajicek et al. (1975)** attributed the following factor to the responsible for the failure to recognize of obtained adequate aspiration for diagnosis of smears.

Size of Lesion : The smaller the size of lesion the grater is the chance of missing it in aspiration. Thus, the rate of false negative diagnosis of small tumour size is higher.

Lock of cytological abnormality: As in well differentiated carcinoma.

Fibrotic or inflammatory : There is failure of aspirate to yield adequate cellular element in sclerotic or massive cancer or cancer associated with oedema and also in inflammatory condition.

The accuracy of cytological diagnosis in the present study was comparable with other workers. **Zajicek et al. (1970)** emphasized the importance of experience of the cytologist in reading the smear as an important factor in determining the diagnostic accuracy of this technique.This was evident from the increased diagnostic accuracy of 88.1% compared to their earlier analysed result **(Franzen & Zajicek, 1968)** with an accuracy of 80.1%. This is also evident from the increased diagnostic accuracy reported by **Southam JC** of 79% to 93% after 2 years of experience.

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Electric Bus Diesel Heating Boiler System

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ABSTRACT

This paper provides an electric bus diesel heating boiler system suitable for cold areas, through design the combustion chamber structure and control system construction, improve the safety and heat efficiency of the existing diesel heating system, and increase the touch screen display and temperature regulation function, improve the use experience. On the basis of fully understanding the present situation of domestic electric bus diesel heating boiler system, the technical parameters of diesel heating boiler system are determined, and the structural design and circuit design are carried out. The test proves that the device meets the safety and efficiency requirements of diesel heating boiler system of electric buses.

Keywords : Diesel Heating, The Combustion Chamber

I. INTRODUCTION

This paper provides an electric bus diesel heating boiler system suitable for cold areas which can improve the safety of electric bus diesel heating boiler system, reduce the accident rate; improve the utilization efficiency of heat energy, more energy saving and environmental protection; use touch screen display and the temperature adjustment to enhance the user experience. The diesel heating boiler system has characteristics of low fuel consumption, low cost and high combustion effect. Therefore, it has great value in terms of application. The internal structure of the system consists of a combustion chamber and a heat exchanger to form an

area where have combustible mixture flow around, and air is supplied to the combustion chamber by an intake fan. While supporting combustion air, a specific field that is full of mixture formed in the combustion chamber. The hot mixture in the chamber turbulent diffusion combustion releases a large amount of heat. Therefore, the combustion chamber structure should be designed reasonably from two aspects of heat exchange and combustion to improve the performance of diesel heating boiler system. At the same time, the SCM is used as the central processing module, and various sensors are set in the key parts of the combustion chamber to achieve all-round control. The whole structure of the device is composed of a vortex combustion chamber

and control system, the control system includes the alarm system, touch screen temperature control system and intelligent control system.

II. Structural Design of Vortex Combustor

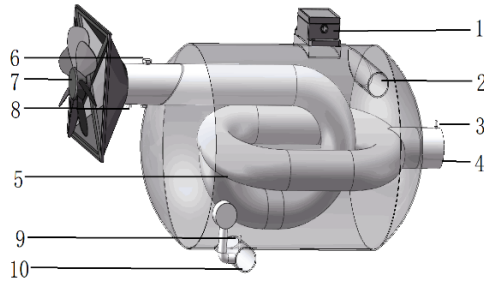The internal structure of vortex combustor is shown in Figure 1.

FIG. 1 Internal structure diagram

1, collision sensor, 2, water inlet, 3, temperature sensor, 4, exhaust manifold, 5, combustion chamber, 6, nozzle, 7, intake fan, 8, ignition plug, 9, pressure sensor, 10, water outlet

The internal structure of the system consists of a combustion chamber and a heat exchanger to form an area where have combustible mixture flows around. Air enters the combustion chamber by the intake fan, which provides combustion air and forms a specific field that is full of mixture formed in the combustion chamber. After the fuel mixture is formed, the mixture of burning gas with high temperature carries on turbulent diffusion in the combustion chamber, and releases a lot of heat. After heat exchange with the wall, the tail gas is discharged through the exhaust port.

Different from the traditional combustor, the vortex structure effectively increases the retention time of fuel in the combustor and makes the energy utilization more full. The space Cartesian coordinate system is established inside the combustion chamber and the function is constructed and the bounded closed region D is set. The surface area and volume can be calculated by geometric calculation and multiple integral formula, and then the improvement of utilization rate can be compared.

$$S=\int_b^a f(x)dx \quad (1)$$

Where, $f(x)$ is a function; $[a,b]$ is a bounded interval.

$$V=\iint_D f(x,y)dxdy \quad (2)$$

Where, $f(x,y)$ is a function; D is a bounded closed region.

The boiler is made of 304 stainless steel, straight pipe, u-pipe, outer diameter of 68cm, inner diameter of 64cm, wall thickness of 2cm.

Volume of designed diesel heating boiler system :

$$V=V_{\text{straight pipe 60mm}}+V_{\text{straight pipe 110mm}}+V_{\text{straight pipe 180mm}}+V_{\text{u-pipe}}* 3 = 4761430.85 \text{ mm}^3$$

Surface area of designed diesel heating boiler system:

$$S=S_{\text{straight pipe 60mm}}+S_{\text{straight pipe 110mm}}+S_{\text{straight pipe 180mm}}+S_{\text{u-pipe}}* 3 = 311663.8 \text{ mm}^2$$

At the same size, traditional diesel heating boiler system surface area:

$$S=S_{\text{cylinder}}= \pi dh = 239703.5 \text{ mm}^2$$

Its surface area is increased by 30.02%, thus greatly improving the heat efficiency.

Parameters of scroll combustor are shown in Table 1:

Table 1

project	parameter
inlet water temperature /°C	30
drainage temperature /°C	95
exhaust manifold temperature /°C	154
CO value/PPM	60
inlet and outlet pressure /Kg	19
inlet fan speed /r/min	4500

The improved combustor structure plays an obvious role, on account of the fuel evaporates and vaporizes in the combustor and mixes with oxygen in the air more fully, and making the combustion more sufficient. The flow dead zone is reduced, the residence time of the mixture in the combustion

chamber is prolonged, and the combustion efficiency is improved. It can fully improve thermal efficiency in the combustion process, reduce emission of pollutants, optimize economy and applicability of the diesel heating boiler system, and achieve the goal of high efficiency and low consumption.

II. Control System

The control system includes the alarm system, touch screen temperature control system and intelligent control system, with single chip microcomputer as the central processing module. MEGA2560PRO microcontroller is adopted in this device, which is compatible with official compilers and other third-party graphic compilers. The data line interface used is microUSB and the interface type is IPS. MEGA2560PRO uses the same ATmega2560 (16M crystal oscillator) chip as the standard version MEGA2560. The driver chip is CH340 (12M crystal oscillator) chip. The size of the main control board is very small, 38*55mm.

The main parameters are shown in Table 2.
Table 2.

project	parameter
power input /V	5
operating voltage /V	5
operating temperature /°C	- 40 ~ 85
digital interface/PCS	54
analog interface/unit	16

3.1 The the alarm system

The the alarm system is composed of RH80408 temperature sensor, the collision sensor, single chip microcomputer, buzzer and ignition plug. If the vehicle hits, rollover and the combustion chamber temperature exceeds the predetermined threshold, the alarm circuit module will automatically alarm and cut off the fire source.

3.1.1 Temperature sensor

The system adopts RH80408 temperature sensor which resistant to 1000 degrees Celsius high temperature, suitable for boiler system internal temperature measurement. In the process of signal transmission, RH80408 temperature sensor will convert the temperature into the corresponding range of voltage, and then through the AD converter into a signal that can be recognized by the MCU, in order to issue a command under the control of the program.

3.1.2 Collision sensor

Collision sensor is a device controlling the input of signals in the alarm system. The collision sensor adopts inertial mechanical switch structure, and its working state depends on the acceleration of the vehicle during collision. Generally, the collision sensor can be used as a collision signal sensor or a cthresholdollision protection sensor, but its deceleration must be set.

The collision sensor is used to detect and judge the collision signal of the car, so as to timely alarm the system. When cars collide, the collision sensor will detect the intensity signal of the car collision and input signal into single chip microcomputer, which will determine whether to close the fuel injection nozzle and open the alarm according to the signal of the collision sensor.

3.1.3 Buzzer

In the buzzer circuit module, the positive end of the buzzer is connected with 5V power supply, the negative end of the buzzer is connected with the triode collector, and the triode base level is controlled by the pin of the MCU through a "Nand gate". Specifically, when the pin of MEGA2560PRO MICROcontroller P1.5 is low, the "Nand gate" outputs a high level, at this time the audion turns on, and the current in the buzzer forms a loop to emit sound; when the pin of MEGA2560PRO MICRO controller P1.5 is high, the "Nand gate" outputs low level, at this time the audion cuts off, no current forms the loop, so that the buzzer can not make the sound. Here, "Nand gate" is actually used as "no gate". The function of

using one "no gate" is to prevent the buzzer from making sound when the system is reset, because the I / O port outputs a high level after the system is reset. The user can write a program to switch on the "low" and "high" of the buzzer pin to make the buzzer sound or turn off the sound.

3.1.4 System design

MEGA2560PRO microcontroller is used as the center processing module. Meanwhile, the temperature and pressure information collected by RH80408 and collision sensor is sent to the microcontroller through the bus. When the temperature or pressure exceeds a certain limit, the microcontroller generates a pulse of a certain frequency to make the buzzer alarm. The system design block diagram is shown in Figure 3.
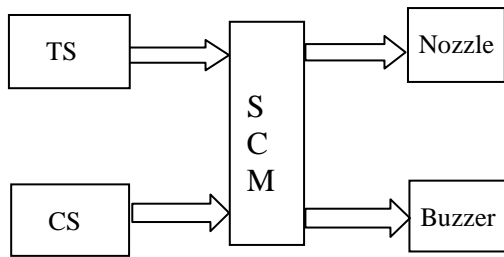
FIG. 3 Block diagram of the alarm system design

3.2 Touch screen temperature control system

3.2.1 Touch screen control temperature system design

MCU receives the temperature sensor information and displays it on the screen. The amount of fuel injection can be controlled through the SCM through the user window to achieve the purpose of heating up or cooling down. Touch screen control temperature system design block diagram is shown in Figure 4.
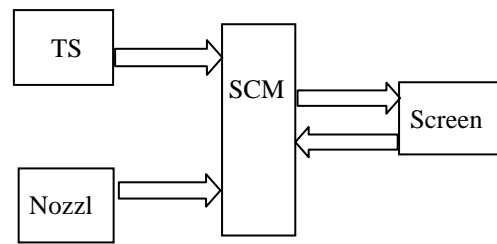
FIG. 4 Design block diagram of touch screen temperature control system

3.2.2 User Window design

The touch screen adopts SKTOOL7.0 configuration design. In the user window, you can design a rich graphical interface with various graphics objects provided by the configuration software, and realize the monitoring and control of the single chip microcomputer by connecting various objects in the interface with the parameters of the single chip microcomputer. In the main interface can feedback the temperature, the user can raise or lower the temperature according to different situations.

Its interface is shown in Figure 5.
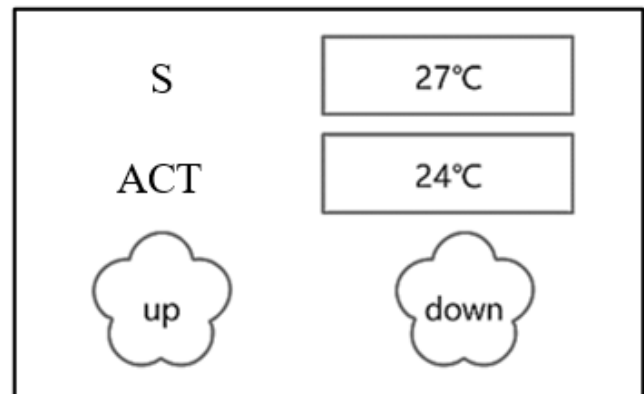
Figure 5. User interface

The rich information of the user interface can provide a reference for users. During operation, you can run commands by setting the temperature. The actual temperature reflects the real-time temperature. After setting, the actual temperature gradually approaches the set temperature and finally reaches the same value.

3.3 intelligent control system

The circuit of intelligent control system is composed of MQ-7 carbon monoxide sensor, the temperature sensor, the pressure sensor and single chip microcomputer to control the temperature, fuel injection and the air intake. The signal collected by each sensor is transmitted to the microcontroller, which compares the basic data set in advance. If it does not match, adjust it through the nozzle, the ignition plug and the intake fan until the specified data range is restored.

3.3.1 CO Sensor

CO sensor which adopts MQ-7 model has good sensitivity to carbon monoxide detection and has fast response and recovery characteristics. The MQ-7 sensor has a power indicator and TTL signal output indicator, DO switch signal (TTL) output and AO analog signal output. TTL output effective signal is the low level. The signal will light when low level output, and it can be directly connected to the MCU. When the air is received by an internal system for sampling, it generates a voltage signal proportional to the concentration of carbon monoxide. The MQ-7 sensor outputs the voltage at an analog level, with the higher the concentration, the higher the voltage.

If the carbon monoxide concentration is too high and the combustion is not sufficient, the power of the fan is increased through the single chip microcomputer to increase the air intake.

3.3.2 Pressure sensor

The principle of pressure sensor is piezoelectric effect. When some dielectric is deformed by an external force in a certain direction, the polarization phenomenon will occur inside the dielectric, and positive and negative charges will appear on its surfaces. When the external force is removed, it returns to an uncharged state, a phenomenon known as the positive piezoelectric effect. As the direction of the force changes, so does the polarity of the charge. On the contrary, when an electric field is applied in the direction of polarization of the dielectric, the dielectric will also deform. When the electric field is

removed, the deformation of the dielectric will disappear. This phenomenon is called inverse piezoelectric effect. The piezoelectric element is supported on the body, and the diaphragm transmits the measured pressure to the piezoelectric element, and then the piezoelectric element outputs an electrical signal which is related to the measured pressure. The sensor has small volume, good dynamic characteristics and high temperature resistance, which meets the working conditions of diesel heating system.

The circuit board consists of three units :(1) Temperature AD conversion unit, which is used to convert the analog value of the sensor into digital value;(2) The control unit is used to input the digital quantity by the AD conversion unit into the control unit;(3) The communication unit sends the converted digital quantity to PC. Through these three parts, to achieve the measurement of pressure.

Pressure sensors always monitor and signal the water pressure in the vortex combustion chamber. Water pressure is too low or too high, is not conducive to the system work. When abnormal data is detected, water intake is controlled to restore normal water pressure.

3.3.3 Principle of PID control temperature

The PID working principle is: due to the continuous generation of various disturbances from the outside, in order to achieve the purpose of keeping the value of the control object constant, the control action must be continuously carried out. If disturbance makes the values of object change, the detection element will collect this change to the input end of the PID controller through the transmitter, and compare it with the given value to obtain the deviation value. The controller follows this deviation and sends out the control signal to change the opening of the controller and make the opening of the controller increase or decrease, then the value of the object changes and tends to be a given value to achieve the control purpose. In fact, the essence of PID is to carry out proportional, integral and differential operations

on the deviation, and control the process of the executive parts according to the operation results.

Through PID operation of temperature, the result fOut is produced. This parameter determines whether to heat and how long the heating time is. Set the program for controlling temperature, the program is as follows:

Proportion=2: // Sets the PID ratio

StPID. Integral = 0;// Set PID integral value

StPID. Derivative = 5;// Set PID differential

FOut = PIDCalc (& stPID, (int) (fT * 10));/ / PID calculation

if(fOut<=0)

* P_IOA_Buffer & = Oxff7f;// When the temperature is higher than the set value, close the ignition plug

else

* P_IOA_Buffer | = 0 x0080;// When the temperature is below the set value, open the ignition plug

...

Intelligent temperature control is achieved by controlling the nozzle, the ignition plug and the intake fan.

2.3.4 System design block diagram is shown in Figure 6.
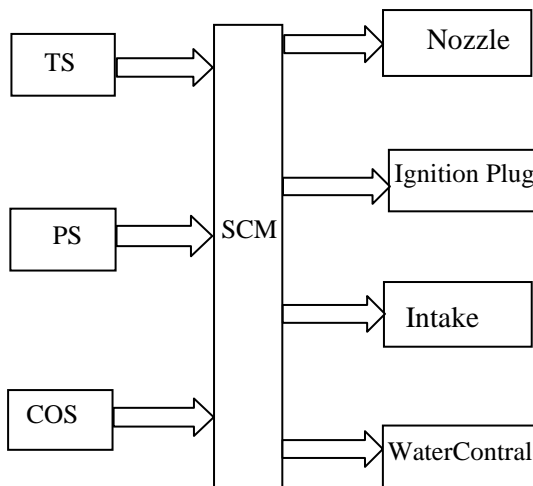
FIG. 6 Block diagram of intelligent control system design

III. Summary and Prospect

The research of electric bus diesel heating boiler system can improve the research system of diesel heating boiler system, improve the safety and heat efficiency of the existing diesel heating system, and increase the function of touch screen display and the temperature regulation, meet the demand of the application market, and lay a foundation for the subsequent research.

At the same time, the research results of electric bus diesel heating boiler system structure and system promote future research on the safety and efficiency of the vehicle, help to raise awareness of this aspect for further develop the research.

The highlights of this study are the following innovations:

(1) The vortex combustion chamber system is used to increase the retention time of fuel in the combustion chamber. At the same time, the amount of fuel injection and the amount of air intake are controlled by MCU intelligently, so that the combustion is more sufficient and the thermal efficiency is higher. After testing, the conversion efficiency of heat energy of the common combustion chamber is 32%, and the efficiency of heat energy conversion of the vortex combustion chamber is 62% , increasing by 30%.

(2) The working chamber temperature sensor and collision sensor and other real-time detection of the vehicle state, when the firewood heating device fire or violent collision and rollover automatically cut off the fuel supply, at the same time the use of warning lights and the buzzer alarm. Improved security.

(3) Through the boiler outlet and return water temperature sensor, detect and reflect the working state of firewood heating, can use the touch screen to adjust the temperature.

(4) The temperature sensor collects the temperature information of each part, and then the single chip microcomputer intelligently controls the ignition plug, fuel injection and air intake through the program, so as to achieve the most reasonable

working state. The combustion gas exhaust outlet is equipped with a temperature sensor, which can correct the amount of fuel injection according to the exhaust temperature and save fuel.

Electric bus diesel heating boiler system for the subsequent related research, provides research road and research theory. But at the same time, there are some limitations. It is believed that with the deepening of research, building a more efficient, green, energy saving system will become the trend of the future.

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Analysis of Stress and Displacement of Landing Gear for an Aircraft Through the Finite Element Method

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ABSTRACT

An aircraft landing gear system must absorb the kinematic energy produced by a landing impact and excitations caused by the aircraft travelling over an uneven runway surface. This is necessary requirement of successfully designed landing system. The oleo pneumatic shock is the most common type of shock absorber landing gear system used in aircraft. It dissipates the kinetic energy produced by impact arising when an airplane lands at high speed but also offer a comfortable rice to passenger when the airplane taxies at low speed. The objective of this project to determine the stress behavior and the displacement of a nose gear of an aircraft during landing using structural finite element analysis using with the help of analytical calculation. The external forces were determine analytical and the interactions between components were carefully modeled using contact analysis.

Keywords : Aircraft Landing Gear System, TAIL DRAGGER, Ar 234 jet

I. INTRODUCTION

Landing gear is the undercarriage of an aircraft or spacecraft and may be used for either takeoff or landing. For aircraft it is generally both. It was also formerly called alighting gear by some manufacturers, such as the Glenn L. Martin Company. For aircraft, the landing gear supports the craft when it is not flying, allowing it to take off, land, and taxi without damage. Wheels are typically used but skids, skis, floats or a combination of these and other elements can be deployed depending both on the surface and on whether the craft only operates vertically (VTOL) or is able to taxi along the surface.

Faster aircraft usually have retractable undercarriages, which fold away during flight to reduce air resistance or drag. For launch vehicles and spacecraft Landers, the landing gear is typically designed to support the vehicle only post-flight, and are typically not used for takeoff or surface movement.

Aircraft landing gear:

Aircraft landing gear usually includes wheels equipped with simple shock absorbers, or more advanced air/oil oleo struts, for runway and rough terrain landing. Some aircraft are equipped with skis for snow or floats for water, and/or skids or pontoons helicopters.

It represents 2.5 to 5% of the MTOW and 1.5 to 1.75% of the aircraft cost but 20% of the airframe direct maintenance cost; each wheel can support up to 30 t (66,000 lb), reach over 300 km/h, roll up to 500,000 km (310,000 mi) ; it has a 20,000 hours' time between overhaul and a 60,000 hours or 20 years life time. The undercarriage is typically 4–5% of the takeoff mass and can even reach 7%.

Gear arrangements

Wheeled undercarriages normally come in two types:

- conventional or "tail dragger" undercarriage, where there are two main wheels towards the front of the aircraft and a single, much smaller, wheel or skid at the rear;
- Tricycle undercarriage where there are two main wheels (or wheel assemblies) under the wings and a third smaller wheel in the nose.

The tail dragger arrangement was common during the early propeller era, as it allows more room for propeller clearance. Most modern aircraft have tricycle undercarriages. Tail draggers are considered harder to land and take off (because the arrangement is usually unstable, that is, a small deviation from straight-line travel will tend to increase rather than correct itself), and usually require special pilot training. Sometimes a small tail wheel or skid is added to aircraft with tricycle undercarriage, in case of tail strikes during take-off. The Concorde, for instance, had a retractable tail "bumper" wheel, as delta winged aircraft need a high angle when taking off. Both Boeing's largest WWII bomber, the B-29 Super fortress, and the 1960s-introduced Boeing 727 trijet airliner each have a retractable tail bumper. Some aircraft with retractable conventional landing gear have a fixed tail wheel, which generates minimal drag (since most of the airflow past the tail wheel has been blanketed by the fuselage) and even improves yaw stability in some cases. Another arrangement sometimes used is central main and nose gear with outriggers on the wings. The B-52bomber uses a similar arrangement, except that each end of the fuselage has two sets of wheels side by side.

Gear arrangements

CONVENTIONAL "TAIL DRAGGER"

Retractable gear:

To decrease drag in flight some undercarriages retract into the wings and/or fuselage with wheels flush against the surface or concealed behind doors; this is called retractable gear. If the wheels rest protruding and partially exposed to the airstream after being retracted, the system is called semi-retractable.

Most retraction systems are hydraulically operated, though some are electrically operated or even manually operated. This adds weight and complexity to the design. In retractable gear systems, the compartment where the wheels are stowed are called wheel wells, which may also diminish valuable cargo or fuel space. Pilots confirming that their landing gear is down and locked refer to "three greens" or "three in the green.", a reference to the electrical indicator lights (or painted panels of mechanical indicator units) from the nosewheel/tailwheel and the two main gears. Blinking green lights or red lights indicate the gear is in transit and neither up and locked or down and locked. When the gear is fully stowed up with the up-locks secure, the lights often extinguish to follow the dark cockpit philosophy; some airplanes have gear up indicator lights.

Multiple redundancies are usually provided to prevent a single failure from failing the entire landing gear extension process. Whether electrically or hydraulically operated, the landing gear can usually be powered from multiple sources. In case the power

system fails, an emergency extension system is always available. This may take the form of a manually operated crank or pump, or a mechanical free-fall mechanism which disengages the up locks and allows the landing gear to fall due to gravity. Some high-performance aircraft may even feature a pressurized-nitrogen back-up system.

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ME 163B KOMET WITH ITS TWO-WHEEL TAKEOFF "DOLLY" IN PLACE

THE LANDING GEAR OF A BOEING 767 RETRACTING INTO THE FUSELAGE
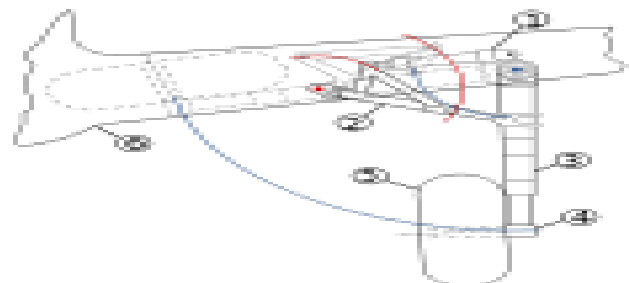
Schematic Showing Hydraulically Operated Landing Gear, With The Wheel Stowed In The Wing Root Of The Aircraft

A Boeing 737-700 with main undercarriage retracted in the wheel wells without landing gear doors

A Ju 87D with a wheel spat on its right wheel, absent on its left

Large aircraft:

As aircraft grow larger, they employ more wheels to cope with the increasing weights. The earliest "giant" aircraft ever placed in quantity production, the Zeppelin-Staaken R.VI German World War I long-range bomber of 1916, used a total of eighteen wheels for its undercarriage, split between two wheels on its nose gear struts, and a total of sixteen wheels on its main gear units - split into four side-by-side quartets each, two quartets of wheels per side - under each tandem engine nacelle, to support its loaded weight of almost 12 metric tons. Multiple "tandem wheels" on an aircraft - particularly for cargo aircraft, mounted to the fuselage lower sides as retractable main gear units on modern designs - were first seen during World War II, on the experimental German Arado Ar 232 cargo aircraft, which used a row of eleven "twinned" fixed wheel sets directly under the fuselage centerline to handle heavier loads while on the ground.[4] Many of today's large cargo aircraft use this arrangement for their retractable main gear setups (usually mounted on the lower corners of the central fuselage structure). The Airbus A340-500/-600 has an additional four-wheel undercarriage bogie on the fuselage centerline, much like the twin-wheel unit in the same general location, used on later DC-10 and MD-11 airliners.

The Boeing 747 has five sets of wheels: a nose wheel assembly and four sets of four-wheel bogies. A set is located under each wing, and two inner sets are located in the fuselage, a little rearward of the outer bogies, adding up to a total of eighteen wheels and tires. The Airbus A380 also has a four-wheel bogie under each wing with two sets of six-wheel bogies under the fuselage.

The world's largest jet cargo aircraft, the Soviet Antonov An-225 has 4 wheels on the twin-strut nose gear units (as its smaller "stablemate", the Antonov An-124 also uses), and 28 main gear wheel/tire units, adding up to a total of 32 wheels and tires.
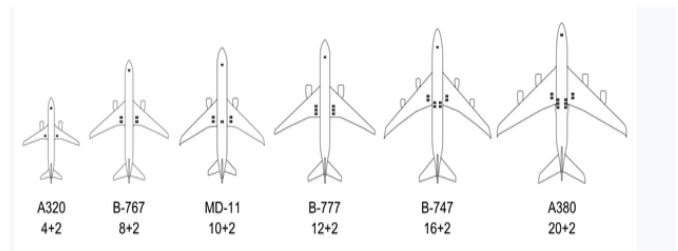
Wheel arrangements of large airliners

Oleo strut rear landing gear of an Antonov An-124 (24 wheel landing gear)

The A340-600 has an additional main undercarriage on the fuselage belly

Wing and fuselage undercarriages on a Boeing 747-400, shortly before landing

1) Nautical:

Some aircraft have landing gear adapted to take off from and land on water. A floatplane has landing gear comprising two or more streamlined floats.

A flying boat has a lower fuselage possessing the shape of a boat hull giving it buoyancy, usually with a "step" near the center of gravity to allow the aircraft to more easily break free of the water's surface for takeoff. Additional landing gear is often present, typically comprising wing-mounted floats, or more rarely, stub-wing like sponsors on the lower sides of the fuselage, with their lower surfaces even with the chine's forming the longitudinal lower corners of a flying boat's lower hull contours. Helicopters able to land on water may have floats or a hull. An amphibious aircraft has landing gear for both land and water-based operation.

Other types of landing gear

landing gear

When an airplane needs to land on surfaces covered by snow, the landing gear usually consists of skis or a combination of wheels and skis.

Detachable landing gear

Some aircraft use wheels for takeoff and then jettison them soon afterwards for improved aerodynamic streamlining without the complexity, weight and space requirements of a retraction mechanism. In these cases, the wheels to be jettisoned are sometimes mounted onto axles that are part of a separate "dolly" (for main wheels only) or "trolley" (for a three-wheel set with a nose wheel) chassis. Landing is then accomplished on skids or similar other simple devices.

Historical examples include the "dolly"-using Messerschmitt Me 163 Komet rocket fighter, the Messerschmitt Me 321 Gigant troop glider, and the first eight "trolley"-using prototypes of the Arado Ar 234 jet reconnaissance bomber. The main disadvantage to using the takeoff dolly/trolley and landing skid(s) system on German World War II aircraft – intended for a sizable number of late-war German jet and rocket-powered military aircraft designs – was that aircraft would likely be scattered all over a military airfield after they had landed from a mission, and would be unable to taxi on their own to an appropriately hidden "dispersal" location, which could easily leave them vulnerable to being shot up by attacking Allied fighters. A related contemporary example are the wingtip support wheels ("pogos") on the Lockheed U-2 reconnaissance aircraft, which fall away after take-off and drop to earth; the aircraft then relies on titanium skids on the wingtips for landing.

Rewards and sideways retraction

A Royal Air Force P-47 with its raked-forward main gear, and rearward-angled main wheel position (when retracted) indicated by the just-visible open wheel door.

Some main landing gear struts on World War II aircraft, in order to allow a single-leg main gear to more efficiently store the wheel within either the wing or an engine nacelle, rotated the single gear strut through a 90° angle during the rearwards-retraction sequence to allow the main wheel to rest "flat" above the lower end of the main gear strut, or flush within the wing or engine nacelles, when fully retracted. Examples are the Curtiss P-40, Vought F4U Corsair, Grumman F6F Hellcat, Messerschmitt Me 210 and Junkers Ju 88. The Aero Commander family

of twin-engined business aircraft also shares this feature on the main gears, which retract aft into the ends of the engine nacelles. The rearward-retracting nosewheel strut on the Heinkel He 219 and the forward-retracting nose gear strut on the later Cessna Skymaster similarly rotated 90 degrees as they retracted.

On most World War II single-engined fighter aircraft (and even one German heavy bomber design) with sideways retracting main gear, the main gear that retracted into the wings was meant to be raked forward, towards the aircraft's nose in the "down" position for better ground handling, with a retracted position that placed the main wheels at some angle "behind" the main gear's attachment point to the airframe – this led to a complex angular geometry for setting up the "pintle" angles at the top ends of the struts for the retraction mechanism's axis of rotation, with some aircraft, like the P-47 Thunderbolt and Grumman Bearcat, even mandating that the main gear struts lengthen as they were extended down from the wings to assure proper ground clearance for their large four-bladed propellers. One exception to the need for this complexity in many WW II fighter aircraft was Japan's famous Zero fighter, whose main gear stayed at a perpendicular angle to the centerline of the aircraft when extended, as seen from the side.

Tandem layout:

Hawker Siddeley Harrier GR7 (ZG472). The two main wheels are in line astern under the fuselage, with a smaller wheel on each wing

An unusual undercarriage configuration is found on the Hawker Siddeley Harrier, which has two mainwheels in line astern under the fuselage (called a

bicycle or tandem layout) and a smaller wheel near the tip of each wing. On second generation Harriers, the wing is extended past the outrigger wheels to allow greater wing-mounted munition loads to be carried, or to permit wing-tip extensions to be bolted on for ferry flights.

A multiple tandem layout was used on some military jet aircraft during the 1950s, pioneered by the Martin XB-51, and later used on such aircraft as the U-2, Myasishchev M-4, Yakovlev Yak-25, Yak-28, Sud Aviation Vautour, and the B-47 Stratojet because it allows room for a large internal bay between the main wheels. A variation of the multi tandem layout is also used on the B-52 Stratofortress which has four main wheel bogies (two forward and two aft) underneath the fuselage and a small outrigger wheel supporting each wing-tip. The B-52's landing gear is also unique in that all four pairs of main wheels can be steered. This allows the landing gear to line up with the runway and thus makes crosswind landings easier (using a technique called crab landing). Since tandem aircraft cannot rotate for takeoff, the forward gear must be long enough to give the wings the correct angle of attack during takeoff. During landing, the forward gear must not touch the runway first, otherwise the rear gear will slam down and cause the aircraft to bounce off the runway.

Crosswind landing accommodation:

The "castoring" main gear arrangement on a Blériot XI

One very early undercarriage arrangement that passively allowed for castoring during crosswind landings, unlike the "active" arrangement on the B-52, was pioneered on the Bleriot VIII design of 1908. It was later used in the much more famous Blériot XI

Channel-crossing aircraft of 1909 and also copied in the earliest examples of the Etrich Taube. In this arrangement the main landing gear's shock absorption was taken up by a vertically sliding bungee cord-sprung upper member. The vertical post along which the upper member slid to take landing shocks also had its lower end as the rotation point for the forward end of the main wheel's suspension fork, allowing the main gear to pivot on moderate crosswind landings.

Kneeling gear

One of the very first aircraft to use a "kneeling" function in its undercarriage design was the World War II German Arado Ar 232cargo/transport aircraft, produced in small numbers as both a twin-engine version, and one with four engines - both the nose gear, and the wing-mounted, inwards-retracting main landing gear were designed to have a "kneeling" function in their design to assist in loading/unloading cargo, and to also allow its unique, exposed fixed ventral fuselage-centerline set of eleven "twinned" auxiliary wheel sets to more firmly support the fuselage on soft ground, and to enable taxiing the aircraft over ditches and other ground obstacles.

Some early U.S. Navy jet fighters were equipped with "kneeling" nose gear consisting of small steerable auxiliary wheels on short struts located forward of the primary nose gear, allowing the aircraft to be taxied tail-high with the primary nose gear retracted. This feature was intended to enhance safety aboard aircraft carriers by redirecting the hot exhaust blast upwards, and to reduce hangar space requirements by enabling the aircraft to park with its nose underneath the tail of a similarly equipped jet. Kneeling gear was used on the North American FJ-1 Fury and on early versions of the McDonnell F2H Banshee, but was found to be of little use operationally, and was omitted from later Navy fighters.

The nosewheel gear systems of some large cargo jets, like the Antonov An-124 Condor, kneel to assist in loading and unloading of cargo using ramps through the forward, "tilt-up" hinged fuselage nose while stationary on the ground.

Monowheel:

A Schleicher ASG 29 glider shows its monowheel landing gear

To minimize drag, modern gliders usually have a single wheel, retractable or fixed, centered under the fuselage, which is referred to as monowheel gear or monowheel landing gear. Monowheel gear is also used on some powered aircraft, where drag reduction is a priority, such as the Europe XS. Much like the Me 163 rocket fighter, some gliders from prior to the Second World War used a take-off dolly that was jettisoned on take-off and then landed on a fixed skid. This configuration is necessarily accompanied with a tail dragger.

Helicopters:

Light helicopters tend to use simple landing skids to save weight and cost. They include attachment points for wheels so that they can be moved for short distances on the ground. Skids are impractical for helicopters weighing more than four tons. Some high-speed machines have retractable wheels, but most use fixed wheels for their robustness, and to avoid the need for a retraction mechanism.

Tailsitter:

A Convair XFY Pogo showing its landing gear

Experimental tail sitter aircraft use landing gear located in their tails for VTOL operation.

Light aircraft:

For light aircraft a type of landing gear which is economical to produce is a simple wooden arch laminated from ash, as used on some homebuilt aircraft. A similar arched gear is often formed from spring steel. The Cessna Air master was among the first aircraft to use spring steel landing gear. The main advantage of such gear is that no other shock-absorbing device is needed; the deflecting leaf provides the shock absorption.

Folding gear:

Ju 288 V1 first prototype, showing its complex "folding" main undercarriage.

In order to save precious space, various folding and splayable landing gear designs have been created. The German Bomber B combat aircraft design competition winner, the Junkers Ju 288, had a complex "folding" main landing gear unlike any other aircraft designed by either Axis or Allied sides in the war: its single oleo strut was only attached to the lower end of its Y-form main retraction struts, handling the twinned main gear wheels, and folding by swiveling downwards and aft wards during retraction to "fold" the main gear's length to shorten it for stowage in the engine nacelle it was mounted in. However, the single pivot-point design also led to numerous incidents of collapsed main gear units for its prototype airframes.

2) Ground carriage

The idea behind a ground carriage is to leave the landing gear on the runway and not take it into the air, in order to reduce weight and drag. Examples include the "dolly" and "trolley" arrangements, respectively of the German Me 163B rocket fighter and Arado Ar 234A prototype jet recon-bomber designs of World War II, as their wheeled "ground carriages" were not usually allowed to either remain attached to the airframe, nor carried vary far away from the ground, during a normal takeoff procedure for either design.

3) Steering

There are several types of steering. Tail dragger aircraft may be steered by rudder alone (depending upon the prop wash produced by the aircraft to turn it) with a freely pivoting tail wheel, or by a steering linkage with the tail wheel, or by differential braking (the use of independent brakes on opposite sides of the aircraft to turn the aircraft by slowing one side more sharply than the other). Aircraft with tricycle landing gear usually have a steering linkage with the nose wheel (especially in large aircraft), but some allow the nose wheel to pivot freely and use differential braking and/or the rudder to steer the aircraft, like the Cirrus SR22.

Some aircraft require that the pilot steer by using rudder pedals; others allow steering with the yoke or control stick. Some allow both. Still others have a separate control, called a tiller, used for steering on the ground exclusively.

Rudder steering:

When an aircraft is steered on the ground exclusively using the rudder, turning the plane requires that a substantial airflow be moving past the rudder, which can be generated either by the forward motion of the aircraft or by thrust provided by the engines. Rudder steering requires considerable practice to use effectively. Although it requires air movement, it has the advantage of being independent of the landing gear, which makes it useful for aircraft equipped with fixed floats or skis.

Direct steering:

The nose gear steering-wheel (tiller) is visible as a semi-circular wheel to the left of the yoke in this photo of a Boeing 727 cockpit

Some aircraft link the yoke, control stick, or rudder directly to the wheel used for steering. Manipulating these controls turns the steering wheel (the nose wheel for tricycle landing gear, and the tail wheel for tail draggers). The connection may be a firm one in which any movement of the controls turns the steering wheel (and vice versa), or it may be a soft one in which a spring-like mechanism twists the steering wheel but does not force it to turn. The former provides positive steering but makes it easier to skid the steering wheel; the latter provides softer steering (making it easy to over control) but reduces the probability of skidding. Aircraft with retractable gear may disable the steering mechanism wholly or partially when the gear is retracted.

Differential braking:

Differential braking depends on asymmetric application of the brakes on the main gear wheels to turn the aircraft. For this, the aircraft must be equipped with separate controls for the right and left brakes (usually on the rudder pedals). The nose or tail wheel usually is not equipped with brakes. Differential braking requires considerable skill. In aircraft with several methods of steering that include differential braking, differential braking may be avoided because of the wear it puts on the braking mechanisms. Differential braking has the advantage of being largely independent of any movement or skidding of the nose or tail wheel.

Tiller steering:

A tiller in an aircraft is a small wheel or lever, sometimes accessible to one pilot and sometimes duplicated for both pilots, that controls the steering of the aircraft while it is on the ground. The tiller may be designed to work in combination with other controls such as the rudder or yoke. In large airliners, for example, the tiller is often used as the sole means of steering during taxi, and then the rudder is used to steer during takeoff and landing, so that both aerodynamic control surfaces and the landing gear can be controlled simultaneously when the aircraft is moving at aerodynamic speeds.

4) Tires and wheels

The specified selection criterion, e.g., minimum size, weight, or pressure, are used to select suitable tires and wheels from manufacturer's catalog and industry standards found in the Aircraft Yearbook published by the Tire and Rim Association, Inc.

II. MATERIALS USED FOR DESIGN

Titanium Alloy:

Titanium alloy has the highest specific strength (strength/weight ratio) of all metallic materials under 400 degree .C, it is also light, strong and corrosion resistant. New passenger jets are using an increasing ratio of Titanium alloy Ti- 6Al-4V, this material is used for aircraft components that require high strength, such as wing joints and landing gear. High efficiency machining of Titanium alloy is a challenge because its low thermal conductivity causes machining heat to concentrate on the edge of the cutting tool.
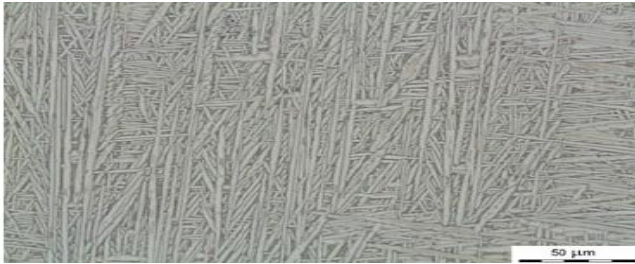
PERCENTAGECOMPOSITION OFTITANIUM ALLOY:

METALS	%COMPOSITION
ALUMINUM	6%
VANADIUM	4%
IRON	0.25%
TITANIUM	90%

OXGYEN	0.2

Percentage composition of Titanium Alloy

MICRO STRUCTURE OFTITANIUM ALLOY :

Titanium Alloy

PROPERTIES OF Titanium Alloy:

PROPERTY	VALUE
Density(kg/m3)	4512
Young's Modulus(MPa)	119000
Poisson's ratio	0.31

Properties of titanium alloy

ALUMINIUM ALLOY:

PERCENTAGECOMPOSITION OFALUMINIUM ALLOY:

METALS	%COMPOSITION
ALUMINUM	91.21-93.5
BERYLIM	0.001
IRON	0.10
TITANIUM	0.06
COPPER	4.8-5.4
MAGNESIUM	0.7-1.1
MANGANESE	0.45-0.80
SILICON	0.08
SLIVER	0.40-0.70
ZINC	0.25
ZIRCONIUM	0.08-0.15

Percentage composition of ALUMINIUM ALLOY

MICRO STRUCTURE OFALUMINIUM ALLOY:
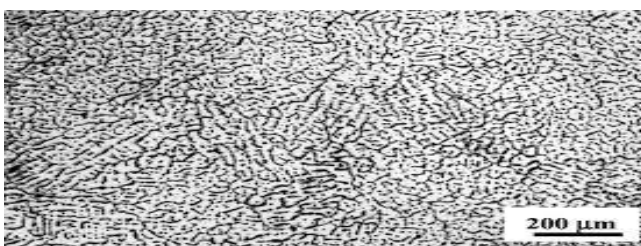
ALUMINIUM ALLOY

PROPERTIES OF ALUMINIUM ALLOY:

PROPERTY	VALUE
Density(Kg/m3)	2810
Young's Modulus(MPa)	73100
Poisson's ratio	0.33

Properties of ALUMINIUM ALLOY

Steel Alloy:

In steel alloys, ferrium m54 turns out to be a good material to use but also ferrium s53 and aermet 100 were also tested. The results shows that these three are not so different in results but ferrium m54 is somewhat better than other two so ferium m54 was selected as steel.

PERCENTAGECOMPOSITION OFSteel Alloy:

METALS	%COMPOSITION
Chrominium	18
Nickel	8-10

Percentage composition of Steel Alloy

MICRO STRUCTURE OFSteel Alloy:

Steel Alloy

PROPERTIES OF Steel Alloy:

PROPERTY	VALUE
Density(kg/m3)	7980
Young's Modulus(MPa)	204000
Poisson's ratio	0.29

Properties of Steel Alloy

III. MODELING OF LANDING GEAR USING CREO
INTRODUCTION TO CREO:

CREO is a powerful software which is a combination of various designing tools. It is popularly used by many leading manufacturing companies across the globe. It was designed by PTC (Parametric Technology Corporation). CREO is one of the most popular and powerful designing tools used in the market. With the popularity of CREO the demand of CREO certification has also increased in the market.

LANDING GEAR DESIGN:
AXLE DESIGN:
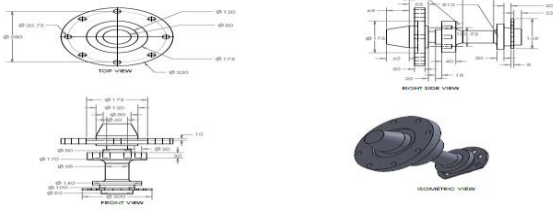
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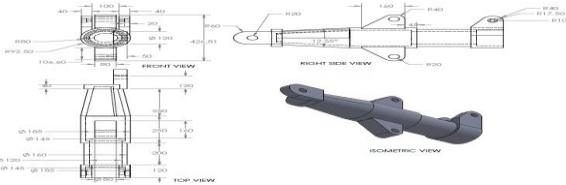
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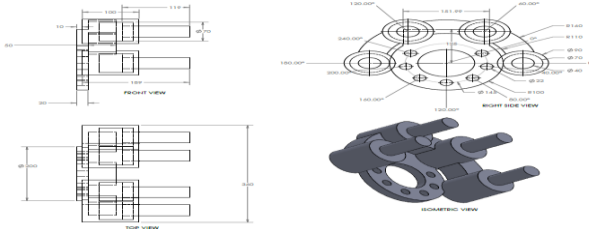
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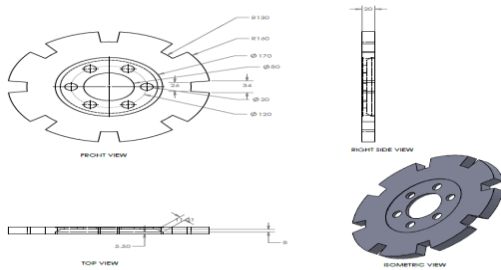
.LINK LOWER DESIGN:

PISTON DESIGN:
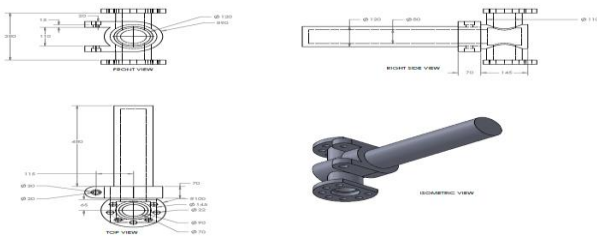
ASSEMBLY OF LANDING GEAR:
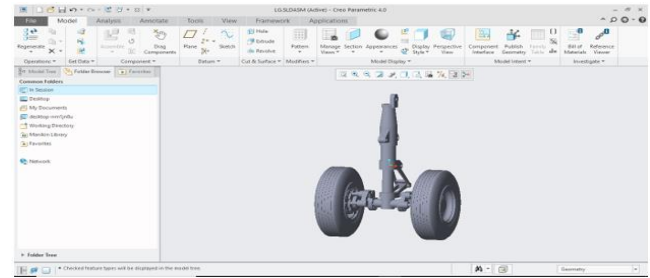
INTRODUCTION TO FEA:

The finite element analysis was the first developed in 1943 by R. Courant (Mathematician), who utilized the Ritz method on numerical analysis and minimization of variation calculus to obtain approximate solutions to vibration systems. Shortly thereafter, a paper published in 1956 M.J. Turner (air craft industry), R.W. Clough (California University), H.C. Martin (air craft industry) and L.J. Top established a broader definition of numerical analysis.

IV. INTRODUCTION TO ANSYS SOFTWARE

Ansys was founded in 1970 by John Swanson. Swanson sold his interest in the company to venture capitalists in 1993. Ansys went public on NASDAQ in 1996. In the 2000s, Ansys made numerous acquisitions of other engineering design companies, acquiring additional technology for fluid dynamics, electronics design, and other physics analysis.

It develops and markets engineering simulation software. Ansys software is used to design products and semiconductors, as well as to create simulations that test a product's durability, temperature distribution, fluid movements, and electromagnetic properties. Ansys develops and markets finite element analysis software used to simulate engineering problems. The software creates simulated computer models of structures, electronics, or machine components to simulate strength, toughness, elasticity, temperature distribution, electromagnetism, fluid flow, and other attributes. Ansys is used to determine how a product will function with different

specifications, without building test products or conducting crash tests.

MECHANICAL PROPERTIES OF THE MATERIALS:

PROPERTY	Aluminium alloy	Titanium alloy	Steel alloy
Density	2780 Kg /m³	4512 Kg/m³	7980 Kg/m³
Young's modulus	73100 MPa	119000 MPa	204000MPa
Poison's ratio	0.33	0.31	0.29

Mechanical properties of the materials

STRUCTURAL BOUNDARY CONDITIONS:
Specifications Of Boeing 747-8:

SNo.	NAME	WEIGHT (Kg)
1	Maximum take-off weight	4400 00
2	Maximum landing weight	306200
3	Operating empty weight	211900
4	Maximum zero fuel weight	288000

- Taking maximum take-off weight into account a static load of 80850 N has been chosen.
- Max take-off weight is 440000 kg and nose landing gear feels 5% of total weight which is 22000 kg so a 215600 N
- as the weight of whole design was 190 kg and actual nose landing gear have 1500 kg weight
- The weight taken is eight times lighter so 215600/8 *3 = 80850 N (taken F.O.S = 3).
- total force of 80850 N is applied to both sides centre nodes 40425 N each
- Total force=40425N

IGES file
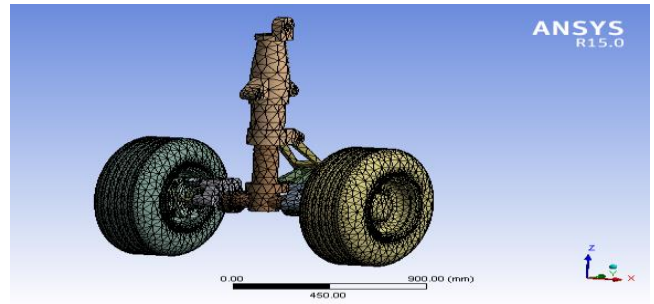
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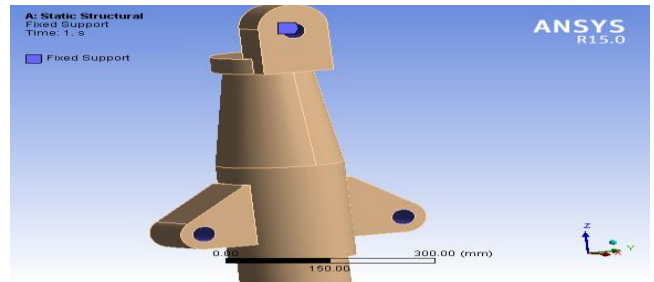
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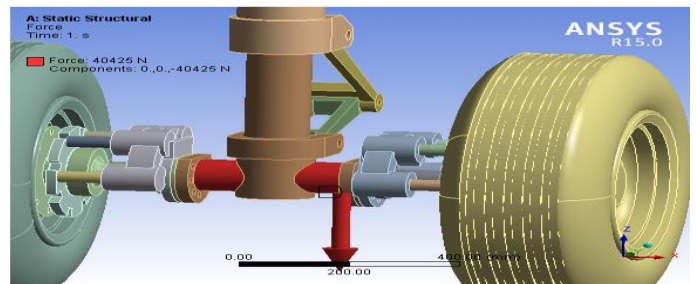
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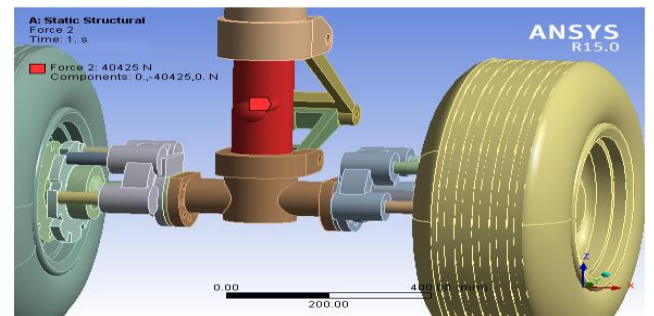
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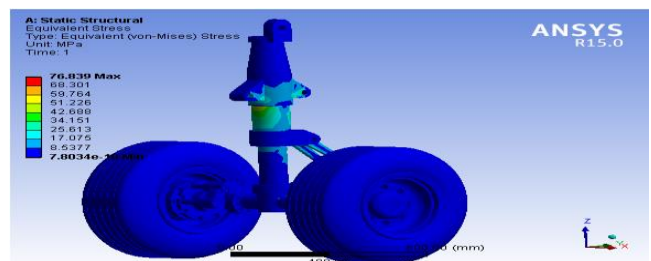
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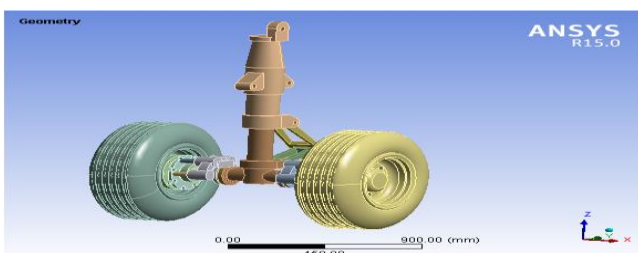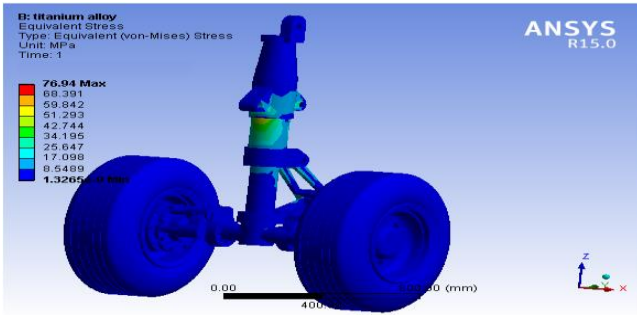
Titanium alloy

Steel alloy

STRAIN ANALYSIS:

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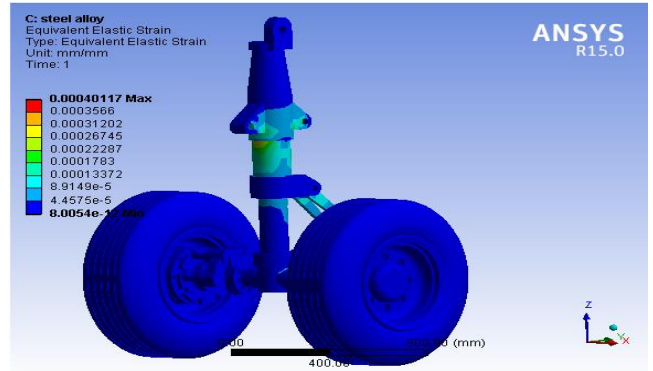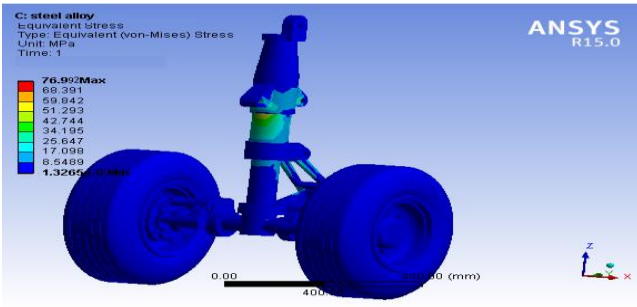
Titanium alloy

Steel alloy

TOTAL DEFORMATION:
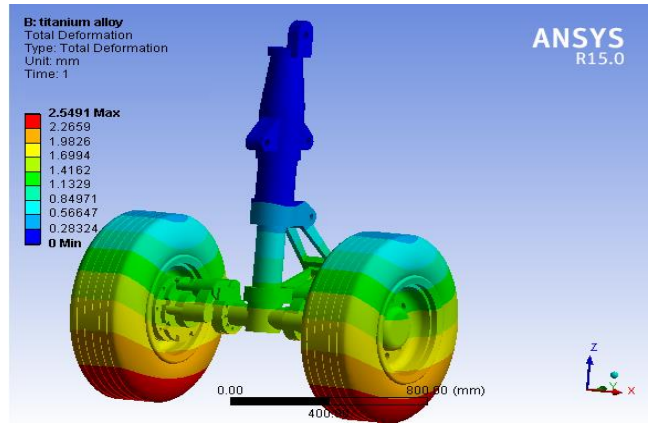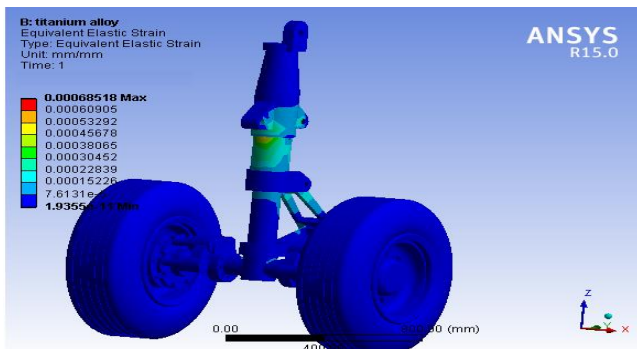
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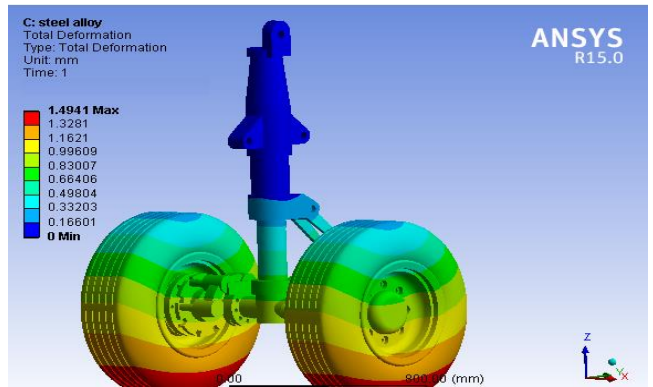
Titanium alloy

Steel alloy

V. RESULTS FOR STRUCTURAL ANALYSIS

MATERIAL	TOTAL DEFORMATION (mm)	EQUIVALENT STRESS (MPa)	EQUIVALENT STRAIN
Aluminium alloy	4.1232	76.839	0.0011105
Titanium alloy	2.5491	76.94	0.00068518
Steel alloy	1.4941	76.992	0.00040117

Results for Structural analysis

VI. CONCLUSION

In this project, we have done structural analysis on the designed LANDING GEAR by changing materials of the landing gear (i.e., aluminum alloy, titanium alloy, steel alloy). The results are as follows:

From the results tables we observe that

- Total deformation and equivalent strain are less for steel alloy when compared with aluminum alloy and titanium alloy. Equivalent stress is more for steel alloy and titanium alloy.
- Thus, we conclude that steel alloy is the best material for manufacturing of landing gear.

FUTURE SCOPE

- In this project, only the static structural analysis on landing gear has been performed by the use of the software ANSYS15.0.
- This work can be extended to study the effect of load on the landing gear under dynamic conditions.
- Experimental stress analysis can be used to compare the different values obtained.

- The further study can be extended to transient structural, modal analysis and dynamic analysis of the landing gear.

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A Review of Machine Learning-Based Fake News Analysis

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ABSTRACT

In this paper considers the use of NLP (Natural Language Processing) methods for identifying Fake news, that is, deceptive reports that come from untrustworthy sources. Simply building a model based on a tally vectorizer (using word counts) or a (Term Frequency Inverse Document Frequency) tfidf framework (word counts compared to how frequently they're used in different articles in your dataset) can only get you so far. However, these models do not take into account critical aspects like word requesting and setting. It is entirely possible that two articles that are similar in their promise include will be completely different in their significance. The information science community has reacted by taking action against the problem. There is a competition called the "Fake News Challenge," and Facebook is using AI to sift fake reports through client channels. Combating Fake News is an excellent book arrangement project with a simple recommendation. Is it possible for you to build a model that can distinguish between "Genuine" and "Fake" news? As a result, a proposed work on amassing a dataset of both fake and genuine news and using a Naive Bayes classifier to create a model to classify an article as fake or genuine based on its words and expressions.

Keywords : Naïve Bayes, Natural Language Processing (NLP), Real News, Fake News, Term Frequency Inverse Document Frequency (tfidf).

I. INTRODUCTION

Previously, if someone needed news, they would wait for the next day's newspaper. However, [1] with the development of online papers that update news in a split second, people have discovered a superior and quicker way to be educated about the issue of their choice [2]. Nowadays, social interaction frameworks, online news entrances, and other [3] online media have become the primary sources of information [4] through which fascinating and breaking news are shared at a rapid pace. Regardless, numerous news entryways serve a specific interest by dealing with twisted, somewhat correct, and once in a while fanciful news that is likely to catch the attention of a specific group of people. Counterfeit news [5] has become a major source of concern due to its potential for causing confusion and intentional disinformation among individuals [6].The term counterfeit news has become a popular expression nowadays. In any case, a

concurred meaning of the expression "counterfeit news [7] is still to be found. It tends to be characterized as a sort of sensationalist reporting or purposeful publicity that comprises of intentional deception or fabrications spread through customary print and broadcast news media or online web-based media [8]. These are distributed for the most part with the aim to deceive to harm a local area or individual, make disarray, and gain monetarily or strategically. Since individuals are frequently unfit to invest sufficient energy to cross-check reference and make certain of the believability of information, robotized location of phony news is essential. Along these lines, it is getting incredible consideration from the examination local area. There are numerous examples where keenly planned phony news had extreme outcome by impelling strict or ethnic gatherings against guiltless casualties. On October 17, 2018, United States Congressman Matt Gaetz (R-FL) presented a video on [9] Twitter and proposed, without proof that showed a gathering of individuals being paid by tycoon George Soros to join a transient train and tempest the United States line. The video was miscaptioned and the tweet contained verifiable inaccuracies.1 On 23 June 2018, a progression of appalling pictures and recordings started to circle on Facebook. One showed a monitors skull hacked open that was seen in excess of multiple times. The Facebook clients who posted the pictures guaranteed they showed a slaughter in progress in the Gashish area of Plateau State, Nigeria by Fulani Muslims who were murdering Christians from the locales Berom ethnic minority. As an outcome, a slaughter occurred in Gashish that end of the week and somewhere close to 86 and 238 Berom individuals were executed, as per gauges made by the police and by neighborhood local area pioneers. Nonetheless, probably the most combustible pictures and recordings were absolutely immaterial to the brutality in Gashish. The video showing a man's head was cut, was not occurred in Nigeria and it was recorded in Congo, in 2012.2 The earlier chips away at counterfeit news location have

applied a few conventional AI [10] techniques and neural organizations to distinguish counterfeit news. In any case, they have zeroed in on recognizing information on specific sorts, (for example, political) [11]. In like manner, they fostered their models and planned highlights for explicit datasets that match their subject of interest. All things considered, these methodologies would experience the ill effects of dataset predisposition and are probably going to perform ineffectively on information on another point. A portion of the current investigations have likewise made correlations among various strategies for counterfeit news recognition. It has assembled a benchmark dataset specifically, Liar and tested some current models on that dataset. The examination result hints us how various models can perform on an organized dataset like Liar. Be that as it may, the length of this dataset isn't adequate for neural organization investigation and a few models were found to experience the ill effects of overfitting. Gilda has investigated some conventional AI approaches [12]. Notwithstanding, many progressed AI models, e.g., neural organization based ones are not applied that have been demonstrated best in numerous content characterization issues. A significant limit of earlier relative examinations is that these are completed on a particular sort of dataset [13], it is hard to arrive at a decision about the exhibition of different models. Additionally, these works have zeroed in on a predetermined number of highlights that have brought about the deficient investigation of expected attributes of phony news. In this examination, we will probably introduce a relative presentation investigation of existing strategies by carrying out every one on two of the accessible datasets and another pre-arranged by us consolidating information on circulated subjects. We likewise fuse various highlights from existing works and explore the exhibition of some effective content order strategies that are yet to be applied for counterfeit news recognition as far as we could possibly know. There exists a huge assemblage of exploration on the

subject of AI techniques for trickiness discovery, its vast majority has been zeroing in on ordering on the web audits and freely accessible online media posts. Especially since late 2016 during the American Presidential political race, the topic of deciding 'counterfeit news' has likewise been the subject of specific consideration inside the writing. Conroy, Rubin, and Chen [14] diagram a few methodologies that appear to be encouraging towards the point of impeccably group the deceptive articles. They note that basic substance related n-grams and shallow grammatical features (POS) labeling have demonstrated inadequate for the characterization task, frequently neglecting to represent significant setting data. Maybe, these techniques have been shown valuable just couple with more perplexing strategies for examination. Profound Syntax examination utilizing Probabilistic Context Free Grammars (PCFG) have been demonstrated to be especially important in blend with n-gram techniques. Feng, Banerjee, and Choi [15] can accomplish 85%-91% precision in trickery related arrangement assignments utilizing on the web audit corpora. Feng and Hirst carried out a semantic examination taking a gander at 'object: descriptor' sets for logical inconsistencies with the content on top of Feng's underlying profound sentence structure model for extra improvement. Rubin, Lukoianova and Tatiana examine logical construction utilizing a vector space model with comparable achievement. Ciampaglia et al. utilize language design similitude networks requiring a prior information base. In this review paper section I contain the introduction, section II contains the literature review details, section III contains the details about methodologies, section and section IV provide conclusion of this paper.

II. RELATED WORK

This section has taken into account an extensive literature survey related to fake news analysis using Machine Learning. Ethar Qawasmeh et. al. (2019) [14]

fast advancement of figuring patterns, remote interchanges, and the keen gadgets industry has added to the inescapable of the web. Individuals can get to internet providers and applications from anyplace on the planet whenever. There is no uncertainty that these innovative advances have made our lives simpler and saved our time and endeavors. On the opposite side, we ought to concede that there is an abuse of web and its applications including on the web stages. For instance, online stages have been engaged with getting out counterfeit word everywhere on the world to fill certain needs (political, monetary, or web-based media). Identifying counterfeit news is viewed as one of the hard difficulties in term of the current substance based examination of customary techniques. As of late, the exhibition of neural organization models has beated conventional AI techniques because of the remarkable capacity of highlight extraction. All things considered, there is an absence of exploration work on distinguishing counterfeit news in news and time basic occasions. Along these lines, in this paper, we have examined the programmed recognizable proof of phony news over online correspondence stages. Besides, we propose a programmed ID of phony news utilizing current AI procedures. The proposed model is a bidirectional LSTM connected model that is applied on the FNC-1 dataset with 85.3% precision execution.

William Yang Wang (2018) [15] automatic phony news identification is a difficult issue in misdirection discovery, and it has huge true political and social effects. Be that as it may, measurable ways to deal with battling counterfeit news has been drastically restricted by the absence of marked benchmark datasets. In this paper, we present LIAR: another, freely accessible dataset for counterfeit news recognition. We gathered a long term, 12.8K physically marked short explanations in different settings from POLITIFACT.COM, which gives nitty gritty examination report and connections to source

records for each case. This dataset can be utilized for certainty checking research too. Prominently, this new dataset is a significant degree bigger than already biggest public phony news datasets of comparable sort. Observationally, we examine programmed counterfeit news recognition [16] dependent on surface-level etymological examples. We have planned a novel, half breed convolutional neural [17] organization to incorporate metadata with text. We show that this crossover approach can improve a book just profound learning model. Z Khanam, et. al., (2021) [18] fake news via online media and different other media is wide spreading and involves genuine worry because of its capacity to cause a ton of social and public harm with ruinous effects. A great deal of exploration is as of now centered around distinguishing it. This paper makes an investigation of the examination identified with fake news discovery and investigates the conventional AI models to pick the best, to make a model of an item with directed AI [19] calculation, that can group counterfeit news as evident or bogus, by utilizing apparatuses like python scikit-learn, NLP for text based examination. This cycle will bring about highlight extraction and vectorization; we propose utilizing Python scikit-learn library to perform tokenization and highlight extraction of text information, since this library contains helpful apparatuses like Count Vectorizer and Tiff Vectorizer. Then, at that point, we will perform include determination techniques, to try and pick the best fit highlights to acquire the most elevated exactness, as indicated by disarray framework results.

Costin BUSIOC et. al., (2020) [20] fighting phony news is a troublesome and testing task. With an expanding sway on the social and world of politics, counterfeit news apply an unprecedently sensational effect on individuals' lives. Because of this marvel, drives tending to computerized counterfeit news discovery have acquired prominence, producing inescapable examination interest. Notwithstanding,

most methodologies focusing on English and low-asset dialects experience issues when conceiving such arrangements. This examination centers around the advancement of such examinations, while featuring existing arrangements, difficulties, and perceptions shared by different exploration gatherings. Furthermore, given the restricted measure of computerized examinations performed on Romanian phony news, we review the materialness of the accessible methodologies in the Romanian setting, while at the same time recognizing future exploration ways. Alim Al Ayub Ahmed (2020) [21] web is one of the significant developments and countless people are its clients. These people utilize this for various purposes. There are diverse web-based media stages that are open to these clients. Any client can make a post or spread the word through these online stages. These stages don't confirm the clients or their posts. So a portion of the clients attempt to get out counterfeit word through these stages. This phony news can be a promulgation against an individual, society, association or ideological group. A person can't distinguish every one of these phony news. So there is a requirement for AI classifiers [22] that can recognize this phony news naturally. Utilization of AI classifiers for distinguishing the phony news is depicted in this methodical writing survey.

Razan Masood (2018) [23] fake news has created uproar recently, and this term is the Collins Dictionary Word of the Year 2017. As the news are dispersed extremely quick in the period of interpersonal organizations, a robotized reality checking device turns into a prerequisite. Notwithstanding, a completely computerized instrument that passes judgment on a case to be valid or bogus is constantly restricted in usefulness, exactness and understandability. Hence, an elective idea is to team up various investigation apparatuses in one stage which help human actuality checkers and ordinary clients produce better making a decision about dependent on numerous perspectives. A

position recognition instrument is a first phase of an online test that means to identify counterfeit news. The objective is to decide the overall point of view of a news story towards its title. In this paper, we tackle the test of position identification by using customary AI calculations alongside issue explicit element designing. Our outcomes show that these models beat the best results of the taking an interest arrangements which primarily utilize profound learning models.

Sohan De Sarkar (2018) [24] satirical news identification is significant to forestall the spread of deception over the Internet. Existing ways to deal with catch news parody use AI models, for example, SVM and various leveled neural organizations alongside hand-designed highlights, yet don't investigate sentence and archive distinction. This paper proposes a strong, progressive profound neural organization approach for parody identification, which is fit for catching parody both at the sentence level and at the report level. The engineering fuses pluggable [25] nonexclusive neural organizations like CNN, GRU, and LSTM. Test results on genuine news parody dataset show significant execution gains exhibiting the adequacy of our proposed approach. An assessment of the learned models uncovers the presence of key sentences that control the presence of parody in news.

Abdullah-All-Tanvir (2019) [26] social media collaboration particularly the word getting out around the organization is an extraordinary wellspring of data these days. From one's viewpoint, its immaterial effort, direct access, and fast scattering of data that lead individuals to watch out and gobble up news from web based life. Twitter being a champion among the most notable continuous news sources also winds up a champion among the most predominant news transmitting mediums. It is known to cause broad damage by spreading pieces of tattle beforehand. Online customers [27] are typically defenseless and will, by and large, see all that they

run over electronic systems administration media as solid. Therefore, automating fake news acknowledgment is rudimentary to keep up generous online media and casual association. This paper proposes a model for perceiving fashioned news messages from twitter posts, by sorting out some way to expect exactness examinations, considering automating manufactured news distinguishing proof in Twitter datasets. Subsequently, we played out an examination between five notable Machine Learning calculations, similar to Support Vector Machine, Naïve Bayes Method, Logistic Regression and Recurrent Neural Network models, independently to show the proficiency of the characterization execution on the dataset. Our exploratory outcome showed that SVM and Naïve Bayes classifier outflanks different calculations.

Hadeer Ahmed, (2017) [28] fake news is a marvel which is essentially affecting our public activity, specifically in the political world. Fake news location is an arising research region which is acquiring interest yet elaborate a few difficulties because of the restricted measure of assets (i.e., datasets, distributed writing) accessible. We propose in this paper, a fake news recognition model that utilization n-gram examination and AI [29] strategies. We examine and think about two distinct highlights extraction methods and six diverse machine arrangement strategies. Trial assessment yields the best presentation utilizing Term Frequency-Inverted Document Frequency (TF-IDF) as highlight extraction procedure, and Linear Support Vector Machine (LSVM) as a classifier, with a precision of 94%.

III. Methodology

3.1 Naive Bayes Classifier Introductory Overview

The Naive Bayes Classifier procedure depends on the supposed Bayesian hypothesis and is especially fit when the dimensionality of the information sources is

high. Notwithstanding its straightforwardness, Naive Bayes can frequently beat more complex arrangement strategies. To show the idea of Naïve Bayes Classification, consider the model showed in the outline above. As demonstrated, the items can be delegated either GREEN or RED. Our assignment is [30] to arrange new cases as they show up, i.e., choose to which class name they have a place, in view of the present leaving objects shown in figure 1.

Figure1. The Naïve Bayes Classification I

Since there are twice as many GREEN items as RED, it is sensible to accept that another case (which hasn't been noticed at this point) is twice as liable to have enrollment GREEN instead of RED. In the Bayesian investigation, this conviction is known as the earlier likelihood. Earlier probabilities depend on past experience, for this situation the level of GREEN and RED items, and frequently used to anticipate results before they really occur.

Thus, we can write:

$$\text{Prior probability for GREEN} \propto \frac{\text{Number of GREEN objects}}{\text{Total number of objects}}$$

$$\text{Prior probability for RED} \propto \frac{\text{Number of RED objects}}{\text{Total number of objects}}$$

Since there is a total of 60 objects, 40 of which are GREEN and 20 RED, our prior probabilities for class membership are:

$$\text{Prior probability for GREEN} \propto \frac{40}{60}$$

$$\text{Prior probability for RED} \propto \frac{20}{60}$$
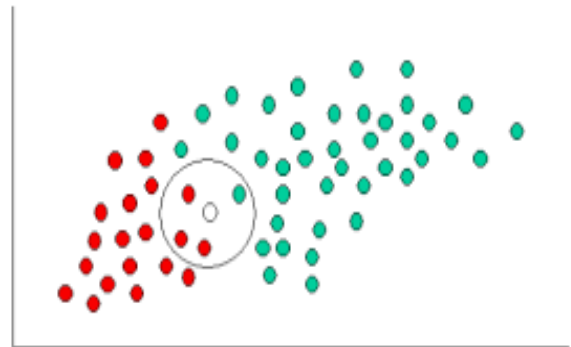
Figure 2. The Naïve Bayes Classification II

Having detailed our earlier likelihood, we are currently prepared to group [31] another item (WHITE circle). Since the articles are very much bunched, it is sensible to expect to be that the more GREEN (or RED) objects nearby X, the more probable that the new cases have a place with that specific tone shown in figure 2. To quantify this probability, we draw a circle around X which envelops a number (to be picked deduced) of focuses regardless of their group names [32]. Then, at that point we ascertain the quantity of focuses in the circle having a place with each class name. From this we figure the probability:

$$\text{Likelihood of X given GREEN} \propto \frac{\text{Number of GREEN in the vicinity of X}}{\text{Total number of GREEN cases}}$$

$$\text{Likelihood of X given RED} \propto \frac{\text{Number of RED in the vicinity of X}}{\text{Total number of RED cases}}$$

From the illustration above, it is clear that Likelihood of X given GREEN is smaller than Likelihood of X given RED, since the circle encompasses 1 GREEN object and 3 RED ones. Thus:

$$\text{Probability of } X \text{ given GREEN} \propto \frac{1}{40}$$

$$\text{Probability of } X \text{ given RED} \propto \frac{3}{20}$$

Albeit the earlier probabilities show that X may have a place with GREEN (given that there are twice as many GREEN contrasted with RED) the probability demonstrates something else; that the class participation of X is RED (given that there are more

RED articles [33] nearby X than GREEN). In the Bayesian investigation, the last characterization is created by consolidating the two wellsprings of data, i.e., the earlier and the probability, to frame a back likelihood utilizing the alleged Bayes' standard (named after Rev. Thomas Bayes 1702-1761).

$$Posterior\ probability\ of\ X\ being\ GREEN \propto$$
$$Prior\ probability\ of\ GREEN \times Likelihood\ of\ X\ given\ GREE$$
$$= \frac{4}{6} \times \frac{1}{40} = \frac{1}{60}$$
$$Posterior\ probability\ of\ X\ being\ RED \propto$$
$$Prior\ probability\ of\ RED \times Likelihood\ of\ X\ given\ RED$$
$$= \frac{2}{6} \times \frac{3}{20} = \frac{1}{20}$$

Finally, we classify X as RED since its class membership achieves the largest posterior probability. The above probabilities are not normalized. However, this does not affect the classification outcome since their normalizing constants are the same.

3.2 Technical Notes

In the previous section, we provided an easy-to-understand example of classification using Naive Bayes. This section contains additional information about the technical issues at hand. Naive Bayes classifiers can handle an arbitrary number of independent variables [34] whether continuous or categorical. Given a set of variables, X = {x1,x2,x...,xd}, we want to construct the posterior probability for the event Cj among a set of possible outcomes C = {c1,c2,c...,cd}. In a more familiar language, X is the predictors and C is the set of categorical levels present in the dependent variable. Using Bayes' rule:

$$p(C_j \mid x_1, x_2, \ldots, x_d) \propto p(x_1, x_2, \ldots, x_d \mid C_j) p(C_j)$$

where p(Cj | x1,x2,x...,xd) is the posterior probability of class membership, i.e., the probability that X belongs to Cj. Since Naive Bayes assumes that the conditional probabilities of the independent variables are statistically independent we can decompose the likelihood to a product of terms:

$$p(X \mid C_j) \propto \prod_{k=1}^{d} p(x_k \mid C_j)$$

and rewrite the posterior as:

$$p(C_j \mid X) \propto p(C_j) \prod_{k=1}^{d} p(x_k \mid C_j)$$

Utilizing Bayes' standard above, we name another case X with a class level Cj that accomplishes the most noteworthy back likelihood. Albeit the suspicion that the indicator (free) factors are autonomous isn't generally exact, it improves on the grouping task drastically, since it permits the class contingent densities p(xk | Cj) to be determined independently for every factor, i.e., it diminishes a multidimensional errand to various one-dimensional ones [35]. As a result, Naive Bayes diminishes a high-dimensional thickness assessment undertaking to a one-dimensional piece thickness assessment. Moreover, the suspicion doesn't appear to incredibly influence the back probabilities, particularly in areas close to choice limits, in this manner, leaving the arrangement task unaffected. Innocent Bayes can be demonstrated in a few distinct manners including ordinary, lognormal, gamma and Poisson thickness.

3.4   Decision Tree Algorithm

Decision Tree algorithm has a place with the group of managed learning calculations. In contrast to other administered learning calculations, the decision tree calculation can be utilized for tackling relapse and order issues as well. The objective of utilizing a Decision Tree is to make a preparation model that can use to anticipate the class or worth of the objective variable by taking in basic decision principles surmised from earlier data [36] (training information). In Decision Trees, for anticipating a class name for a record we start from the foundation of the tree. We

think about the upsides of the root [37] trait with the record's characteristic. Based on examination, we follow the branch relating to that worth and leap to the following hub.

IV. CONCLUSION

So, was your fake news classifier investigation a success? Definitely not. Regardless, will you experiment with another dataset, try out some NLP order models, and assess how fruitful they were? Indeed. Characterizing fake news with simple pack of words or TF-IDF vectors is a distorted methodology that has been in place since the beginning. Especially with a multilingual dataset full of boisterous tokens.

If you hadn't investigated what your model had truly learned, you might have assumed the model had mastered something significant. As a result, remember to consistently examine your models. I'd be interested if you discovered any patterns in the data that I may have overlooked. As far as significant highlights on my blog, I'll be returning to a post on how various classifiers analyse. If you spend some time exploring and discover something interesting, please share your findings and notes in the comments section, or you can generally connect on dataset. Our preliminary plan is to investigate a larger dataset to see how the traditional model, such as Naive Bayes, competes with profoundly computational neural organisation based models to detect fake news.

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House Pricing Prediction using ML Algorithm - A Comparative Analysis

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ABSTRACT

The real estate industry is the least transparent in our environment. Housing prices fluctuate on a daily basis and are sometimes inflated rather than based on valuation. Since the housing industry is rapidly expanding, forecasting house prices is critical not just for businesses but also for individuals. However, there are other factors that influence house price variations. The purpose of this article is to forecast a real estate property's market value. The goal here is to build a prediction model for evaluating pricing based on characteristics that influence price. We are going to predict data using Machine learning algorithm i.e. linear regression model to predict the house pricing.

Keywords - House Pricing, Market Value, Linear Regression

I. INTRODUCTION

The real estate market is one of the most price-sensitive in the world, and it is always changing. It is one of the most important domains in which machine learning techniques may be applied to improve and predict costs with great accuracy. The size of the property, its location, and its amenities are all important considerations that can influence the price. Our main goal is to create a model that estimates a customer's property cost based on his or her preferences. Our methodology examines a set of parameters chosen by the customer in order to determine the best pricing for their needs and interests. For prediction, it employs traditional techniques such as linear regression, forest regression, and boosted regression, and attempts to provide an interpretation of the data produced. After the trained model is complete, Flask (a Python framework) or Django are used to connect it with the user interface.

II. LITERATURE SURVEY

1. House Price Prediction Using Machine Learning and Neural Networks

Our dataset contains a number of critical factors, and data mining is at the heart of our system. We first cleaned up the full dataset and trimmed the numbers that were outliers. Furthermore, we weighted each parameter based on its relevance in determining the system's price, resulting in an increase in the value that each parameter retains in the system. We chose three distinct machine learning algorithms and tested our system with various combinations to provide the most reliable results possible [1].

Data is at the center of technological advancements, and predictive models may now achieve any result. This method makes considerable use of machine learning. Computer learning is supplying a reliable dataset and then making predictions based on it. The machine learns how important a given event is to the overall system based on its pre-loaded data and predicts the outcome appropriately. Anticipating stock prices, predicting the possibility of an earthquake, predicting corporate sales are only a few examples of recent applications of this approach [4].

2. House Price Forecasting Using Machine Learning

A. Varma devised a method for obtaining exact real-world assessments utilising Google maps and real-time neighbourhood data. Researchers have discovered links between a city's visual look and non-visual characteristics such as crime statistics, property costs, population density, and so on. "City Forensics: Using Visual Elements to Estimate Non-Visual City Elements," for example, uses visual attributes to predict the property's sale price. [2]. Classification and regression techniques were employed by Hujia Yu and Jiafu Wu. According to the findings, the living space square feet, roof content, and neighbourhood have the most statistical significance in determining a home's selling price. The PCA approach can also help with prediction analysis [3].

3. Housing prices prediction with deep learning: an application for the real estate market in Taiwan

The fundamental challenge in predicting house prices is that the real estate market is impacted by a variety of factors, including macroeconomic and market value. The home is both an investment and a consumer item, and the goal of the investment or consumption decides whether the property will be utilised for living or for renting [5].

Deep learning algorithms show considerable benefits in time series prediction in all of the research covered here. There are still deep learning algorithms for predicting house values that aren't widely used. As a result, this work uses deep learning algorithms (BPNN, CNN) to forecast house prices using a time series dataset.

4. Machine Learning based Predicting House Prices using Regression Techniques

Pow, Nissan, Emil Janulewicz, and L. Liu employed four regression approaches to forecast the property's pricing value: Linear Regression, Support Vector Machine, K-Nearest Neighbors (KNN), and Random Forest Regression, as well as an ensemble approach combining KNN and Random Forest Technique. The prices were predicted with the least error of 0.0985 using the ensemble technique, while PCA did not improve the prediction error [6]. Several research have also looked at how to collect characteristics and how to extract them. [8] Wu, Jiao Yang examined a variety of feature selection and extraction techniques using Support Vector Regression. To anticipate property values, several academics have constructed neural network models. To anticipate property values, Limsombunchai contrasted hedonic pricing structure with artificial neural network model [7].

III. EXPERIMENTAL SETUP AND METHODS

The simplest basic approach for prediction is linear regression. It employs two variables as variables: the predictor variable and the one that is the most important of the two, the predictor variable. These regression estimations are used to describe how one dependent variable and one or more independent variables are related. The formula is used to describe the regression equation with one dependent and one independent variable [9]. $b = y + x^{*}a$, where b represents the estimated dependent variable score, y represents the constant, x represents the regression coefficient, and a represents the score on the independent variable.
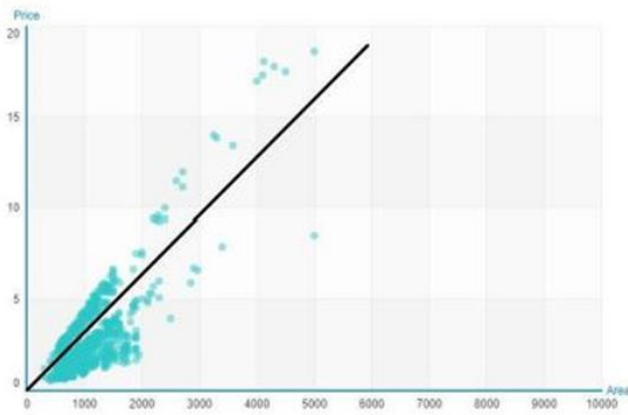
Figure 1: Linear regression scatter plot

Bagging of trees is a method used in forest regression. The main goal is to arrange the various trees in a pleasing manner. The Variance in the Trees is then reduced by averaging them. A significant number of decision trees are constructed using this method [10]. The random forest training algorithm uses the bootstrap aggregating, or bagging, strategy to train tree learners [11].

Collection of Data

There are several data processing techniques and procedures to choose from. We gathered information on real estate properties from a variety of websites. Location, carpet area, built-up area, property age, zip code, and other factors would be included in the data. We need to collect organised and classified quantitative data. Before doing any machine learning study, it is necessary to collect data. Validity of the dataset is essential; otherwise, there is no use in evaluating the data.

	MedInc	HouseAge	AveRooms	AveBedrms	Population	AveOccup	Latitude	Longitude	Target
0	8.3252	41.0	6.984127	1.023810	322.0	2.555556	37.88	-122.23	4.526
1	8.3014	21.0	6.238137	0.971880	2401.0	2.109842	37.86	-122.22	3.585
2	7.2574	52.0	8.288136	1.073446	496.0	2.802260	37.85	-122.24	3.521
3	5.6431	52.0	5.817352	1.073059	558.0	2.547945	37.85	-122.25	3.413
4	3.8462	52.0	6.281853	1.081081	565.0	2.181467	37.85	-122.25	3.422

Data Preprocessing

The process of cleansing our data collection is known as data preparation. The dataset may contain missing values or outliers. Data cleansing can take care of these issues. If a variable has a lot of missing values,

we'll remove them or replace them with the average value.

Training the model

We must first train the model since the data is divided into two modules: a Training set and a Test set. The target variable is included in the training set. The training data set is subjected to the decision tree regressor method. The decision tree uses a tree structure to create a regression model.

Testing & Integrating with UI

The trained model is used to forecast property prices on a test dataset. The front end is then connected with the trained model using Python's Flask framework.
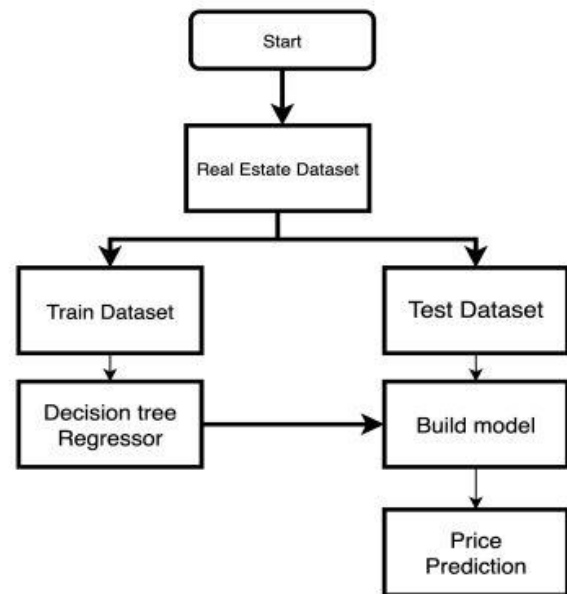
Fig 1. The generic flow of development

IV. Conclusion

A technique has been created that seeks to deliver an accurate prediction of house prices. Linear Regression, Forest Regression, and Boosted Regression are all used to their full potential by the system. The introduction of neural networks has improved the algorithm's efficiency even further. Customers will be satisfied since the method will provide precise results and eliminate the danger of buying in the wrong residence. We are also incorporating a new concept in this project. The House Bidding Management System

will be an online platform for purchasing modern apartments, houses, and offices. Buyers no longer go from property to property looking for a deal. In this age of computer science, everyone expects everything to be delivered to their doorstep.

Additional customer-beneficial features can be added to the system without interfering with its primary operation such as adding different file types to CMS to accept as a file upload from Customer (seller). The inclusion of larger cities to the database might be a key future upgrade, allowing our users to look at more residences, get greater accuracy, and so make better decisions.

V. Future Work

The system's accuracy may be enhanced. If the system's size and processing capacity grow, it will be possible to add several additional cities. Furthermore, we may use Augmented Reality to incorporate several UI/UX methodologies for a better representation of the results in a more interactive approach. In addition, a learning system may be developed that collects user feedback and history so that the system can present the most appropriate results to the user based on his preferences.

VI. Acknowledgment

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Machine Learning Based Theft Detection Using Yolo Object Detection

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ABSTRACT

Object detection and tracking could be an immense, vivacious however inconclusive and trending area of computer vision. Due to its immense use in official surveillances, tracking modules applied in security and lots of other's applications have made researchers to devise a lot of optimized and specialized methods. For validation purpose live input video will be taken for the same where objects will be getting detected and it can be simulated same for real-time through external hardware added. In the end we see the proper optimized and efficient algorithm for object detection and alert for security. Object Detection is computer vision technique used to detect object and identify its localization. This technique is not only used to identify the location but also to identify which type of object it is. This CV technique is used to detect objects in real time while maintaining the level of accuracy. By bringing some advancement in it, this system can be very helpful for people to keep track of their precious things or devices which are very expensive and need to be protected. Open CV (Open-Source Computer Vision Library) is a library of programming functions mainly aimed at real- time computer vision. Open CV features GPU acceleration for real-time operations. This feature helps us to write computationally intensive codes in C/C++ and create a Python wrapper for it so that we can use these wrappers as Python modules.

Keywords: Object detection, vivacious, YOLOv3, Tensor Flow, security, Tracking modules

I. INTRODUCTION

Humans can easily detect and identify objects present in an image. The human visual system is fast and accurate and can perform complex tasks like identifying multiple objects and detect obstacles with little conscious thought. With the availability of large amounts of data, faster GPUs, and better algorithms, we can now easily train computers to detect and classify multiple objects within an image with high accuracy. In this, we will explore terms such as object detection, object localization, loss function for object

detection and localization, and also explore an object detection algorithm known as "You only look once" (YOLO).

Effective and reliable geographic point security is extremely necessary these days. Many times, individuals lose their most vital things and until the time they fight to report a grievance for a similar, time already goes from their hand. What if there's a machine which might facilitate individuals to stay secure for his or her necessary things and not solely keep secure but additionally if any of the necessary things gets miss from its place it provides alert at the same time, so the action will be taken presently against the theft? affirmative, it will be finished with the assistance of some tools and a software package cryptography, trough that we will implement a machine which might be used as a security system. Here we tend to square measure making system exploitation some hardware tools and properties from Machine learning Language. However, there square measure several issues with pictures in real-world shooting like tiny object detection, the accuracy of tiny object detection isn't therefore sensible and these issues have a very important impact on object Detection. So, they are resolved by exploitation YOLOv3 formula here we tend to are exploitation Open CV, Tensor Flow library and YOLOv3 formula and that we are going to be labeling the detected layers with accuracy being checked at a similar time.

1.1 Object Detection

Object detection is a computer vision technique in which a software system can detect, locate, and trace the object from a given image or video. The special attribute about object detection is that it identifies the class of object (person, table, chair, etc.) and their location-specific coordinates in the given image. The location is pointed out by drawing a bounding box around the object. The bounding box may or may not accurately locate the position of the object. The ability to locate the object inside an image defines the performance of the algorithm used for detection. Face detection is one of the examples of object detection.

1.2 Tensor Flow

Tensor flow allows developers to create a graph of computations to perform. Each node in the graph represents a mathematical operation and each connection represents data. Hence, instead of dealing with low-details like figuring out proper ways to hitch the output of one function to the input of another, the developer can focus on the overall logic of the application.

1.3 Yolo

YOLO which stands for "You only look once" is a single shot detection algorithm which was introduced by Joseph Redmon in May 2016. Although the name of the algorithm may sound strange, it gives a perfect description of this algorithm as it predicts classes and bounding boxes for the whole image in one run of the algorithm.

1.4 Open CV

Open CV (Open supply laptop Vision Library) may be a library of programming functions primarily aimed toward period laptop vision. Originally developed by Intel, it had been later supported by Willow Garage then (which was later non-heritable by Intel). The library is cross-platform and free to be used beneath the ASCII text file Apache a pair of License. beginning with 2011, Open CV options GPU acceleration for period operations. This feature helps U.S. to put in writing computationally intensive codes in C/C++ and make a Python wrapper for it so that we will use these wrappers as Python modules. this provides U.S. 2 advantages: 1st, our code is as quick as original C/C++ code (since it's the particular C++ code operating in the background) and second, it's simple to code in Python. this can be however Open CV-Python works, it's a Python wrapper around original C++ implementation

II. LITRATURE REVIEW

1. Object Detection Based on YOLO Network
- Yolo is an algorithm which is used to detect and recognize small objects moreaccurately.
- In comparison to recognition algorithms, a detection algorithm does not only predict class labels but detects locations of objects as well.
2. Object Detection and Tracking using Tensor Flow
- Tensor Flow is the library of Python which plays important role in recognizing and detecting an image.
- TensorFlow is at present the most popular software library. There are several real-world applications of deep learning that makes TensorFlow popular. Being an Open-Source library for deep learning and machine learning, TensorFlow finds a role to play in text-based applications, image recognition, voice search, and many more.
3. Object Detection Tutorial in Tensor Flow: Real-Time Object Detection
- This system captures images and detects the object continuously in real time.
- Real-time object detection is the task of doing object detection in real-time with fast inference while maintaining a base level of accuracy.
4. Object Detection through Modified YOLO Neural Network
- Yolo is an algorithm which is used to detect and recognize small objects accurately and location as well.
- YOLO struggles with small objects. However, with YOLOv3 we see better performance for small objects, and that because of using short cut connections

III. PROPOSED METHODOLOGY

Here, we tend to square measure victimization parts like external camera, computer, Arduino controller, buzzer, and 20x4show|LCD|digital display| alphanumeric display} display. The camera can capture the pictures returning before of it and also the detection half is finished victimization cryptography within the comp/ portable computer. The Arduino nano used here is for serial communication between the pc, LCD, and buzzer. Buzzer used here provides us the alert of the object being incomprehensible and to show the names of explicit objects incomprehensible, we tend to square measure victimization LCD

Proposed Block Diagram:
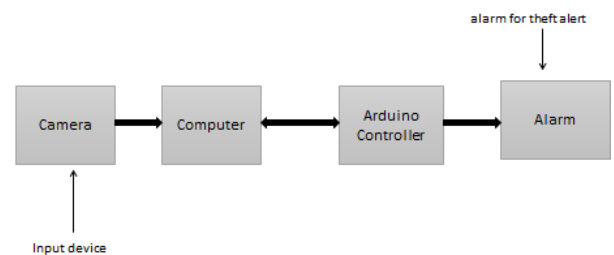
Fig. 3.1 Block diagram of Proposed methodology

Object detection is a computer technology related to computer vision and image processing that deals with detecting instances of semantic objects of a certain class (such as humans, buildings, or cars) in digital images and video methods for object detection generally fall into either machine learning-based approaches or deep learning-based approaches.

Here, we are using deep learning-based approach via YOLO (You only look once). Starting the concept, first the camera will work as an input for the system, then after taking in the image it will initialize and start capturing device.
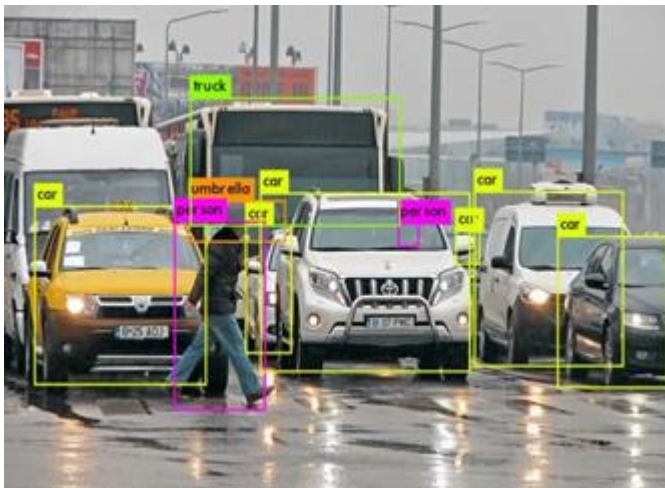
Fig. 3.2 : Forming of Bounding Boxes around Detected Objects & Labelling them
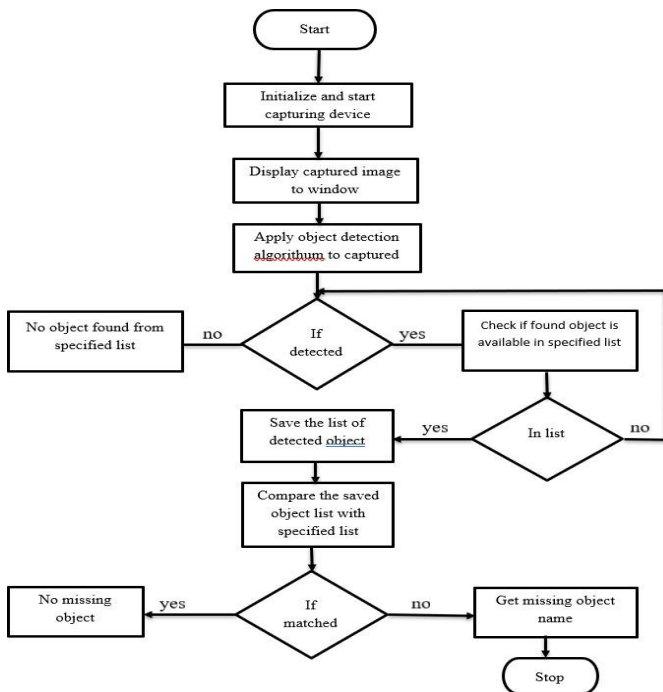
According to flow diagram, first the camera will work as an input for the system, then after taking in the image it will initialize and start capturing device. After capturing the image to window we will apply object detection algorithm to captured image.

Then condition applies if object isn't detected then system will say no object found from specified list, if detected is a yes, then check if found object is available in specified list, if in list then save the list of detected objects and compare the saved object list with specified object list, if match found then system will display no object missing and if match not found

then system will show alert on display and buzzer will ring.

IV. IMPLEMENTATION

The following subsequent specs have been used to build this module: • Quantum QHM495LM Web Camera interpolated to 2 Megapixels. • Arduino nano Atmega328P Processor • Display 20(x4 LCD Module)• Computer / Laptop: Windows 8 i5 8th gen Intel Core Processor 64(-bit)

V. RESULT

The following figures show the output when the objects are present in front of the camera and when it is missed from its place. The GUI of the output screen is designed in Qt source.

Fig 5.1 : When all objects are present

In figure 5.1, every object is being detected when placed in front of the camera, along with that we can see their labels (names), bounding boxes and confidence in %. On the top right corner, we can see the found objects block which shows the detected objects name. The objects which we want to keep in our database are being added in saved objects block. These three objects are being saved in our database camera, CCTV, drone, etc. would like we'd like we want to contemplate that we'll need object detection systems that will explore areas that haven't been seen by humans. In such cases, a period of open-world intelligence is going to be important, thus we want a system that is adaptive to the quickest technologies that leading.
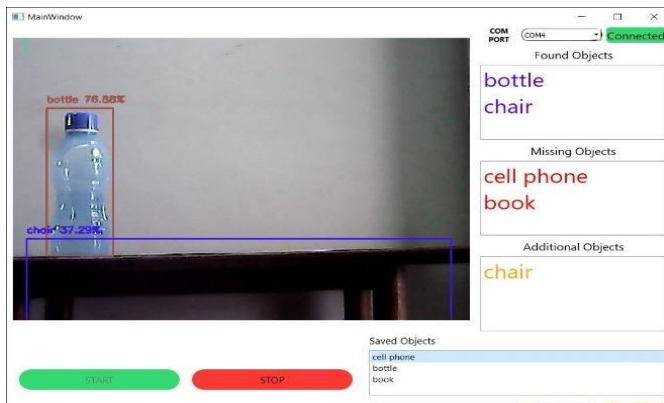
Fig 5.2: When objects are missing and additional objects are added.

In figure 5.2, the two objects are missing and are not in the frame so we can see their names in missing objects block. If the camera detects an object apart from the database the object comes under the additional object list. Here, chair is not in our database so it has been shown in additional objects block

VI. CONCLUSION AND FUTURE SCOPE

Despite fast development and achieved promising progress of object detection, there are several areas that we can add future to the primary one is little(small) object detection like occurring in the COCO palm dataset to enhance localization accuracy on little(small) objects. Another potentially beneficial extension would be to modify the algorithm to perform recursive, coarse-to-fine segmentation, thereby achieving better performance, and allowing the algorithm to segment higher-resolution images.

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Study of Operational Amplifier Test Procedure and Methods

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ABSTRACT

In this paper, we present about the study of operational amplifier test procedure and methods. Operational Amplifiers (Op-amps) are one of the most widely used building blocks for analog and mixed-signal systems. They are employed from dc bias applications to high-speed amplifiers and filters. General purpose op-amps can be used as buffers, summers, integrators, differentiators, comparators, negative impedance converters, and many other applications. The two-pole model widely used in the test analysis to assess the parameters of an op amp is not accurate and may be unsuitable for gain boosting op amp designs. A more complex model with more than two poles may require tedious analysis and a large amount of calculation. Most reported op amp measurement methods require a complicated test circuit, delicate calibration, and sophisticated test instrumentation. The practical bench test of the open loop gain along with other op amp characteristics are addressed also in this paper.

Keywords : High Gain Op Amp, Low Power Op Amp, Compensation Techniques.

I. INTRODUCTION

With the quick improvements of computer aided design (CAD) tools, advancements of semiconductor modeling, steady miniaturization of transistor scaling, and the progress of fabrication processes, the integrated circuit market is growing rapidly. Simulation and experimental results to measure the open loop gain of the op amp can be found in [1–3]. The experimental measurements of the common mode rejection ratio and the power supply rejection ratio are proposed in [4]. But it becomes more difficult to measure the op amp characteristics, especially the open loop gain, as the power supplies decrease for lower voltage processes. When the multiplication of input referred noise and the open loop gain of the op amp [5] exceeds the voltage level of the power supplies, it is difficult to directly measure the open loop gain of the op amp. In addition, if the signal magnitude is even smaller than the noise magnitude at the input, the output waveform would have little meaning. The measurement of a real chip is more difficult than performing a computer simulation of the circuit. The environment in the real world is always full of noise and interference. Special attention is needed to make sure that the test results are valid.

The setup of the chip test and the debugging of the problems encountered during the test are now presented.

II. POWER SUPPLY CURRENT TEST AND DEBUGGING

A "functionality" test may be defined as applying an input signal to the device under test and observing the expected output. In general, the measurable parameters of the experimental design are simulated using different versions of SPICE simulators. A table of expected results could be tabulated. For example, power supply current, gain, and bandwidth for different closed loop feedback resistor ratios can be simulated, measured and compared to test results. The validity of the chip performance can then be evaluated by comparing the experimental results with the simulation results. A specific procedure needs to be done to make sure the op amp circuit is not affected by the digital circuit on the same chip since the pure analog op amp circuit is fabricated with the A/D mixed signal circuit of another researcher on one chip. Due to the lack of pins, some of the pins are even shared between the different circuits. To make sure the test results are authentic, the A/D circuit sharing the same chip with the op amp circuit has to be turned off. One way to check whether the digital circuit has been shut down is to measure the current through the power supply and compare the current to the value given by simulation. If the two elements are close to each other, the credibility of the test board is increased. The interconnection of the circuits is necessary for understanding the possible paths of the interference coming from the A/D circuit. Fig.1 shows the placement between the op amp circuit and the A/D mixed signal circuit.

In Fig. 1, gnda denotes the analog ground while gndd represents the digital ground. Vcc is the analog power supply and Vdd represents the digital power supply. It is clear that the positions where the op amp circuit

connects with the A/D circuit are the analog power supply Vcc and the analog ground gnda. Because analog ground connects to the digital ground through the substrate, the op amp circuit is also associated to the A/D circuit through the substrate.

To see how the digital circuit affects the op amp circuit, a test circuit is set up to measure the power supply current. Fig. 2 is the schematic of a simple test circuit to check the possible parasitic currents. A 10 resistor is placed between the negative power supply and the negative supply terminal pin of the op amp. The pins 21 and 26 are the common analog positive supply voltage Vcc which is shared between the op amp circuit and the analog part of the mixed A/D circuit. They are tied to 1 V voltage source for the configuration of feedback op amp test.
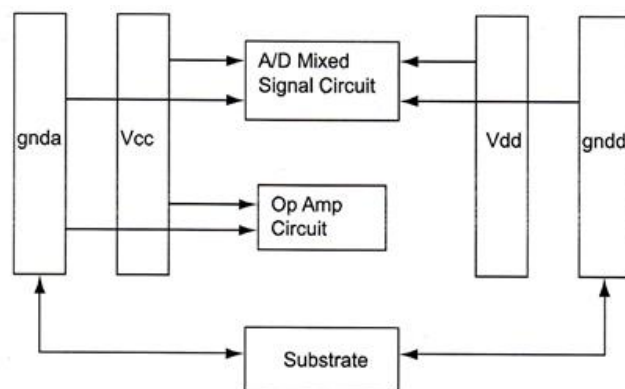
Fig. 1 : The interconnection of the chip

The pins 20 and 27 are the common analog negative supply voltage Vss (the P substrate of N channel device) shared between the op amp circuit and the analog part of the mixed A/D circuit. Vss is also called analog ground gnda in an alternative way. They are tied to -1 V source in this test circuit. The pins 6 and 40 are the digital ground of the A/D circuit. They are tied inside the chip layout to analog ground pins 20 and 27 which are used for the most negative analog supply -1 V. As a result, the analog ground is connected with the digital ground due to the common substrate in the process. The pins 1 and 15 are the digital power supply voltage Vdd of the digital part of the mixed A/D circuit. They are tied to the nwell

voltage, which changes from -1 V to 1 V during test. The current is measured by recording the voltage across the 10 resistor between the -1 V dc source and the analog negative voltage terminals pins 20 and 21. By adjusting the digital supply voltage Vdd, which is also the nwell voltage, the current through the op amp circuit power supply is shown in Table 1. The simulated current of the op amp supply by CADENCE is around 55 μA.
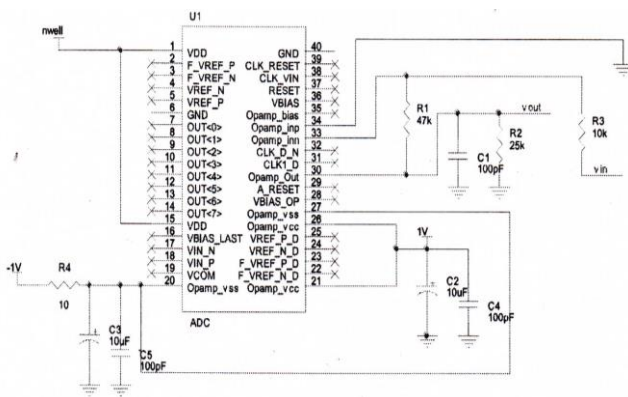
Fig. 2 : Debugging circuit setting

Table 1: The test results of the current of the op amp chip

nwell voltage (Vdd)	Current	if op amp functions
folating	200μA	no
-1 V	48 mA	no
0 V	920μ A	yes
1 V	5.99 mA	yes

When the digital power supply Vdd is floating (not connected to anything), the current flowing through the 10 resistor is under 200 μA (the lowest current recorded in the table). At that point, the op amp does not function. For example, with a 100 mV sine wave input, with the feedback inverting gain at 4.7, the output waveform does not show any gain over the input. Consequently, Vdd can not be left floating. The op amp circuit in feedback connection still does not function as an amplifier if the digital supply voltage Vdd is in the range of -1 V to -0.4 V. When Vdd gets close to - 0.3 V, the op amp circuit starts to work as a

feedback amplifier with some distortion on the output waveform. The op amp circuit functions when the digital power supply Vdd is tied to the highest voltage supply 1 V as well as when Vdd is tied to the middle voltage level 0 V. When Vdd is 1 V, the current 5.99 mA is much higher than the value 920 μA measured while Vdd is set at 0 V. After careful inspection on the layout of the whole chip, it is found that the analog op amp circuit is put on the digital part of the ESD pads used to protect the integrated circuit from electrostatic damage. The left side is the analog part of the mixed A/D circuit and the right side includes the digital part of the A/D circuit and the analog op amp circuit which should not have been surrounded by the digital ESD. The analog ESD is separated from the digital side. The ESD at the left part is connected to the analog power source and the analog ground. Instead, the ESD at the right part uses the digital power source and the digital ground. Unfortunately, the op amp circuit, which is at the bottom of the chip, is put on the digital ESD side. This explains that why the op amp could not function when Vdd is floating or connected to -1 V. Since the ESD is mainly comprised of a diode connected PMOS at the top and a diode connected NMOS at the bottom as shown in Fig. 3. If Vdd is set lower than the voltage level at the pad, the PMOS will be forward biased. Even though the total current at the analog ground Vss is 5.99 mA when Vdd is tide to 1 V, most of the current might come from the digital current which is not related to the analog op amp. With the ESD circuit functions, one possible reason for this large current might come from the incomplete shut down of the A/D digital circuit. Manually turning off the digital circuit is applied to the chip under test. A sine wave with low frequency around 10 KHz is connected to the digital pin Clk_vin of the A/D circuit while Vdd is kept constant at 1 V.
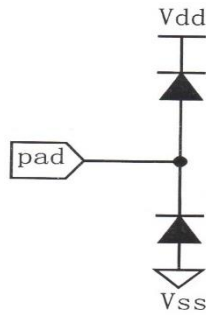
Fig. 3: ESD circuit

The current at Vss was checked and found to decrease from 5.99 mA to about 160 μA. The input signal is then disconnected from the digital pin Clk vin, the current at Vss is measured to be near 60 μA. The op amp is assumed to operate with the correct current since the measured current value is very close to the simulated value, which is 55 μA. The small difference might come from the current of the analog part of the mixed A/D circuit and the leakage current. The op amp in feedback connection is then tested and the performance is as expected. One important lesson learned here is not to put the sensitive analog circuit close to the power digital device.

III. OP AMP TEST SETUP

A simple test circuit can be built by placing components on a breadboard and connecting them with jumper wires. It is convenient to get a rough estimation of the chip performance on a breadboard in a short period of time. It also saves money since the breadboard is a cheap reusable solderless device. But the noise contribution from the breadboard and wires is usually high enough to affect the behavior of the circuit experiments. The specific printed circuit board (PCB) is necessary for testing circuit designs, especially for low voltage high gain op amps which demand low noise environment. The layout of the PCB designed for the op amp chip test is shown in Fig. 4.
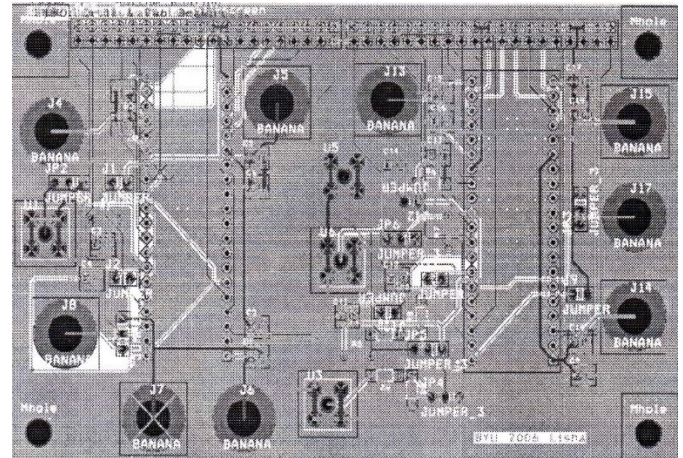
Fig. 4 : The PCB layout

Two different settings are provided on the PCB. The one on the left is the configuration set up for testing the unit feedback response. The one on the right can provide various feedback gains to measure the gain and bandwidth for the corre- sponding feedback factor F. Decoupling capacitors are used to reduce the fluctuation noise from the source supplies.

IV. OP AMP CLOSED LOOP CHARACTERISTIC TEST CONFIGURATION

The configuration for measuring the unit feedback response, the slew rate, the settling time, the input common-mode voltage range, and the input-offset voltage is shown is Fig. 5. The input offset voltage is not only due to the small bias mismatches in design but mostly caused by device and component mismatches through fabrication. Most simulators are not capable of predicting device and component mismatches from the fabrication process.
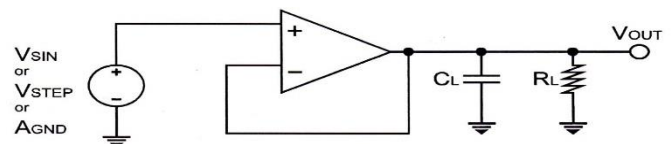
Fig. 5 : Op amp unit feedback configuration

The input offset voltage is simulated to be only 37 nV by CA- DENCE spectre. For over 10 chips tested, the

input offset voltages range from 0.3 mV to 3 mV due to the process variation. The configuration for measuring the gain bandwidth and output voltage swing is shown in Fig. 6. The value of the resistor Rf should be large enough compared to the load resistor RL in order not to cause significant dc current load on the output of the op amp.
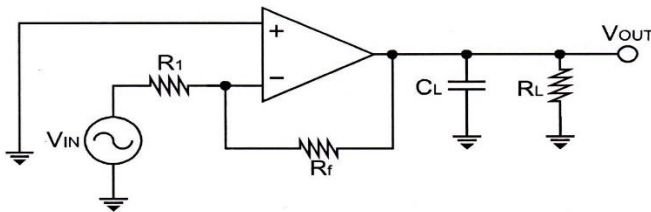
Fig. 6 : Op amp gain bandwidth configuration

V. OPAMP OPEN LOOP GAIN TEST METHODS

While the closed loop properties can be easily and straightforward to test with feedback setting, measuring the open loop characteristics is much more difficult to perform. The differential gain of an op amp is quite high. A small offset voltage is generally enough to saturate the op amp to the power supply level. With the supply voltages decreasing, even a very little input noise can drive the op amp out of the power supply limits. For the composite cascode op amp with a gain of one million at ± 1 power supplies, an input noise level as low as 1 µV is sufficient to saturate the op amp. It is hard to directly measure the open loop gain of the op amp. Suitable approaches are needed to measure the open loop gain for low voltage high gain op amp.

One conventional way to check the open loop frequency response is by measuring closed loop gain phase response at various values of feedback factor F. If the measured closed loop gain phase response at different values of F could match the simulated closed loop gain phase response respectively, there is a good chance that the open loop gain phase response of the op amp under test is similar to the simulated open loop gain phase response. There might be some difference between the simulated closed loop

response and the measured closed loop response due to parasitic effects and process variations. The dominant pole of the composite cascode op amp under test is only a couple of Hz after compensation by simulation. A second order op amp model can be built, if the equivalent second pole, which patterns all non-dominant higher poles into a single pole, can be found. Then, the closed loop transfer function becomes

$$G_d(s) = \frac{\frac{A_0}{1+A_0F}}{1+\frac{\frac{s^2}{P_1P_2}+s\left(\frac{1}{P_1}+\frac{1}{P_2}\right)}{1+A_0F}} \qquad (1)$$

The corresponding expressions of the gain and phase of the closed loop transfer function are denoted as

$$G_{dB}(\omega) = 20\log\left|\frac{A_0}{1+A_0F}\right| - 20\log\left|1 - \frac{\frac{\omega^2}{P_1P_2}}{1+A_0F} + j\omega\frac{\left(\frac{1}{P_1}+\frac{1}{P_2}\right)}{1+A_0F}\right| \qquad (2)$$

and

$$G_{phase}(\omega) = \arctan\frac{\frac{\omega\left(\frac{1}{P_1}+\frac{1}{P_2}\right)}{1+A_0F}}{1-\frac{\frac{\omega^2}{P_1P_2}}{1+A_0F}} \qquad (3)$$

It is possible to predict the poles and the midband gain by using the experimental gain and phase of the op amp measured at different values of F. With a gain phase meter, the closed loop response can be tested and compared to the simulated response. This indirect way by employing a two-pole op amp model to estimate the characteristics of the op amp is similar to the studies reported in [6-8]. Those reported measurement approaches do not fully consider the nonlinear distortion or more complete models with orders higher than two to represent the op amp behaviour accurately. The two-pole model works well for op amps with one low dominant pole and a second pole higher or near the unity frequency. For op amps using cascade connections or other kinds of gain boosting schemes, the second pole of the op amp will be much lower than the unity frequency. Moreover, many multistage op amps have zeros and some significant poles besides the second pole. The classical

two pole model assumption does not hold for these op amps and is not capable of providing precise modeling and measurements.

In [9], more complicated models of op amps are considered and the calibration of the measurement setup [10] are presented. Most methods require a lengthy procedure of calculations, sophisticated instrumentation, and/or complicated bench setup to implement the test. In addition, most methods do not work well for CMOS devices with low power supply voltage.

To address the inaccuracy of applying the indirect modeling of feedback op amps to describe the open loop characteristics, other simple but reliable test methods of op amps using typically available bench test equipment are investigated and presented. The supplies of 1 V and -1 V are applied to the op amp chip. The power consumption of the chip is around 120 μW based on the supply current which is measured to be close to 60 μA. The offset voltages on a sample of ten chips was found to be between 0.3 mV and 3 mV. The output load of the op amp consists of a 100 pF capacitor in parallel with a 25 k resistor. The CMRR and PSRR are measured to be above 100 dB. The main test results are summarized in Table 2.

Table 2: Opamp Test Results

DC Gain (dB)	≥117
GBW(MHz)	1.2
PM(^{0})	43
SR$^+$/SR$^-$(V/μs)	0.27/0.43
Ts$^+$/Ts$^-$(μs) (to1%)	3.85/2.2
Power μW)	≤120
Supply Voltage (V)	$\pm$1

The lack of high precision signal generator that can produce low frequency signal with little distortion prevents the more accurate evaluation of the open loop gain. A spectrum analyzer plot shows the signal generator available in the analog lab produces a low frequency signal with significant harmonic distortion. Strategy three estimates the op amp gain to be above 100 dB. However, the more precise measurement of the gain is not possible due to the noise of the test chip, which is presented as the fluctuation of the amplified offset voltage. The result of 117 dB open loop gain is given by strategy four because the measurement of the slope instead of the magnitude value is more robust to noise. Using a voltage divider to decrease the input signal to get an exact measurement of the open loop gain will eventually be limited by the input noise floor of the test chip. The extremely low signal noise ratio leads to the corruption of the output signal slope. The further evaluation of the op amp open loop gain as the expected 120 dB is prohibited by the considerable flicker noise of the MOSFET device. Nevertheless, the adequately close match between the op amp chip experimental results and the CADENCE Spectre Spice Simulation demonstrates that the prototype chip has achieved the expected performance in the case of low current weak inversion operation of the composite cascode output device.

VI. CONCLUSION

Detailed test set up, debugging, and test methods implemented to describe the op amp performance are presented in this paper. It discusses the increasing challenge to measure the high gain op amp characteristics when the power supplies are getting smaller. Several simple bench test methods are investigated and proposed to characterize the op amp characteristics, in particular the open loop gain. Those practical techniques do not require sophisticated instrumentation or a complicated lab setup. The requirements and the suitability of the different measurements in various situations are also evaluated.

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Brain Tumor DetectionwithVGG-16 Model

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ABSTRACT

A brain tumor is a life-threatening neurological condition caused by the unregulated development of cells inside the brain. Brain tumor can be very unforgiving to all age groups. The patient's survival rate is usually very less, if they are not treated properly. Braintumorsaccountfor85%to90%ofallprimarycentral nervous system (CNS) tumors. Most ofthe times, survival rates decrease significantly with the age. While the anatomy of brain is more complex than any other vital organ, It becomes very crucial to find outthechancesofpeopledevelopingbraintumorinlaterstagesoflife.The segmentation, diagnosis, and isolation of contaminated tumor areas of brain from magnetic resonance (MRI) images is a prime concern. However, it is a very tedious and more time-consuming process that radiologists or clinical specialists must undertake and it soley depends on their performance and their expertise. In this paper, the different traditional and hybrid ML models were built and analyzed in detail, to classify the brain tumor images without any human intervention.Thefigureoffindingbraintumorinanindividuallifetimeis1inevery100[4].

Keywords : BrainTumorClassification,VGG-16CNNModel

I. INTRODUCTION

A disease is defined as a disorder of function during a living being. If we drill down the definition, it is defined as a disorder of structure or function within the division of cells during a living organism. If a disorder of unnatural mass is developed within the cerebrum of a brain, we call it a brain tumour. Brain tumors are of various types and might be dangerous now and then, and glioma is that the most typical style of nonpermanent or treatable tumor. Glioma will be classified into two types, namely High-Grade Gliomas (HGG) and Low-Grade Gliomas (LGG). LGG could be a slow-spreading tumor, while HGG could be a rapidly growing tumor, which explains why HGG may be a fatal disease. those

that are diagnosed with HGG and who are aged between 20–44 years have a survival rate of 19% with treatment after 14 months of diagnosis, supported a recent survey of the central system (CNS) [1] on a Canadian population from 2009–2013.
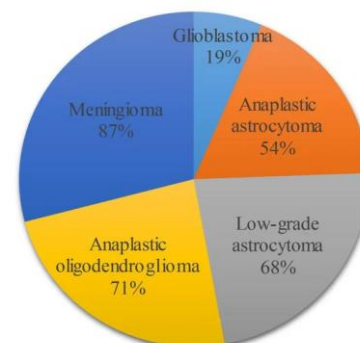
Figure 1 shows the distribution of survival rates between differing types of brain tumors.

Though there are many medical imaging modalities available to differentiate the characteristics of brain tumors, resonance images (MRIs) are the foremost commonly used medical imaging modalities because of its advantage of visual analysis and its flexibility within the domain of computer-aided analysis of medical images. It plays an important role at many stages of the clinical work flow for population screening; the role of MRI modalities will build within the coming future thanks to developments within the domain of study methods along the lines of cost effectiveness and accuracy. With the assistance of MRIs, tumors may be differentiated into different grades of gliomas. Among the most recent high-tech technologies, MRIs may be considered one amongst the foremost advanced techniques wont to characterize brain tumors for diagnosis and evaluation. Accurate identification of tumor distance may be considered a critical phase of varied neuroimaging studies [2]. the categories of MRI modalities are clearly outlined in Figure 2. They [3] focused their experimental analysis on the fully annotated neoplasm segmentation (BraTS) challenge 2013 data set using the well-defined training and testing splits, thereby allowing us to check directly and quantitatively a good form of other methods. Deep learning (DL) and Convolutional Neural Networks (CNN) stood at the middle of of these developments in brain MRI image analysis and computer interventions and proved their adoption to be a successful execution to drive for continuous improvements.

(a)   (b)

(c)   (d)
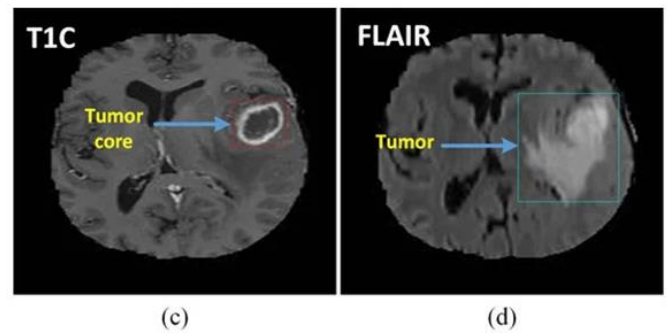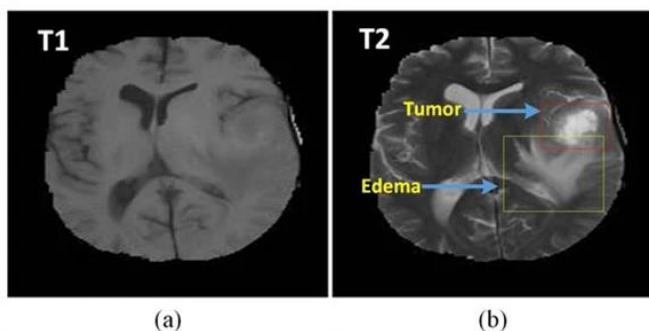
Figure 2. the various tumor types with different shapes in four resonance images (MRI) sequences: (a) T1 MRI sequence, (b) T2 MRI sequence with tumor type edema, (c) T1C MRI sequence with core tumor, and (d) Search Results Web results Fluid attenuation inversion recovery (FLAIR) sequence showing the bottom truth of a tumor.

Convolutional networks were inspired by biological processes [4,5] therein the connectivity pattern between neurons resembled the organization of the animal visual area. Initially, Artifical Neural Network (ANN) was wont to study the info from digital images, but so as to try to to so, the domain experts or the researches need to manually decide and extract features from the digital images and to feed it to the ANN. CNN came to the rescue in eliminating the cumbersome manual work of deciding the features. CNN is one among the foremost remarkable kinds of ANN that's inspired by natural visual recognition phenomenon [6]. There are innumerable applications of CNN within the field of image classification and pattern recognition [7]. The architecture of CNN was introduced within the late 80 s [8]. After the introduction of CNN, it had been improved by LeCun within the late 90s [9], but the introduction of the ConvNet architecture [10] within the 21st century has taken CNNs to a unique level, with a slip rate of 15.3% as compared to standard computer vision (CV) techniques [11]. CNN has made huge impacts within the medical imaging domain [12] and plenty of other fields like computer vision, digital image processing, and computing. because of its multilayered

architecture, CNN is that the most well-liked technique employed for image analysis although there are many deep learning algorithms introduced over the past decades [13,14,15]. the same as ANN, CNN also uses an adaptive approach to be told spatial hierarchies of features through back propagation, but unlike ANN, CNN doesn't have fully connected neurons for all the layers and it's only the last layer as fully connected layer. CNN consists of multiple building blocks, like convolution layers, pooling layers, and fully connected layers [16]. The convolution layer is answerable for feature extraction, which makes it special compared to ANN; this layer is usually accountable for convolution operation and activation function.

II. SYMPTOMS

Brain symptoms varies depending on type size Some signsarefollows:

1. Headache Severe headache is a common symptom in aboutmorethan50percentpeople.Continuouspressureis beingprovided by tumour in brain to sensitive nerves blood ves-sels. following are some kind of headache: a). Having a sharppain in head, unlike migraine. b). Accompanied by vomiting. c).getsworsewhilecoughingandchangingpositions.

2. Seizures Brain tumours can interfere with presented elec-trical signal swhich result inseizures. It'sactuallyfirstsign of tumour mostly people having brain tumour experienced itonce.

3. Memory Lossand Confusion Due to tumourinfrontal lobe, memoryproblemsoccur. Which can effect in decision making and results in confusion. Following are so meproblems:
a). Difficulty in concentrating and get easily distracted.
b).Memory issues, planning issues, multitasking issues. These arethe result of vitamin deficiencies, medications, or emotional disorders.

5. Fatigue Fatigue ismorethanfeelingalittletiredoncein a while.Following are some signs: a). completely

exhaus-tion,overallweakness,troubleinsleeping.Cancerousbrai ntumour result in fatigue.they are also side effect of cancertreatment.

6. Depression Depression is the mostly observed symptom inbraintumourpatients.Followingaresomeproblems:a). longerlastingfeeling of sadnessin patients,thanthenormal ones.b).interest losing,lackof energy or showingless energeticinsomething. c). insomniad). suicidalthoughts orfeelingworthlessness

7. Weaknesswhile body isfightingwith braintumour,it'sobvious that one feels weakness in body,some tumours cancause tingling in hands feet.Weakness can also be cause bycancertreatments,multiplesclerosis,diabeticneuropa thy.

III. PROJECTOBJECTIVE
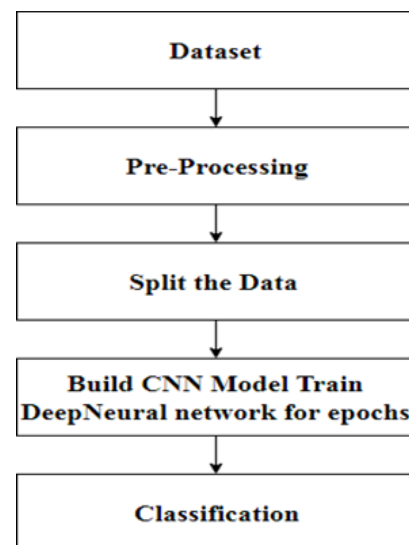
The main motivation behind Brain tumor detection is to not only detect tumor but it can also classify types of tumor. So it can be useful in cases such as we have to sure the tumor is positive or negative, it can detect tumor from image and return the result tumor is positive or not. This project deals with such a system, which uses computer, based procedures to detect tumor blocks and classify the type of tumor using Convolution Neural Network Algorithm forMRI images of different patients.The soul purpose of this

report to classify random Magneticresonance imaging (MRI) scan on the basis of presence oftumoron aImageTargetby training aCNN-ModelusingVGG-16 model architecture (also called OxfordNet). We usedaccuracy as a measure to justify the model performance whichcanbedefinedas:

IV. METHODS

A. Flowchart
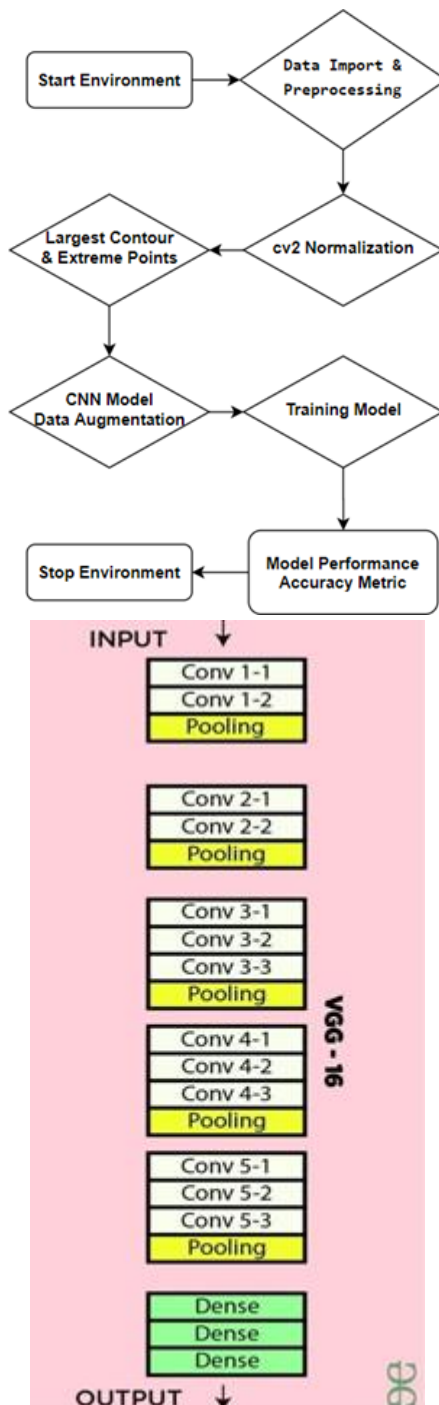
B. Normalization

Sinceourdatasetiscomprisedofimagesofdifferentdimension,hue andsaturation of colors, tobring theimageinto a range of intensity values i.e. better for later training themodel meaning statistically it follows a normal distribution.The actual intensity distribution is graphed along the meanvalue of all images which should be determined with highconfidencelevel.Traditionally,cv2libraryisusedtosupportawiderangeofoperationinnormalization.

C. ContourandextremityofanImage

Contours are the shape determined by cv2 operation basedonchangingintensitiesofimagematrix[8].TheyholdsaRegion of Interest(ROI) where the main information of theimagelies,in ourcase,wewant toanalysejust theregionof MRI enclosed within the Skull for tumor detection. Whilethecontoursarecorrectlydetected,wecanalsopoin ttheextremities of the images present in the dataset for clearlyassign coordinates to CNN Model for less computation andmoreaccuracate.

D. CNNModel

Convolutional Neural Network (CNN) is a deep learningnetworkusedforclassifyingimages.ThebasicpremisebehindCNN is using predefined convolving filters to identify patternsinimageedges, part sofobjects and the build on to this knowledge to detect complete objects like automobiles, animals, human being etc[10]. VGG16 is a convolutional neuralnetwork architecture named after the Visual Geometry Groupfrom Oxford, who developed it.
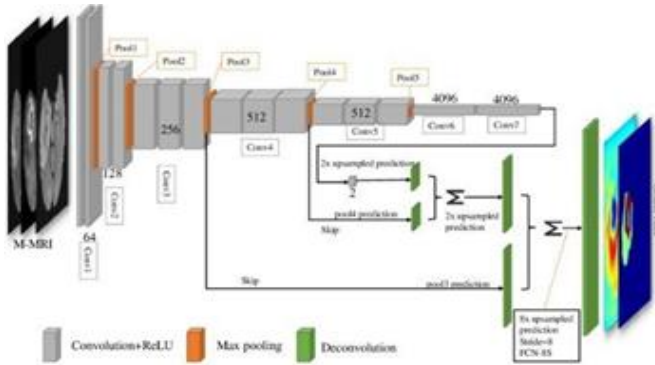
E. Data Augmentation

When wedon'thaveenoughtotrainmodels,wecanapt for data augmentation where a single image is multiplied withrandom crop and rotation. It helps the CNN model to provideenoughdatawithoutactuallycollectingnewdatat otrainitself. Here, we also make use of this strategy that enables tosignificantly increase the diversity of our data available fortraining models. It involves operations like cropping, padding,andhorizontalflipping.

V. CONCLUSION

Brain Tumor is very critical in our society. It should be detected nascent stages to begin treatment as early as possible for the subject to recover faster. Other researchers(see [1],[2]) are also suggesting techniques which require large datasets while our model is using data augmentation for work as efficient as large datasets. Using VGG16 along with data augmentation is faster and use less computation processing power and obtain similar accuracy in detecting brain tumor. This model has been tested with different datasets consisting of high definition photos and give faultless results. This project is practically aimed towards a social cause and developement of medical sector and helps to create a system which will help patients to its fullest.

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Study of Electronic Properties of Bismuth- Antimony (Bi₁₋ₓsbₓ) Nanowire

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ABSTRACT

In this paper, we presented about the study of the bismuth antimony (Bi1-xSbx) alloys material are considered to be one of the best materials for low temperature thermoelectrics, supercooling, millivolt electronics and infrared applications. A notable number of interesting properties have been observed in bulk bismuth materials, such as non-parabolic dispersions and abnormal magneto-resistance, the ultra-high mobility of carriers, and the high anisotropy. In 1993, Hicks et al. suggested that thermoelectric materials could have enhanced figure of merit if the materials were synthesized in the form of low dimensional systems and nano-systems. Since then, much more focus has been given to bismuth antimony as related to nanoscience and nanotechnology.
Keywords : Nanowire, Bismuth- Antimony, quantum Confinement Effect.

I. INTRODUCTION

Lin et al. have synthesized and studied some electronic properties of Bi1-xSbx nanowires of diameters (d=40, 45 and 60 nm) and Sb composition (x=0, 0.05, 0.10 and 0.15), which are oriented along the (012) crystalline axis. 1-5 Bi1-xSbx nanowires with their wire axis oriented in the trigonal direction have been studied by Rabin et al, 6 for the composition range of (x=0˜0.30) and the nanowire diameter range (d=10˜100 nm), below the temperature of 77 K, where the authors suggested that the thermoelectric performance can be optimized by aligning the carrier pockets. Bi1-xSbx wires of larger diameters on the order of microns have been studied

for their strain effect in the wire direction on their electrical resistivity by Nikolaeva et al. 7 Tang and Dresselhaus have given systematic guidance on the electronic band structure of Bi1-xSbx thin films as a function of growth orientation, film thickness, stoichiometry and temperature.8,9,10 However, there are no corresponding systematic studies of Bi1-xSbx nanowires, and researchers, especially experimentalists, are very eager for global guidance on Bi1-xSbx nanowires as a function of growth orientation, wire diameter, stoichiometry, temperature, etc. The present paper aims to provide such guidance on the electronic phases and band gaps or band overlaps of Bi1-xSbx nanowires to stimulate

the synthesis of such nanowires for different applications.

In the current paper, we first develop a model for the mini-band gap and the related non-parabolic dispersion relations at the L point of bismuth antimony in one dimension. In particular we use the iterative one dimensional two band model, and we have here developed an analytical approximation for this model. Thereafter, we study the band edges and electronic phases as a function of growth orientation, wire diameter and stoichiometry, including the semimetal phases, the indirect semiconductor phases and the direct semiconductor phases. The band overlap of the semimetal phases, and the band gap of the semiconductor phases are then studied as well. The aim of this paper is to: 1) develop a one-dimensional non-parabolic band model, and 2) provide a guide for the synthesis of Bi1-xSbx nanowires with various crystallographic orientations that could be used for different applications.

II. MATERIALS AND METHODS

We first review the crystal and electronic band structure of bulk materials of Bi1-xSbx. The bulk materials of bismuth, antimony and their alloys have the same R3m symmetry with a rhombohedral lattice structure.

(a)
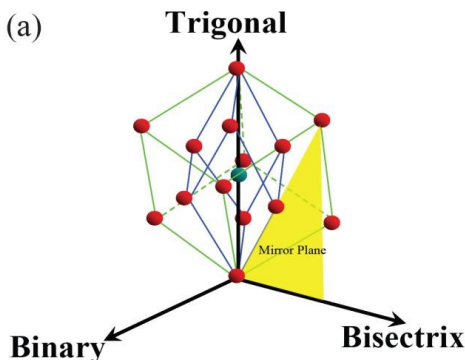
Figure 1 : The atomic unit cell of bismuth

The quantum confinement effect of nanowires may change the symmetry properties of the carrier pockets, the positions in energy of the band edges, and possibly the shape of the dispersion relations at the T point, the L points and the H points. There are two types of quantum confinement effects on the band edges. One is a trivial quantum confinement effect that does not change the inverse-effective-mass tensor or the shape of the dispersion; the other is a non-trivial quantum confinement effect that does change the inverse-effective-mass tensor and the shape of the dispersion. For the T point and the H points, the dispersions of the band edges are parabolic, and the quantum confinement effect is trivial. The valence band edge at the T point will decrease in energy by $\frac{h^2}{8} \cdot (d_1^{-2} \cdot \alpha_{||,11}^{[T,Wire]} + d_1^{-2} \cdot \alpha_{||,22}^{[T,Wire]})$ where d_1 and d_2 are the cross-sectional widths of a rectangular nanowire, and $\alpha_{||,11}^{[T,Wire]}$ and $\alpha_{||,22}^{[T,Wire]}$ are the corresponding components of the cross-sectional inverse-effective-mass tensor.[11] For a square nanowire, the width is $d=d_1=d_2$, and the expression of energy decrease at the T point is reduced to $\frac{h^2}{8^2} \cdot (\alpha_{||,11}^{[T,Wire]} + \alpha_{||,22}^{[T,Wire]})$. Similarly, the valence band edge at an H point will decrease in energy by $\frac{h^2}{8} \cdot (d_1^{-2} \cdot \alpha_{||,11}^{[H,Wire]} + d_1^{-2} \cdot \alpha_{||,22}^{[H,Wire]})$ for a rectangle nanowire, and by $\frac{h^2}{8^2} \cdot (\alpha_{||,11}^{[H,Wire]} + \alpha_{||,22}^{[H,Wire]})$ for a square nanowire. Furthermore, we can still assume that $\alpha_{||,11}^{[T,Wire]} = \alpha_{||,11}^{[T,Bulk]}$ and $\alpha_{||,11}^{[H,Wire]} = \alpha_{||,11}^{[H,Bulk]}$ as have been validated in previous reports.[5,6,8,9]

For the L points, the dispersions of the band edges are non-parabolic, and the quantum confinement effect is non-trivial, so that the traditional square-well model is not accurate any more. There coexists an electron pocket and a hole pocket at each L point. Thus, the conduction band edge and the valence band edge for the L point are very close to each other in energy, and are strongly coupled, which results in the non-parabolicity of the dispersion for the L-point electrons and holes or possibly even linearity if the two bands

are touching. Meanwhile, the shape of the dispersion is also correlated with the magnitude of the narrow band gap. On the one hand, quantum confinement in the cross-sectional plane will change the narrow band gap, which is associated with the inverse-effective-mass tensor. On the other hand, the inverse-effective-mass tensor of $Bi_{1-x}Sb_x$ nanowire is changed by the change of the narrow band gap, which is also different from the inverse-effective-mass tensor of a bulk $Bi_{1-x}Sb_x$ with the same Sb composition. Therefore, the puzzle is that neither the narrow band gap nor the inverse effective-mass tensor is known at this stage for the nanowires case.

Historically, the relation between the narrow band gap and the dispersion for bulk bismuth is described by a two-band model,[16]

$$p.\alpha^{[L,Bulk,Bi]}.p = E(k)\left(1 + \frac{E(k)}{E_g^{[L,Bulk,Bi]}}\right), (1)$$

Where $\alpha^{[L,Bulk,Bi]}$ is the inverse-effective mass tensor for the L point carrier-pocket of bulk bismuth, and it is assumed that $\alpha^{[L,Bulk]}$ for both the conduction band edge and the valence band edge are the same due to the strong interaction between these two bands and this approximation has been shown to be valid for bulk bismuth samples The relation between the band gap and the inverse effective mass tensor is seen more clearly in the form of the second derivative of Eq. (1).,

$$\alpha^{[L,Bulk,Bi]} = \frac{2}{h^2}\frac{\partial^2}{\partial k^2} = \frac{1}{m}I \pm \frac{1}{m_0^2}\frac{2}{E_g^{[L,Bulk,Bi]}}p^2$$

$$(2)$$

where m0 is the mass of free electron and I is the identity matrix. It is assumed that the form of Eq. (2) holds also for $Bi_{1-x}Sb_x$ in the range of x = 0~0.30, though the band gap and the effective mass tensor may change as a function of Sb composition x. Thus, we further have [5,18].

$$\alpha^{[L,Bulk,Bi_{1-x}Sb_x]} = \frac{E_g^{[L,Bulk,Bi_{1-x}Sb_x]}}{E_g^{[L,Bulk,Bi]}}\left(\alpha^{[L,Bulk,Bi]} - \frac{1}{m_0}I\right) + \frac{1}{m_0}I \quad (3)$$

which is consistent with the experimental results carried out by Mendez et al, where a simpler version of Eq. (3) was adopted [19] and is given by,

$$\alpha^{[L,Bulk,Bi_{1-x}Sb_x]} = \frac{E_g^{[L,Bulk,Bi_{1-x}Sb_x]}}{E_g^{[L,Bulk,Bi]}}\alpha^{[L,Bulk,Bi]}$$

$$(4)$$

The theoretical validation between from Eq. (3) and Eq. (4) is discussed in Ref.[8], and these experiences can beach be extended to connect the bulk materials and nanowire materials, i.e.

$$\alpha^{[L,Bulk,Bi_{1-x}Sb_x]} = \frac{E_g^{[L,Bulk,Bi_{1-x}Sb_x]}}{E_g^{[L,Bulk,Bi]}}\left(\alpha^{[L,Bulk,Bi]} - \frac{1}{m_0}I\right) + \frac{1}{m_0}I \quad (5)$$

and

$$\alpha^{[L,Bulk,Bi_{1-x}Sb_x]} = \frac{E_g^{[L,Bulk,Bi_{1-x}Sb_x]}}{E_g^{[L,Bulk,Bi]}}\alpha^{[L,Bulk,Bi]}$$

$$(6)$$

Now we have two approaches to solving the dispersion relation and for finding the narrow band gap of the L-point band edges. One is the iterative way. We set $E_g^{(0)} = E_g^{[L,Bulk,Bi]}$ and $\alpha^0 = \alpha^{[L,Bulk,Bi]}$ and we repeatedly carry out the iteration steps of

$$E_g^{(n+1)} = E_g^{[n]} + 2.\frac{h^2}{8d^2}.trace\left(\alpha_{||}^{(n)}\right)$$

$$(7)$$

and

$$\alpha^{(n+1)} = \frac{E_g^{(n)}}{E_g^{(n+1)}} + \left(\alpha^{(n)} - \frac{1}{m_0}I\right) + \frac{1}{m_0}I$$

$$(8)$$

Until convergence, where $\alpha_{||}^{(n)}$ is the cross-sectional sub-tensor of $\alpha^{(n)}$.

The other approach is to use the simple Eq. (6) and derive a solution in an analytical form, by solving Eq. (6) and

$$E_g^{(L,Wire,Bi_{1-x},Sb_x)}$$
$$= E_g^{(L,Bulk,Bi)}$$
$$+ 2.\frac{h^2}{8d^2}.trace\left(\alpha_{||}^{[L,Wire,Bi_{1-x},Sb_x]}\right)..(9)$$

Thus, the L-Point narrow band gap of the nanowire

III. RESULTS AND DISCUSSION

Now we illustrate the electronic phase diagrams and band gap/overlap diagrams of $Bi_{1-x}Sb_x$ nanowires with a much stronger quantum confinement effect, occurring in nanowires with a small width, explicitly for nanowire with a width of 10 nm. The small width nanowires show how the quantum confinement effect influences the symmetry properties and the electronic phases of the nanowires comparatively. The electronic phase diagrams and band gap/overlap of $Bi_{1-x}Sb_x$ nanowires with d=10 nm, as a function of growth orientation and stoichiometry, are illustrated in Fig. 2. The changes in the electronic phase diagrams are more obvious in Fig. 2. First, the direct semiconductor phase regions have disappeared in all of the three cases (a), (b) and (c). The semimetal phase region (dark blue) where the top of the valence band edge is located at the T point has significantly shrunk to a tiny size in both Fig. 2(a) and Fig. 2(c), and has disappeared in Fig. 2(b). The semimetal phase region where the top of the valence band edge is located at an H point (light blue) has shrunk as well, in all the three cases, but still is present. The dominant phase regions become the indirect semiconductor phases arrange, which have both expanded remarkably in Fig. 2 (a), (b) and (c). Such information is very important for the design of electronic devices using $Bi_{1-x}Sb_x$ nanowires. The much stronger quantum confinement effect in 10 nm wide nanowires makes the contrast for the anisotropy of all the diagrams much more obvious. The existence of inversion symmetry and the absense of mirror symmetry is shown clearly in Fig. 2 (a) and (d). Furthermore, the mirror symmetry about the binary axis, mirror

symmetry about the trigonal axis, and the associated inversion symmetry of the orientation-stoichiometry phase diagram of the trigonal-binary crystallographic plane normal to the bisectrix is further clarified in Fig. 2(c) and (f). The above discussions show that $Bi_{1-x}Sb_x$ nanowires of larger wire width show a much richer variation of electronic phases, but the contrast of anisotropy for different growth orientation is less obvious, while for the $Bi_{1-x}Sb_x$ nanowires of larger wire width, the richness of the variation of electronic phases is reduced, but the contrast of the anisotropy for different growth orientations is much enhanced.
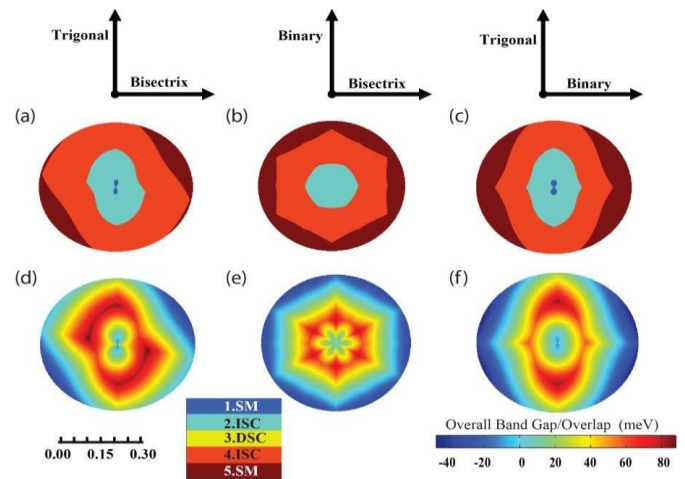
Figure 2: The electronic phase diagrams (a)-(c), and the band gap/overlap diagrams (d)-(f) of $Bi_{1-x}Sb_x$ nanowires of 10 nm wire width, as a function of wire growth orientation and Sb composition x.

IV. CONCLUSION

In conclusion, we have developed a model to accurately describe the quantum confinement in one-dimensional narrow band gap systems, which accurately captures the band edge shifts and the shape of the non-parabolic dispersion relations. We have then used this model to study the phase diagrams and band gap/overlap of the bismuth-antimony nanowire materials system.

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A Review on modern vehicle Virtual Crash Test to Understand the Effect of Impact on Passengers

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ABSTRACT

Modern vehicles are much safer, lighter, faster and drive convenient as far as older vehicles are concerned. They are more stable and having better safety features. Now a days everyone is giving more importance to the passenger safety. In order to avoid the passenger threats during vehicle crash, we need to understand the collusion effects on vehicle body and passenger cabin. It can be studied well with the help of crash test where vehicle is allowed to hit an obstacle with a particular speed and due to hitting vehicle damage and effect of collusion on the cabin is observed. But physical crash test is much costlier and consumes money, effort, material and much more things.

To avoid this virtual crash test is preferred in industry. It is a simple computerised crash test simulating process in which virtual model of vehicle is allowed to hit a virtual obstacle with a known speed virtually on computer. The effects will be generated by finite element analysis module in the form of deformation and stresses on virtual parts. It also shows the bending and cracks on parts. Hence this virtual crash test is Having 95 % accurate results. It also avoids physical damage on vehicle, saves efforts and money.

In this paper we have studied the various literatures available based on this crash test. Authors opinions are understood and based on their opinions a standard conclusion is drawn. This study will help to conduct virtual crash test with the help of FEA package and CAD Tool.

Keywords : Crash Test, FEA Package, CAD Tool

I. INTRODUCTION

In response to the need to improve crashworthiness, various countries have proposed and implemented a variety of test methods in order to provide regulations and safety information. Recently, offset crash tests have come into widespread use in addition to full frontal crash tests or oblique impact tests. In actual

accidents, chassis deformation and intrusion into the cabin has been observed in many cases. In addition, passenger deaths have been reported in conjunction with chassis and cabin deformation. Therefore, with the primary objective of securing cabin space and thereby reducing passenger deaths, a great deal of research has been conducted on offset crash tests, as well as on the body frame structure in order to improve passenger survivability. Full frontal crashes are considered useful for evaluating the performance of safety devices which restrain passengers during a crash. Offset crashes are considered appropriate for evaluating cabin deformation caused by the impact loads on the vehicle during a crash. As has already been described in a wide range of literature on the subject, in a certain sense, these two test methods involve evaluating mutually contradictory phenomena. This is an extremely serious and difficult problem for automobile development engineers who are attempting to improve crashworthiness. Issues which will be critical in discussions of vehicle crashworthiness in the future are:

(1) Does each of these evaluation techniques provide methods and criteria which are suitable for increasing vehicle crashworthiness?

(2) Which of these test methods is useful in developing and evaluating a vehicle?

A variety of configurations and conditions have been proposed, especially for offset crashes, so further research and discussion are needed. An area which is currently a main focus of concern is the types of considerations that are needed for vehicle designs which will provide compatible crashworthiness for both small cars and large cars. This issue is especially important for vehicles which are evaluated with these methods. This research seeks to verify how crash test methods, either full frontal or offset frontal crashes, are associated with actual accidents. This research also discusses what needs to be done in the future.

Safety is one of the design considerations in automobile community. Therefore, crash test is an important step to validate the novel car design.

However, high cost in experimental testing limits the number of crash tests, and adequate data might not be obtained consequently. Alternatively, numerical modelling and simulation have been widely used to study car crash in addition to experimental testing. As a powerful numerical tool, finite element method (FEM) [1] plays an vital role in crash test simulations.

II. LITERATURE SURVEY

Andrew Hickey, Shaoping Xiao, "Finite Element Modeling and Simulation of Car Crash". In this paper, quasi-static simulations were conducted to simulate car crash via finite element method. A 2002 Ford explorer was modeled in the 3D modeling software CREO and then imported into ANSYS for mesh generation and FEM analysis. Various incoming speeds were considered when the car was modeled to crash into a wall. It was observed that when the car with an incoming speed of 100mph, the car was totaled. The maximum deformation in numerical simulation agreed with the one from a real life testing. [1]

Michael S. Varat, Stein E. Husher, "Crash Pulse Modelling for Vehicle Safety Research". Computer simulation, component testing, and sled tests often require the generation of suitable, derived acceleration time histories to define a collision event. These time histories have shape, amplitude, and duration characteristics. Suitable, derived acceleration time histories should be based on a particular vehicle's response in a staged full scale crash test. A staged crash test includes instrumentation in order to measure acceleration time histories, force time histories and other engineering parameters. Analytical techniques are developed to derive acceleration time histories at different collision severities based on the measured acceleration time history in a particular crash test. [2]

Tomiji Sugimoto, Yoshiji Kadotani, Shigeru Ohmura, "The Offset Crash Test -A Comparative Analysis of Test Methods". This research will discuss the issue of

how the currently used frontal crash tests correlate to actual accidents. The following data will be presented in relation to this:

1. Results of offset crash tests now being conducted, and results of vehicle-to-vehicle crash tests, especially results of crash tests in which the vehicles have different weights.

2. Why do such differences occur?

3. Differences between the results of tests with moving deformable barriers (MDB) which are being studied by the National Highway Traffic Safety Administration (NHTSA)and results of vehicle-to-vehicle crash tests.

4. Results of modifications to test methods The following aspects of the abovementioned issues will be discussed:

1. Important items and information to be considered in studying crash test methods to be used in the future.

2. Information which needs to be taken into consideration in developing cars in the future. [3]

T. J. Hirsch, "Vehicle Crash Test and Evaluation Of Median Barriers For Texas Highways". This study adds support to the vast knowledge obtained from previous testing programs and field experience in demonstrating that maintenance repair increases as barrier flexibility increases. Maintenance of the rigid CMB barrier would require at most an occasional light sand blasting job to remove unsightly tire scrub markings. The findings of this study indicate that the CMB barrier would best serve the public in narrow medians of roadways located in urban developments and carrying high speed and high traffic volume. Information is presented on the safety, economic, and aesthetic considerations for each of the three barriers investigated. [4]

Witold Pawl us& Hamid Reza Karimi & Kjell G. Robbersmyr, "Investigation of vehicle crash modelling techniques: theory and application". Creating a mathematical model of a vehicle crash isa task which involves considerations and analysis of different areas which need to be addressed because of

the mathematical complexity of a crash event representation. Therefore, to simplify the analysis and enhance the modelling process, in this work, a brief overview of different vehicle crash modelling methodologies is proposed. The acceleration of a colliding vehicle is measured in its centre of gravity—this crash pulse contains detailed information about vehicle behaviour throughout a collision. A virtual model of a collision scenario is established in order to provide an additional data set further used to evaluate a suggested approach. Three different approaches are discussed here: lumped parameter modelling of viscoelastic systems, data-based approach taking advantage of neural networks and autoregressive models and wavelet-based method of signal reconstruction. The comparative analysis between each method's outcomes is performed and reliability of the proposed methodologies and tools is evaluated. [5]

Tso-Liang Teng1, Peng-Hsiang Chang2, Cho-Chung Liang3 and Da-AnFung3, "Application of crash pulse on the car crashworthiness design". Crash pulse is an acceleration curve measured in the car during a crash test. The shape, time duration, and maximum acceleration of crash pulse may influence the predicted motion of the occupants. The characteristics of crash pulse measured during crash tests can be further used to analyse the crashworthiness of a given vehicle design. Thus, the dummy installation steps can be skipped entirely. This study comprised two parts. First, frontal crash pulse data were analysed to determine the relationship between crash pulse curves and occupant injuries and identify the types of pulse associated with minimal occupant injury. Second, crash pulses obtained from frontal crash simulations using different bumper and crossmember designs were correlated to original crash pulse curves to assess car crashworthiness and suggest design improvements. Dummy injuries were not directly considered. However, to verify the effectiveness of using crash pulse curves to evaluate design crashworthiness, crash simulations were conducted

with dummies, and the severity of dummy head damage was recorded. According to comparison results, the evaluation results of car bumper and crossmember design using head injury criterion value with employing crash pulse on crashworthiness design result are identical. It reveals the feasibility of car crashworthiness design based on the crash pulse. [6]

T. Ananda Babu 1 D. Vijay Praveen 2 Dr.M.Venkateswarao 3, "Crash Analysis Of Car Chassis Frame Using Finite Element Method". In this project impacts and collisions involving a car frame model are simulated and analysed using ANSYS software. The chassis frame forms the backbone of a heavy vehicle; its principle function is to safely carry the maximum load for all the designed operating conditions. The frame should support the chassis components and the body. It must also withstand static and dynamic loads without undue deflection or distortion. The given model is tested under frontal collision conditions and the result ant deformation and stresses are determined with respect to a time of 80 Mille sec for ramp loading using ANSYS software. The crash analysis simulation and results can be used to assess both the crashworthiness of current frame and to investigate ways to improve the design. This type of simulation is an integral part of the design cycle and can reduce the need for costly destructive testing program. [7]

Raj Kumar G, Balasubramaniyam S, Senthil Kumar M, Vijayanandh R, Raj Kumar R, Varun S, "Crash Analysis on the Automotive Vehicle Bumper". In this article deals the crash investigation of Bumper for different materials using ANSYS Workbench. Bumper is a vital parameter which is used as safety protection for passengers from accidents by means of impact energy absorption from collision environment. The ultimate focus of this work is material optimization for Bumper by performing impact analysis with the help of ANSYS. The entire analysis process comprises of two stages, which are conceptual design of Bumper and preparation of Bumper for numerical analysis.

The optimization of this work is based on structural parametric results, in which total deformation, equivalent stress induced are primarily involved. The reference component's modeling process is completed by means of CATIA, and then the impact analysis is carried by ANSYS Workbench 16.2, in which the materials used for bumper are Steel and Glass fiber based composite with the constant boundary conditions [speed = 13.3 m sec-1]. Finally suitable material is finalized for car bumper. [8]

Woon Kim, Raul Arbelaez, Jack Jensen, "Impact of Speeds on Drivers and Vehicles — Results from Crash Tests". A series of crash tests requires an appropriate facility and specialized equipment, along with detailed preparation work for setup and execution. The test design includes a consideration of various parameters including but not limited to test type, impact speed, vehicle type, barrier type, and dummy type. This section presents the setup of each parameter for this study following the IIHS test protocol (IIHS, 2017) and the rationale for the selected setup. For this study, a moderate overlap frontal impact test was conducted following the IIHS test protocol version XVIII (IIHS, 2017) for all three tests, except we increased the impact speed in Tests 2 and 3. In this crash mode, 40% of the maximum width of the test vehicle crashed into a deformable barrier on the driver side with the forces concentrated on the driver side of the vehicle. Figure 1 illustrates the vehicle aligned with the barrier from the overhead view. This test setup simulates a head-on, partial-overlap crash between two vehicles of the same weight and size travelling at the same speed. [9]

Tejasagar Ambati, K.V.N.S. Srikanth & P. Veeraraju, "Simulation of Vehicular Frontal Crash-Test". This work reports on the simulated crash test of an automobile". The objective of this work is to simulate a frontal impact crash of an automobile and validate the results. The aim is also to alter some of the materials of the components with a view to reduce the forces experienced during the crash. Computer models were used to test the crash characteristics of

the vehicle in the crash. The model used here was that of a Chevrolet C1500 pick-up truck. The software used for the simulation is LS-DYNA. It is widely used by the automotive industry to analyse vehicle designs. It accurately predicts a car's behaviour in a collision. The results obtained by the simulation were then validated by comparing it with the test results of the same test performed by the NCAC (National Crash Analysis Centre).[10]

Giridhar Aramane, "ROAD ACCIDENTS IN INDIA – 2019". As per the Road Accident Report for 2019, a total number of 449,002 accidents took place in the country during the calendar year 2019leading to 151,113 deaths and 451,361 injuries. In percentage terms, the number of accidents decreased by 3.86 % in 2019over that of the previous year, while the accident related deaths decreased by 0.20 % and the persons injured decreased by3.86. The decline in road accidents, killings and injury reported during the calendar year 2019appear to have been a result of the Motor Vehicle Act implemented in States from September Ist2019 which focused on road safety and included, inter-alia, stiff hike in penalties for traffic violations as well as electronic enforcement. The other trends noted in 2019 were very similar to those recorded in the previous years. National Highways which comprise of 2.03 percent of total road network, continued to account for a disproportionate share of 35.7 per cent of deaths in 2019 pointing to need for improved enforcement and correctives to be put on National Highways. State Highways which account for3.01% of the road length accounted for 24.8 percent of deaths. Other Roads which constitute about95 % of the total roads were responsible for the balance 39% deaths respectively, and electronic monitoring of the same. [11]

Juncheng Yao 1, Bo Wang 1, Yujie Hou 1 and Liang Huang 2, "Analysis of Vehicle Collision on an Assembled Anti-Collision Guardrail". The result shows that the assembled anti-collision guardrail proposed in this paper can better change the trajectory of a moving vehicle and can prevent the vehicle from falling off the bridge. From the car body collision results, the assembled anti-collision guardrail for bridges proposed in this paper can reduce vehicle damage and can protect the driver effectively. From the analysis of the main girder stress on the bridge, an anti-collision guardrail installed on an existing bridge will not cause damage to the main girder during a collision. In order to study the influence of the four parameters on the anti-collision effect, we carried out a comparative calculation of multiple working conditions. The results show that the new type of assembled anti-collision guardrail has good protective performance under different working conditions. [12]

III. CONCLUSION

By studying all above references and literatures we have found that the virtual crash test will be the best suitable method for studying the impact on vehicle during crash and also the effect of collusion on the passenger cabin. There are also physical crash test is available but it will be more costlier, time consuming and can waste material, efforts. Most of the authors have discussed the failure effect of vehicle during crash and the strength improvement of vehicle. But the cost of crashing vehicle is also too high which can be reduced by using virtual; crash test.

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A Machine Learning Methodology for Diagnosing Chronic Kidney Disease

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ABSTRACT

Chronic kidney disease (CKD) is a global health problem with high morbidity and mortality rate, and it induces other diseases. Since there are no obvious symptoms during the early stages of CKD, patients often fail to notice the disease. Early detection of CKD enables patients to receive timely treatment to ameliorate the progression of this disease. Machine learning models can effectively aid clinicians achieve this goal due to their fast and accurate recognition performance. In this study, we propose a machine learning methodology for diagnosing CKD. The CKD data set was obtained from the University of California Irvine (UCI) machine learning repository, which has a large number of missing values. KNN imputation was used to fill in the missing values, which selects several complete samples with the most similar measurements to process the missing data for each incomplete sample. Missing values are usually seen in real-life medical situations because patients may miss some measurements for various reasons. After effectively filling out the incomplete data set, six machine learning algorithms (logistic regression, random forest, support vector machine, k-nearest neighbor, naive Bayes classifier and feed forward neural network) were used to establish models. Among these machine learning models, random forest achieved the best performance with 99.75% diagnosis accuracy. By analyzing the misjudgments generated by the established models, we proposed an integrated model that combines logistic regression and random forest by using perceptron, which could achieve an average accuracy of 99.83% after ten times of simulation. Hence, we speculated that this methodology could be applicable to more complicated clinical data for disease diagnosis.

Keywords: Chronic kidney disease (CKD), KNN, University of California Irvine (UCI), disease diagnosis

I. INTRODUCTION

Chronic kidney disease (CKD) is a global public health problem affecting approximately 10% of the world's population. The percentage of prevalence of CKD in China is 10.8% , and the range of prevalence is 10%-15% in the United States. According to another study, this percentage has reached 14.7% in the Mexican adult general population. This disease is characterised by a slow deterioration in renal function, which eventually causes a complete loss of renal function. CKD does not show obvious symptoms in its early stages. Therefore, the disease may not be detected until the kidney loses about 25% of its function. In addition, CKD has high morbidity and mortality, with a global impact on the human body. It can induce the occurrence of cardiovascular disease. CKD is a progressive and irreversible pathologic syndrome. Hence, the prediction and diagnosis of CKD in its early stages is quite essential, it may be able to enable patients to receive timely treatment to ameliorate the progression of the disease.

Machine learning refers to a computer program, which calculates and deduces the information related to the task and obtains the characteristics of the corresponding pattern. This technology can achieve accurate and economical diagnoses of diseases; hence, it might be a promising method for diagnosing CKD. It has become a new kind of medical tool with the development of information technology and has a broad application prospect because of the rapid development of electronic health record . In the medical field, machine learning has already been used to detect human body status , analyze the relevant factors of the disease and diagnose various diseases. For example, the models built by machine learning algorithms were used to diagnose heart disease , diabetes and retinopathy, acute kidney injury , cancer and other diseases. In these models, algorithms based on regression, tree, probability, decision surface and neural network were often effective. In the field of

CKD diagnosis, Hodneland et al. utilized image registration to detect renal morphologic changes. Vasquez-Morales et al. established a classifier based on neural network using large-scale CKD data, and the accuracy of the model on their test data was 95%.In addition, most of the previous studies utilized the CKD data set that was obtained from the UCI machine learning repository. Chen et al. used k-nearest neighbor (KNN), support vector machine (SVM) and soft independent modelling of class analogy to diagnose CKD, KNN and SVM achieved the highest accuracy of 99.7% . In addition, they used fuzzy rule-building expert system, fuzzy optimal associative memory and partial least squares discriminant analysis to diagnose CKD, and the range of accuracy in those models was 95.5%-99.6% . Their studies have achieved good results in the diagnosis of CKD. In the above models, the mean imputation is used to fill in the missing values and it depends on the diagnostic categories of the samples. As a result, their method could not be used when the diagnostic results of the samples are unknown. In reality, patients might miss some measurements for various reasons before diagnosing. In addition, for missing values in categorical variables, data obtained using mean imputation might have a large deviation from the actual values. For example, for variables with only two categories, we set the categories to 0 and 1, but the mean of the variables might be between 0 and 1. Polat et al. developed an SVM based on feature selection technology, the proposed models reduced the computational cost through feature selection, and the range of accuracy in those models was from 97.75%-98.5%.

II. LITERATURE SURVEY

- **Convolutional Neural Network for Paraphrase Identification.**

In [1] the new deep learning architecture Bi-CNN-MI paraphrase identification (PI). The PI compares two sentences on multiple levels of granularity. In this BI-

CNN means two CNN and MI is Multigranular interaction. They determine whether paraphrase roughly have the same meaning. They are closely related to NN for sentence representation and text matching. They are mainly based on Convolutional sentence model. The parameters of the entire model are optimized for PI. Use of language modeling task is to address the lack of training data. Results on the MSRP corpus surpass that of previous NN competitors. The Bi-CNN-MI can be used for sentence matching, question answering in future. The new deep learning architecture Bi-CNN-MI Paraphrase Identification (PI). The PI contemplates two sentences on various levels of granularity. They choose if rephrase by and large has a similar importance. The parameters of the considerable number of models are updated for PI. Usage of vernacular showing task is to address the nonattendance of planning data.

- **Machine Learning Techniques for Data Mining: A Survey**

In [2] they have compared machine learning algorithms like Decision Tree, Bayes algorithm, Support Vector Machine and Nearest Neighbor. These algorithms are used for classification mainly. They are used for predicting group membership for data instances. They provide a relative analysis of various algorithms. In data mining they extract the hidden predictive data from the large database. They have analyzed machine learning calculations like Decision Tree, Bayes algorithm, Support Vector Machine (SVM) and Nearest Neighbor. These figuring are used all together generally. They are used for anticipating group enlistment for data illustrations. They give a relative examination of various calculations. In information mining they remove the covered insightful data from the sweeping database.

- **Mining electronic health records: towards better research applications and clinical care.**

In [3] the clinical data demonstrate the categories and treatment of patients that represent the under used

data sources which are much greater in research potential than the currently which is realized. The potential of EHR (Electronic Health Record) is for establishing the new patients by revealing the unknown disease correlation. In EHR and mining of it a broad range of ethical, legal and technical reasons may hinder the systematic deposition. The potential for the medical research and clinical health care by using EHR data and the challenges which can be overcome before this becomes a reality. The capacity of Electronic Health Record (EHR) is for setting up the new patients by revealing the dark sickness connection. In EHR and its mining a sweeping extent of good, honest to goodness and particular reasons may keep the systematic declaration. The tele-health administrations are being used which are known as the tele-health cautioning organizations. They are generally used as a piece of metropolitan urban communities.

- **Optimal Big Data Sharing Approach for Tele-Health in Cloud Computing.**

In [4] the tele-health services are been used which are known as the telephone health advisory services. They are mostly used in metropolitan cities. Due to tele-health services the patients can get a help easily. Rapid increase in tele-health system has received various techniques like cloud computing and big data. They have proposed a dynamic programming to produce optimal solutions so that data sharing mechanisms can be handled. In this it considers the transmission probabilities, the timing constraints, and also the maximizing network capacities. Due to tele-health organizations the patients can get help effortlessly. A quick incremental in the tele-health structure has become diverse strategies like distributed computing and enormous information. They have a dynamic programming to make perfect game plans with the objective that data sharing frameworks can be dealt with. In this it contemplates the transmission probabilities, the arranging objectives, and moreover increasing as far as possible.

- **Recurrent Convolutional Neural Networks for Text Classification.**

In [5] for a content conclusion examination with jointed Convolutional Neural Network (CNN) and Recurrent Neural Network (RNN) engineering, taking the upsides of both like course grained neighborhood highlights features which are made by CNN and long-separate conditions learned by methods for the RNN. The provincial perpetual infection has been engaged.

- **Combination of Convolutional and Recurrent Neural Network for Sentimental Analysis of Short Texts**

In[6] consideration has been paid on both organized and unstructured information. It utilizes a maximum pooling layer that consequently judges, which words assume an essential part in content arrangement to catch the key segments in writings. The data contains in characteristics with missing data regards are basic in improving decision- making system of an affiliation. The learning procedure on every event is fundamental as it may contain a couple of remarkable learning. There are distinctive procedures to manage missing data in choice tree learning. The proposed credit figuring depends on the genetic count that uses space regards for that property as pool of courses of action. Survival of the fittest is the start of hereditary calculation. The health work is gathering precision of an event with credited a motivation on the decision tree.

- **Multiple Imputation of Missing Data with Genetic Algorithm based Techniques.**

The health work in [7] is gathering precision of an event with credited a motivation on the decision tree. The overall chase framework used as a piece of hereditary calculation is depended upon to get ideal arrangement. Our procedure reasonably melded zone finding out about the therapeutic portrayal of both ailment and EHRs into a data driven approach. Exploratory results on a certified dataset from a mending office showed the practicality of our

proposed procedure. Their approach merged endeavor relatedness, i.e., how every disease relates with others, appropriately, which incited an adjustment in the perceptive execution.

- **Learning text representation using recurrent convolutional neural network with highway letters.**

In [8] the joining of zone finding out about the helpful request of EHRs was also effective. Plus, the delayed consequences of the examinations of the malady particular judicious features not simply contained revelations relentless with existing therapeutic territory adapting, yet furthermore conveyed a couple of hypothetical proposition. Their strategy and results could be capable to update the perception of sickness specific settings and moreover to improve the insightful execution in mortality showing in intense healing center care.

- **Simultaneous modeling of multiple diseases for mortality prediction in acute hospital care.**

In [9] they join illness particular settings into mortality displaying by detailing the mortality forecast issue as a multi-errand learning issue in which an undertaking relates to an ailment. Our technique viably coordinates restorative area information relating to the similitude among illnesses and the likeness among Electronic Health Records (EHRs) into information driven approach by joining chart Laplacians into the regularization term to encode these likenesses. The test comes about on a genuine dataset from a healing facility support the viability of the proposed strategy. The Acute Hospital Care (AUC) of a few baselines was enhanced, including calculated relapse without multi-errand learning and a few multi-undertaking learning strategies that don't consolidate the area information. Moreover, we show some fascinating outcomes relating to disease specific prescient highlights, some of which are not just steady with existing medicinal area learning, yet in addition contain suggestive

theories that could be approved by facilitate examinations in the medicinal area.

- **Septic shock prediction for patients with missing data.**

In [10] Sepsis and septic shock are normal and possibly lethal conditions that regularly happen in Intensive Care Unit (ICU) patients. Early expectation of patients in danger for septic stun is hence significant to limiting the impacts of these entanglements. Potential signs for septic stun hazard traverse an extensive variety of estimations, counting physiological information assembled at various fleeting resolutions and quality articulation levels, driving to a nontrivial forecast issue. Past deals with septic stun forecast have utilized little, deliberately curated datasets or clinical estimations that may not be accessible for some ICU patients. The current accessibility of a huge, rich ICU dataset called MIMIC-II has given the chance to broader demonstrating of this issue. Be that as it may, such an extensive clinical dataset definitely contains a significant sum of missing information. We examine how extraordinary ascription choice criteria and strategies can overcome the missing information issue. Our outcomes demonstrate that attribution techniques in conjunction with prescient displaying can prompt exact septic stun expectation, regardless of whether the highlights are confined essentially to noninvasive estimations.

III. PROBLEM STATEMENT

A. Problem Statement:

In this section, we first design A Machine Learning Methodology for Diagnosing Chronic Kidney Disease.

B. Goals & Objectives:

The aim of the present study was to systematically review published economic models that simulated long-term outcomes of kidney disease to inform cost-effectiveness evaluations of CKD treatments.

IV. PROPOSED SYSTEM

A. Proposed Work:

An In the present study, a number of different ML classifiers are experimentally validated to a real data set, taken from the UCI Machine Learning Repository, and our findings are compared with the findings reported in the recent literature.

The results are quantitatively and qualitatively discussed and our findings reveal that the random forest (RF) classifier achieves the near-optimal performances on the identification of CKD subjects.

Hence, we show that ML algorithms serve important function in diagnosis of CKD, with satisfactory robustness, and our findings suggest that RF can also be utilized for the diagnosis of similar diseases.

System Architecture:
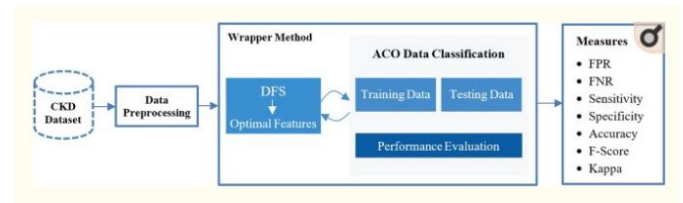
Fig.1 : System Architecture

V. METHODOLOGY

1. Machine Learning

Machine Learning is such a _eld which gives an ability to learn without being explicitly programmed. They mainly focus on the prediction. Statistics and Machine Learning are closely related fields. They can be divided into three categories: 1) Supervised Learning 2) Unsupervised Learning 3) Reinforcement Learning.

2. Healthcare

Healthcare is preserving or improving the health through prevention, diagnosis and treatment of that particular disease. Healthcare contributes beyond the delivery of services to the patients. It contributes to the part of country economy. It is

mainly regarded as to determine in promoting the physical and mental health around the world.

3. Naive Bayesian

The Naive Bayes is a classification technique based on the Bayes Theorem. They are easy to build and useful for large data set. It is even a highly sophisticated classification method. It is used to predict the multi-class prediction. It performs well for categorical input variables. Naive Bayes is a simple technique for constructing classifier: models that assign class label to problem instances, represented as vector of feature values, where the class labels are drawn from some finite set. The application is the real time prediction, text classification, multi-class prediction.

4. K Nearest Neighbor

The k-Nearest Neighbor stores all the cases and classifies new class based on the similarity measures. The output of k-NN is the class membership. The object is been classified on the basis of majority votes of its neighbors. The values of output are by averaging the values of its k nearest neighbor. It is a special case of variable bandwidth. They are used for both classification and regression. The neighbors are taken from the set of objects for which the class or the object property value is known. It is sensitive to the local structure of the data.

VI. CONCLUSION

The proposed CKD diagnostic methodology is feasible in terms of data imputation and samples diagnosis. After unsupervised imputation of missing values in the data set by using KNN imputation, the integrated model could achieve a satisfactory accuracy. Hence, we speculate that applying this methodology to the practical diagnosis of CKD would achieve a desirable effect. In addition, this methodology might be applicable to the clinical data of the other diseases in actual medical diagnosis. However, in the process

of establishing the model, due to the limitations of the conditions, the available data samples are relatively small, including only 400 samples. Therefore, the generalization performance of the model might be limited. In addition, due to there are only two categories (ckd and notckd) of data samples in the data set, the model can not diagnose the severity of CKD. In the future, a large number of more complex and representative data will be collected to train the model to improve the generalization performance while enabling it to detect the severity of the disease. We believe that this model will be more and more perfect by the increase of size and quality of the data.

VII. ACKNOWLEDGMENT

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Implementation on EEG Imaginary Decoding Using Fast RCNN

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ABSTRACT

Reducing the electrode pathways in the signal acquisition allows for the determination of computational burden models and the filtering out of extraneous sounds in Brain Computer Interface (BCI) devices. With the use of a Convolutional Gated Recurrent Unit, Differential Entropy plays a vital part in deducing emotions in signal components, which reveals the difference in region activity. This is a concept for extracting visible spectral signals with better feature signal recognition. The projection of DE and PSD impulses to two geographic data might be done first, followed by the selection of active channels in activation modes. Second, to fill in zero values, reconstructing of ID information signal sequences with four channels into the 3D characteristic signal matrix using radial fundamental function interpolation is utilised. The ID feature signal sequences will be input into such a Bidirectional Gated Recurrent Unit (BiGRU) circuit for temporal feature extraction, and the 3D feature signal matrices will be fed it in to a 2D Convolutional Neural Network (2DCNN) using U-NET model for spatial feature extraction. Finally, a convolution fuses the spatial and temporal features, and a DEAP dataset is used to conduct recognition studies depending on DE characteristic signals at various time scales. Various activation modes will be seen at different time scales, and the electrode channel will be reduced to obtain improved accuracy across all channels. The suggested automated CNN-LSTM ResNet-152 method will be recognised for its accuracy in recognising credible data in the field of human emotional analysis.

Keywords : Electroencephalography (EEG), BCI, Region- based Convolutional Neural Network (RCNN), CNN, Long Short- Term Memory (LSTM)

I. INTRODUCTION

In recent years, the EEG method has become increasingly important in identifying emotions, and it is currently employed in a variety of institutions to diagnose patients based on their brain waves. Electroencephalography (EEG) is a method of

recording electrical activity in the brain via electrophysiological monitoring.

Electroencephalography is the measuring and monitoring of electrical activity for diagnostic reasons, whereas electroencephalogram is a measurement of electric brain activity (brain waves) created by an electroencephalograph [1]. CNNs have achieved great accomplishments in the area of image categorization. Multi-channel Dataset are likewise two-dimensional, however the time as well as channel of EEG contain distinct units. Different from earlier CNN approaches using EEG data as pictures for classification, our methodology uses distinct time and space filters, and concentrates on the identification of time-related properties in Brain activity, which helps to increase the accuracy [2].

The measure to which such categorization is achievable reflects the intensity with which that component of the neural signal has been stored in the neuromodulator itself. For EEG, the spatial distribution of power in various frequency bands (or the raw EEG information) across electrodes is utilised to identify the task element under consideration [3]. An abnormal EEG indicates that there is indeed a problem with the activity of a certain part of the brain. This may provide a hint to the diagnosis of a variety of neurological diseases. More information may be found in the article 10 Disorders Diagnosed with an EEG. The use of EEG testing is a component in making a diagnosis [4].

EEG analysis is the process of extracting information using electroencephalography (EEG) data using statistical signaling analysis methods & computer technologies. EEG analysis aims to aid researchers in getting a greater understanding of the brain, physicians in diagnosing and treating patients, and to improve brain computer interface (BCI) innovation. When it comes to comprehending high-dimensional M/EEG brain data, "decoding" approaches have a great deal of promise [5]. When utilised to discriminate between different situations and map the temporal courses of various brain functions, from fundamental sensory processing through high-level cognitive processes, MVPA may be used to make accurate distinctions.

A normal EEG somehow doesn't rule out the possibility of a seizure. Approximately 50% of all EEGs performed on seizure patients are regarded as normal. An EEG test can be normal even if someone experiences seizures every week. Because the EEG only records brain activity during in the test, this is the case. The categorization of an EEG signal is a critical step in the process. It is possible to do this using the feature extraction process [6]. The feature values are sent into the classifier, which may then anticipate which class of classifier approach is being used as an input. There are a large number of parameters that must be taught in order to generate training data.

II. RELATED WORKS

For EEG MI classification, a multilayer scaled feature fusion architecture is based on CNN is utilised. Their technique demonstrates that different Neural network layers can recover some abstract features representations [7]. The resulting combined characteristics can increase overall classification accuracy whenever these extracted features are merged. When compared to other approaches, they produce good consistency for subject-specific data and have higher sensitivity [8].

Use CP-MixedNet in conjunction with the intensity data augmentation technique for EEG decoding of motor imagery. In the beginning, the CPMixedNet analyses the multi-channel EEG data by utilising the CP-Spatio-Temporal blocks before obtaining the spatio-temporal representation. When compared to current state-of-the-art methods such as FBCSP, deep ConvNets, and residual ConvNets, the proposed approach achieves much higher classification accuracy than these algorithms [9].

MI classification challenges were tackled using a 3D representation approach and a multi-branch 3D CNN. Experiments demonstrate that this framework may

perform well in MI classification techniques while also greatly increasing robustness [10]. With spectrally localised time-domain representation of multichannel EEG as input, a deep learning driven electroencephalography (EEG) -BCI system decodes hand motor images using deep convolution neural network architecture. The suggested design provides a considerable boost in overall classification accuracy of +6.47% [11].

The discriminative characteristics are chosen to improve the categorization of MI utilising multichannel electroencephalography (EEG) signals. The suggested method's assessment is built upon that MI classification model, which is used to implement BCI [12]. To improve effectiveness of MI task classification, subband CSP features are employed, and a neighbourhood component analysis (NCA)-based attribute selection approach is used to isolate the highly discriminative features.

The regularisation method is used in the Temporal-constrained Group Lasso EEGNet (TSGLEEGNet) algorithm, which is a convolutional neural network-based solution for the motor imagery BCI system. It's difficult to decode MI jobs inside the same limb [13]. Using CNN, EEGNet, LDA, and SVM classifiers, this research proposes to enhance hand MI task decoding within another limbs in a Brain Computer Interface [14].

To improve binary categorization of motor images, two sliding window approaches are presented (MI). The first, known as SW-LCR, estimates the longest consecutive repetition (LCR) of the prediction sequence for all sliding windows. The second, known as SW-Mode, calculates the modes of the all the sliding windows' prediction sequence [15].

To generate more transferable characteristics for merge motor imagery categorization, a dynamic concurrent domains adaptation neural network, dubbed DJDAN, was developed. Unlike standard EEG classification approaches, our DJDAN model used a generative model to extract discriminative features from start to finish [16]. To recover more transferable characteristics for cross-session gesture recognition categorization, a new dynamic joint domain adaption neural network, dubbed DJDAN, was developed. Unlike standard EEG classification approaches, our DJDAN model used a deep architecture that learns discriminative features from start to finish.

III. METHODOLOGY

According to the suggested theory, emotion is really the human brain's reaction to objective phenomena. Human emotions are complicated and changing in real life, hence study into emotion identification is critical for real-world applications. Many deep learning & machine learning algorithms have recently been widely used in the detection of emotions based on EEG data. The basis for the planned Unlike previous EEG decoding methods, our method's feature extraction and classification parts are optimised using same objective function, making it easier to find more acceptable features and improve EEG decoding accuracy.

This work attempts to propose an emotion identification system using pattern recognition & classification techniques in order to develop an intelligent man-machine interaction system that understands nonverbal information such as a user's purpose, emotions, and attachments.

The amplitude and frequency of electrical activity generated by the human brain are measured using human electroencephalography (EEG). The advantages of adopting EEG for experiment testing are that it is noninvasive, easy, quick, and economical. For the subjects, it is neither unpleasant, uncomfortable, nor time-consuming. It is easy to comprehend and interpret, and it can handle either numerical and categorical data. It takes minimum data preparation, and it can be validated using statistical tests. It also works well with huge datasets. It is resilient, which implies that it works well even if the real model wherein the data were created violates some of its assumptions.

3.1 CNN-LSTM ResNet 152

The CNN is used to categorise objects into K separate classes based on the set of criteria that are being used to train it. To categorise an object, the sum of the quadratic of the gap between both the item as well as the appropriate cluster is employed in conjunction with the relevant cluster.

Convolutional neural networks (CNNs, also known as ConvNets) are a form of deep neural network that is used to evaluate visual pictures in deep learning applications. They are also referred to as shift intact artificial neural networks and space intact artificial neural networks, depending on the shared-weight architecture of the convolution kernels that scan the convolution layer and the translation invariance qualities of the convolution kernels (SIANN). Only a few of the applications include video and image identification.

In the first step, deep features are retrieved from video frames to use a ResNet152 CNN architecture that has already been trained. In order to enhance depth, numerous layers of the DB-LSTM network are layered simultaneously in both forward backward passes, resulting in the learning of the sequential information contained in the frames. Typically, a pre - trained models CNN extracts the characteristics from our input picture using supervised learning. After being converted linearly, the feature vector is scaled to have the same size as the re - inserted of the RNN or LSTM network. This network is being developed as a lstm model using our feature vector as a training set.

Multilayer artificial neurons are normalised variations of convolutional neural networks. Typically, multilayer perceptrons are totally connected networks, which means that every neuron from one layer is coupled to all neurons in the next layer. Because of their "full connectedness," these networks are particularly susceptible to data overfitting. In addition to modifying weights when the error value is lowered, random cutting of connections is another regularisation approach that is often utilised. A different type of regularisation is used by CNNs: they take use of another person's design in data and utilise data that has been broken down into smaller patterns contained in the filters to generate patterns that become more complex. A direct outcome of this is that CNNs are located at the bottom of the connectedness and complexity spectrum. The list consists of the various components that will be used in the proposed system, in no particular order as shown in fig 1.
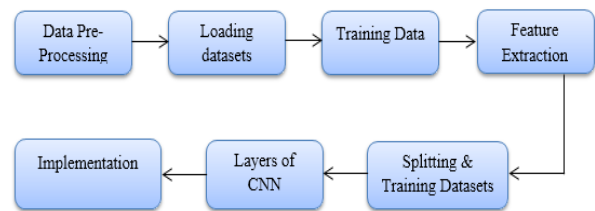
Fig.1. Architecture Diagram for Proposed system

a. Data Pre-processing

It is vital to note that data preprocessing may refer to the altering or dropping of information before it is utilised in order to assure or increase performance. It is a phase in the data analysis that should not be overlooked. It is possible to get inaccurate conclusions from data analysis if the data has not been thoroughly vetted for errors. As a result, before doing any analysis, it is essential to consider the representation and precision of the information. In data preprocessing, the raw data is prepared in such a way that it may be used by a machine learning algorithms without further processing. It is the first and most important stage in the process of developing a machine learning technique. When working on a machine learning program, it is not always the case that we will come across data that is clean and well-organized.

b. Feature Extraction

A method for extracting features for use in machine and deep learning. It is the process of changing raw converted into numerical characteristics that can be handled while maintaining the information included in the dataset that is referred to as feature extraction.

It produces better outcomes than implementing machine learning straight to raw data, which is the alternative. The feature Extraction approach provides us with new features that are a convolution of the current features, which we can use to create new features. When comparing the new set of features to the original set of features, it will be clear that the new feature set will have different values. The primary goal is to reduce the number of features necessary to collect the same amount of information.

c. Data augmentation

In data analysis, data augmentation refers to approaches that are used to expand the quantity of data available by adding slightly changed copies of the already current data or by creating new synthetic data from previously existing data. When building a machine learning model, it serves as a regularizer and aids in the reduction of overfitting. Using data augmentation, practitioners may dramatically enhance the variety of data accessible for training models without having to acquire any new data themselves. Cropping, filling, and horizontal tilting are examples of data augmentation methods that are widely employed to train massive neural networks in a single session.

d. Classification

Classification is a kind of predictive modelling task in machine learning in which a classifier is determined for a given sample of input data. The following are some examples of categorization problems: Consider the following sample and determine if it is trash or not. Determine if a handwritten character belongs to one of the recognised characters given the character. One of the most frequent tasks performed by machine learning techniques is the recognition of objects and the ability to categorise them. This process is known as classification, and it allows us to categorise large amounts of data into discrete values, i.e., separate, such as 0/1, True/False, or a pre-defined output label class, which can then be analysed further.

IV. IMPLEMENTATION PROCESS

i. Module for Dataset Collection

Machine learning systems need a large amount of energy, which is represented by data, in order to work properly. Our algorithms perform better because we have more classified data to work with. Through the use of a collection of 300 million photographs, Google tested the theory that further information leads to improved performance on a large scale. In order to improve the performance of a machine learning algorithms, it must be fed with fresh data on a consistent basis. During the age of machine learning, data is without a doubt the most valuable resource available.

ii. Dataset Splitting

The training data and the test data are two components of a dataset that are typically separated in machine learning. Data pre-processing is the process of cleaning and turning raw data into a clean and usable dataset. It is also known as data cleaning and conversion. Since the data is constantly received and gathered from multiple sources, it is essential that the data is both of acceptable quality and in a prescribed format first before model can be trained or learned from.

iii. Dataset of Pre-Processing Module

A cleaning operation that directly convert original data together into clean, well-structured dataset that may be used for future study is known as data pre-processing. Data is typically gathered and formatted in a certain manner well before the model is taught or trained with it. It must be of adequate quality and in a specific format. Using crucial data, this will help in the generation of more accurate outputs with more precision.

iv. Training with Algorithm

The Deep Belief Network is a statistical machine learning algorithm used it to train the dataset containing abusive comments on social media. Machine learning models involve a lot of data to perform, which is why the Deep Belief Infrastructure is a correlational machine learning algorithm used it

to train the dataset that contains abusive comments online.

When developing a machine learning model, the training set might include as many parameter's as text, photos, and data obtained from specific users of the service. While constructing a machine learning model, keep an eye out for overfitting.
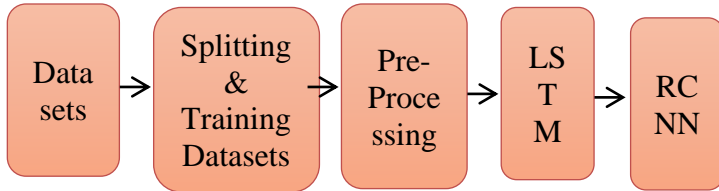
Fig.2. Implementation diagram

v. LSTM

When it comes to sequence prediction issues, LSTM networks are a kind of recurrent neural network that is capable of learning order dependence. Translation software, voice recognition, and other complex issues need the use of this talent. LSTMs, which are used in deep learning, are a difficult issue. The project must be installed on the required system after coding and testing. It is necessary to generate and load the executable file into the system. Implementation is the process of putting the created code into the system as an executable file.

vi. Fast RCNN

R-CNN is to address the challenge of efficient object localisation in object identification. Exhaustive Search, which employs sliding windows of various scales on a picture to suggest region recommendations, is used in the prior approaches. Instead, the Selective search technique is used in this study, which takes full advantage of object segmentation as well as Exhaustive search to rapidly select region recommendations.

V. EXPERIMENTAL RESULTS

This study gathered data from 20 participants, 10 males & 10 females.

Fig.3. Comparison with Algorithms

All of the participants were Shanghai Jiao Tong University undergraduates with normal hearing and eyesight, a dominant right hand, as well as a stable mental state who were solicited through social media.
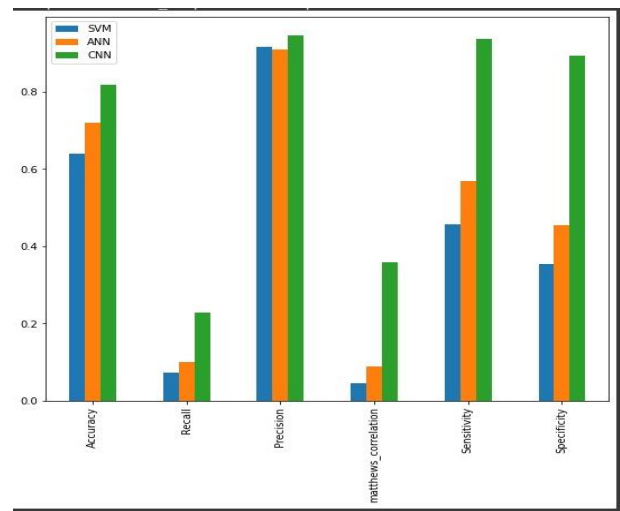
Fig.4. Graph comparison with existing algorithm

After declaring their willingness to engage in the study via social media, subjects will get an Eysenck EPQ personality exam.

VI. CONCLUSION

There is no general agreement on the optimal frequency for such an EEG signal in order to improve the performance of an emotion classification classifier. Human variables such as decreased concentration and increased fatigue have made it challenging to construct EEG datasets with a wide range of signal samples. The influence of extended stimulation media on people was not examined in this study. We want to look at datasets where the signals have varying durations between them but the same durations

inside them. That wasn't the case in the trials conducted in this work with the STEED and MAHNOB datasets. We contended that an EEG set of data suitable for emotion classification should have two attributes: the media stimulation used to extract emotions should be created similarly to the LIRIS-ACCEDE dataset (which comprises a set of publicly available media specimens and is evaluated by volunteers worldwide); and the digital stimulus should be long enough to affect the subjects.

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Uses of Technology among Preschoolers at Home

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ABSTRACT

Although the amount of time that preschoolers spend with screen media at home is continuing to increase, less is known about the types of media experiences children are having in preschool settings. This study was conducted to know the uses of Digital Technology among Preschoolers at homes. The sample consisted of 200 preschoolers of ECE Centers from Lucknow city. Self structured questionnaire were used for data collection. Frequency & percentage statistical tool were used for data analysis. The findings showed that majority of preschoolers uses Digital Technology at their homes.

Keywords : Screen media, Preschoolers, ECE centers, Digital Technology.

I. INTRODUCTION

Hands on Smartphone or tablet to a toddler, chances are they'll figure out how to open it and make some in-app purchases in a matter of seconds. The technological boom means that children are becoming computer experts at a very young age. Elementary school kids have classes on computers, and many of them have been using their computers and tablets at home well before they started school. As kids are learning from a very young age about technology, they're making huge strides as they grow in being prepared for schooling, future careers, innovation, and more. Your kids may even be able to help you with your online coursework at WGU!

"We live in an age of innovation, where digital technology is providing solutions to problems before we've even realized we needed them"-**David Lidington**

We live in a digital era where technology is at our beck and call.We have everything at our fingertips due to digital technology-"knowledge", "information", "research" you can find everything and explore anything with just a push of a button.

Even though the toughest of times, when finding a solution seems impossible we find it and it's all because of digital technology. Thebiggest example. Well, we are living it. Due to the corona virus pandemic and the ensuing lockdown, we have been confined to the four walls of our house but we didn't let that stop us from pursuing knowledge and continuing our education.

The concept of traditional education has changed radically; being tangibly present in a classroom isn't the only learning option anymore, not with the rise of

the internet and new technologies at least. Nowadays, you have access to a quality education whenever and wherever you want.

In an experiment, it was proven that a child was able to learn a topic better by using an interactive game rather than the teacher explaining it in class. Through engaging applications, children develop their hand-eye coordination further. Technology may provide basic skills in which children must have competency in order to be successful in school. Gaming and learning applications equip children to pay more attention to details in order to complete these activities. Let's use Role Playing Games (RPGs) for example. In RPGs, the child uses a character. In order to play, he has to move the character around while planning his next move. These simultaneous activities train children to pay attention to every detail on the screen in order to achieve the goals of the game. Interactive media can be used to explore children's talent. When children are exposed to music or writing exercises onscreen early on, parents may discover their children's interests and inclinations. Technology presents opportunities to present different activities children may eventually engage in. For those who live in the city and far away from the zoo, seeing a giraffe up close may be impossible. What about that newly discovered animal in the Pacific Ocean? With technology, your child can access multimedia presentations of the different types of animals, or even see various places around the world. Technology exposes children to things they can't see every day. Children then begin to understand that life is more than just the four walls of the home or classroom.

The digital revolution is shaping children's lives in profound ways. Children are early adopters and frequent users of the internet for communication, play, school work, access to information and expression. The digital world increasingly records children's choices and actions. How can we maximize children's well-being through the positive use of digital technologies while mitigating the risks of harm?

Many people have argued by saying during online classes many children disturb the decorum of the class and I would like to start by saying yes, I agree that it's a problem for children during online classes to disturb the decorum of the class or sometimes not even going to the class, yes I agree it's a problem, but to every problem there is a solution , and in this case the solution is again digital technology, nowadays in a lot of schools , it has been mandatory to turn on your mic and camera so the teacher knows that the student is not getting sidetracked or is losing attention from the topic going on, and then going on to how they might play music and make noise or do something to disturb the class, well the answer to this problem is just a phone call from the Childs parent's away and then addressing the topic of how sometimes students do not attend classes or just login and go ,well there are 2 solutions for this problem the first is how, it is now mandatory to keep your camera on, so the teacher knows you are in the class and the second solution is again phone call , you can just call the parent of the child to let them know what's going on.

Many people also argue by talking about social media and its negative effects on children, but again they are only telling us half of the story. There are also significant potential benefits social media can provide. It can create a sense of community and facilitate support from friends. It can encourage people to seek help and share information and resources. More frequent social media use has been associated with an improved ability to share and understand the feelings of others.

The reach, cost-effectiveness, and accessibility of social media mean information, support, or treatment can reach people who might not otherwise have easy access

Positive and Negative Effects of Technology on Children:

While there are many negative impacts that can be connected to technology use, there are many positive impacts as well.

- **Technology promotes creativity:**It indirectly encourages children to bring out their hidden artistic selves and helps them express in ways that they had never been able to do before.

- **Learning enhancement:** Technology in education enables children to adjust to their own pace of learning. It also frees up the teacher to help kids who need more support on an individual level.

- **Helping them learn**. There are many educational elements of technology that can help children learn. From TV programming to apps on a Smartphone or tablet, there are many things that children can be exposed to that can help develop their mind and teach them new things.

- **Classroom tool**. Many teachers have started using technology in classrooms to help students learn. Technology helps teachers reach different kinds of learners, reinforce and expand on concepts, and motivate students in new ways.

- **Preparing for future tech careers.** As technology continues to grow and flourish, there will be more demand for professionals ready to take on technology careers. When children start getting excited about technology and the potential it offers them from a young age, they're more prepared for their future and the possibilities it offers. Children can start getting technological skills early that they'll need in the future.

- **Improved multitasking.** Studies show that using technology helps young children learn how to multitask more effectively. While multitasking never allows you to fully focus on one area, students can learn how to listen and type to take notes, or other multitasking activities that can help them succeed in their future.

Now let's look at these negative effects that you need to be aware:

- Technology is making children addicted.
- Technology is making children socially disconnected.
- Technology is having unsuitable content for children.
- Technology is causing health problems in children.

Technology is providing great opportunities to children but also the **physical** and **mental health** of children is badly affected by the overuse of technology.

The youngsters spend hour's daily watching movies, cartoons and playing games which lead to the following physical and health problems

- Due to over usage of digital devices children are having problems regarding sleep patterns and unable to sleep well. The blue light emits from the screens that cause this sleeplessness.
- Due to hours of eye contact with digital screens and lights emit from them children suffering from weak eye vision.
- Children and youngsters cannot maintain good physical posture because of using digital technology too often
- Head, arm, and shoulder ache due to using devices in the wrong positions
- Weight gain and obesity resulting from no physical activities due to devices

How parents and adult can help:

Parents and adults can help children get the benefits of technology with less of the negative effects. Parents can start by ensuring children under two

don't use screens. They can also play along with children to include face-to-face interactions with technology, and make sure that tech doesn't interfere for opportunities to play. Parents should also work to set appropriate boundaries including time limits, and model good Smartphone use. Cyber security software and systems can help ensure that kids stay safe while using technology.

Objectives:

- To know the use of Digital Technology among Preschoolers at home.

Delimitation:

- The study will be delimited to the beginners of early childhood education centers.

II. Methodology

Research Design

Survey method will be followed to know the use of Digital Technology among Preschoolers at home.

Locale of study

The research will be conducted in the ECE (early childhood education) centers of Lucknow city, Uttar-Pradesh.

Sample size & Sampling method

In this study 200 preschoolers will be selected from ECE centers of Lucknow city. Random sampling technique will be adopted to select ECE centers for the sample.

Procedure of data collection

The investigator used survey method for the study. The data was collected in following steps:

- For the administration of tool the principal of ECE centers(12 ECE Centers) were contacted to get the permission.
- After getting the permission theself-structured questionnaire were given to the selected samples (parents of preschool children)
- The researcher made contact with the selected samples to get relevant information.

- For better understanding of the questions; certain questions were elaborate to them and essential instruction were given to them to fill the tool.

Then at last the filled tool was collected back.

Tool used for data collection:

Self-structured questionnaire were used for data collection.

Statistical Analysis:

The collected data were coded, classified according to the tool, to achieve the objective for the present investigation. Respondent score were analyzed by using statistical technique. The statistical techniques used to analyzed data were:

- Percentage
- Frequency

Statistics employed Percentage:

Percentage = $n/N \times 100$
Where, n= Frequency of respondent
N= Total number

III. RESULT AND DISCUSSION

Keeping the mind the objective of present researches this deal with analysis and interpretation of data. To facilitate analysis and interpretation various statistical techniques such as percentage, mean standard deviation etc. were used. The result has been presented in accordance with the specific objective of study.

Table. 1 : Uses of Digital Technology among Preschoolers at home.
N-200

S.No.	Technology access by child at home	Frequency &Percentage
1.	Television	97% (194)
2.	YouTube	89% (178)
3.	Smart phone	91% (182)
4.	Tablets	51.7% (103)
5.	Internet	76% (152)
6.	Videogames	79.9% (160)

Table was clearly reveled that majority of preschoolers access technology at their homes. In which 97% of children access the use of television, 89% of children use YouTube, 91% children access Smart phones, 51.7% children use tablets, 76% of children access the use of internet and 79.9% children play videogames.

IV. CONCLUSION

The result of the study revealed that this is a digital era where every child is influenced by technology. In this paper we can see that majority of children age 2 to 4 years uses technology at very early age. Technology is providing great opportunities to children but also the physical and mental health of children is badly affected by the overuse of technology. So we need to identify the right uses of technology in terms of screen time, applications etc. Parents and teachers can watch for quality apps that promote vocabulary, math, literacy, and science. Adults can help make sure kids learn about computer science and IT as part of technology use to give them opportunities for a bright tech future but the time should be strictly mentioned.

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Formulation, Development and Evaluation of Anti-Viral Microspheres Using Ionotopic Gelatin Method

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ABSTRACT

Objective: Maraviroc is a small-molecule drug that inhibits HIV-1 access through blockading the interplay among HIV-1 and the chemokine receptor CCR5 on host cells. Maraviroc through Ionotropic gelation approach through using sodium alginate as mucoadhesive polymer in diverse proportions for keeping the dosage shape continue to be in location of absorption site for prolonged time period to deal with HIV contamination and to keep away from first pass metabolism. Maraviroc is an antiretroviral drug which can exactly manipulate viral load in HIV/AIDS patients. Maraviroc publicity is altered through sellers that modulate the interest of CYP3A4 and, in a few circumstances, maraviroc dose adjustment is necessary.

Results - The optimal maraviroc microspheres had particles size of 434.82 um , Mucoadhesion of 93.3% and encapsulation efficiency 92.80% . The satisfactory batch F9 exhibited drug entrapment performance of 84.22%, and the drug launch from the microspheres become additionally sustained for extra than 10 hrs (96.48%). There have been no compatibility problems and the crystallinity of maraviroc drug become observed to be decreased in prepared maraviroc mucoadhesive microspheres, which have been showed via way of means of IR, DSC and XRD studies .The Stability of Maraviroc mucoadhesive microspheres become decided in 40℃/75% RH; it become observed that each Maraviroc and mucoadhesive microspheres have been strong in 40℃/75% RH for three months.

Conclusion - The sodium alginate primarily based totally mucoadhesive microspheres have been organized through Ionotropic gelation technique for the managed release of maraviroc . Drug release observed the anomalous delivery and tremendous case-II delivery mechanism. Thus, it could be concluded that successfully designed to give controlled drug delivery, minimizing the drug related side effects and improved oral bioavailability.

Keywords : Maraviroc , Mucoadhesion , Iontopic Gelatin , Microspheres And Sodium Alginate

I. INTRODUCTION

Maraviroc, an inhibitor of the interplay among the chemokine receptor CCR5 and HIV-1 gp120, become accredited for remedy of sufferers already experiencing virologic failure due to resistance to different antiretroviral sellers.

A new magnificence of antiretroviral sellers that objectives a number protein, the chemokine receptor CCR5, in preference to a viral goal. Binding of maraviroc to this mobileular-floor protein effects in blockading human immunodeficiency virus kind 1 (HIV-1) attachment to the coreceptor and stops the virus from getting into CD4+ cells. Inhibition of viral access isn't a brand new concept. It is, after all, one of the precept mechanisms of viral inhibition via way of the obtained immune reaction to contamination, and viral access is the step in viral lifestyles cycles that vaccine-brought about antibodies are designed to block. Therefore, inhibition of viral access become a logical goal withinside the case of HIV-1.

When the CD4 receptor become decided to be the number one receptor for HIV-1 binding to CD4+ cells in 1984 [1], there have been severa tries via way of researchers and the pharmaceutical enterprise to increase inhibitors of the binding step. It become obvious from experiments with hybrid murine cells expressing human CD4+ cells that CD4+ mobileular binding on my own did now no longer bring about viral access into cells and that every other step become necessary [2]. The coreceptors CCR5 and CXCR4 have been found some years later via way of 2 distinct studies groups [3, 4]. These chemokine receptors have been the lacking piece of the puzzle that defined viral access into CD4+ cells, and blockading those cells with their herbal ligands (MIP-1α, MIP-1β, and RANTES for CCR5; SDF-1 for

CXCR4) led to profound inhibition of HIV-1 contamination in vitro [5]. Because CCR5 is utilized by almost all viral isolates located in new or early infections and is gift in the course of the direction of >50% of infections, this coreceptor supplied a ability vulnerability withinside the viral lifestyles cycle. An attempt to locate powerful inhibitors of the interplay among the viral envelope and CCR5 become for that reason released via way of numerous pharmaceutical companies. The maximum a hit of those efforts led to the medication maraviroc, vicriviroc, and aplaviroc.

Mucoadhesion has been a subject of hobby for remaining a long time withinside the layout of drug transport structures to lengthen the house time of the dosage shape on the site of software or absorption [1].Mucoadhesive micro provider structures using bioadhesive assets of a few polymers, which come to be adhesive on hydration, and therefore may be used for localizing the bioactives to a selected place of gastrointestinal tract for prolonged durations of time[2, 3]. Bioadhesioc is an interfacial phenomenon wherein one can be artificial or organic macromolecules and 2d substances is organic floor (epithelial tissue or the mucus coat at the floor of tissue) are held collectively by interfacial forces, while the related organic floor is mucin layer of a mucosal tissue, it's miles referred to as mucoadhesion. Mucoadhesive microspheres transport machine is an appealing concept, because of their capacity to stick to the mucosal floor and launch the entrapped drug in a sustained manner. Mucoadhesive microspheres have blessings like green absorption, stronger bioavailability of the bioactives because of excessive floor to extent ratio, a whole lot greater intimate touch with the mucin layer of a mucosal tissue and placement unique concentrated on of the bioactives to absorption webweb page may be performed via

way of the use of appropriate plant lectins, micro organism and antibodies at the floor of mucoadhesive micro carriers .

II. MTHOD AMD METHODOLOGY

Method –

The maraviroc mucoadhesive microspheres was successfully developed by Ionotropic gelation technique, using sodium alginate, pectin, HPMC as mucoadhesive polymer in various proportions in combination. Further, the prepared maraviroc mucoadhesive microspheres were characterized for particle size, morphology, micrometric studies, entrapment efficiency, mucoadhesion . Fourteen batches of Maraviroc loaded mucoadhesive microspheres had been formulated to research the impact of certain method variables, including special crosslinking agent (Ca chloride, barium chloride, aluminium sulphate), Maraviroc to sodium alginate polymer ratio (0.5, 1, 1.5 and 2), attention of cross-linking agent (five,10 and 15%), curing time (15, 30 and 60 min),Maraviroc ratios (0.5, 1.0 and 1.5) and stirring rate (200,400 and 600 rpm) at the suggest particle size, yield, drug entrapment efficiency, mucoadhesion , percent swelling index and in-vitro drug release.

1. PREPARATION OF MARAVIROC MUCOADHESION MICROSPHERES

The Maraviroc mucoadhesive microspheres have been organized through ionotropic outside gelation method the composition of the numerous Maraviroc mucoadhesive microspheres formulations have been referred to in Table1. Maraviroc and sodium alginate polymers have been in my view handed thru sieve $\neq$ 60. The required portions of sodium alginate have been dissolved in purified water to shape a homogenous polymer answer. The drug maraviroc became brought to the polymer answer and combined very well with a stirrer to shape a viscous dispersion. The ensuing dispersion became sonicated for 30 min to put off any air bubbles. The bubble unfastened

dispersion became then brought manually drop smart into crosslinking ion answer the use of polyethylene syringe (needle length 22 G) and stirred at 200-six hundred rpm.Fourteen batches of Maraviroc loaded mucoadhesive microspheres have been organized to research the impact of sure formula and procedure variables, inclusive of exclusive crosslinking agent (Calcium chloride, barium chloride, aluminium sulphate), Maraviroc to polymer ratio (zero.five, 1, 1.five and 2), awareness of move-linking agent (five,10 and 15%), curing time (15, 30 and 60 min),Maraviroc ratios (zero.five, 1.zero and 1.five) and stirring fee (200-six hundred rpm) at the imply particle length, yield, drug entrapment efficiency, mucoadhesion and in-vitro drug launch. The received microspheres have been amassed through decantation, washed again and again with distilled water and dried at 45°C for12 hour .

Determination   of   Optimum   Cross-linker Concentration

Serial concentrations i.e. five%, 10% ,15% w/v, of move linker answer (aluminum sulphate) have been organized and used to formulate   maraviroc mucoadhesive microspheres whilst preserving sodium alginate awareness, curing time and stirring pace at constant values i.e. 1:1 drug polymer ratio,30 min curing time and four hundred rpm respectively .

1.1 Determination Of Optimum Curing Time

Different cross linker solution 1 i.e. calcium chloride, barium chloride and aluminum sulphate have been organized and used to formulate maraviroc mucoadhesive microspheres whilst preserving sodium alginate awareness, move linker awareness, curing time and stirring pace at constant values i.e. 1:1 drug polymer ratio, 10percentw/v move linker awareness, 30 min curing time and four hundred rpm respectively [13].

1.2 Determination Of Optimum Curing

The Sodium alginate, drug Maraviroc 1:1 ratio have been combined and stirred properly, until

217

homogenous answer formed. This answer became brought drop smart to move linker answer (i.e. aluminum sulphate 10% w/v) the use of polyethylene syringe (needle length 22 G) and stored for 15, 30, 60 mins in cross linking solution whilst preserving move linking agent awareness, sodium alginate polymer awareness, and stirring pace at constant values i.e. 1:1 drug polymer ratio, 10percentw/v move linker answer and four hundred rpm respectively [14

1.3 Percentage Yield

The percent yield of Maraviroc microsphere became calculated through weighing after drying. The weight of dried microspheres (W1) became divided through the entire quantity of all preliminary dry weight of beginning materials (W2) used for the practise of the Maraviroc microspheres, which gave the entire percent yield of Maraviroc microspheres [18].

1.4 Particle Size

Particle length of the Maraviroc micro debris became decided through the use of an optical microscope approach and the imply particle length became calculated through measuring 50-a hundred debris in every batch with the assist of a precalibrated ocular micrometer. The imply Maraviroc microspheres particle length and widespread deviation values have been calculated and reported [19].

1.5 Morphology Of Microspheres

The floor morphology and form of the Maraviroc microspheres became tested through scanning electron microscopy. The pattern became established directly to an aluminum stub and sputter-lined with platinum debris in an argon atmosphere [20].

1.6 Drug Entrapment Efficiency

the quantity of drug entrapped became anticipated through crushing 100mg of maraviroc mucoadhesive microspheres and extracting with a hundred ml of zero.1 N HCl for twenty-four hr in rotary shaker. The answer became filtered and the absorbance became measured after appropriate dilution spectrophotometrically (LABINDIA UV-3092 PC) at 210 nm in opposition to zero.1N HCl as a blank. The quantity of Maraviroc entrapped withinside the Microspheres became calculated through the subsequent formula [21].Percentage entrapment efficiency = Observed Drug Content x a hundred /calculated drug content .

Table 1 : Kinetic parameter of Maraviroc mucoadhesive microspheres

Formulation code	Zero Order	First Order	Higuchi	Korsemyer pepas	n - value	Hixson Crowell
F1	0.950	0.886	0.972	0.977	0.811	0.742
F2	0.966	0.728	0.977	0.983	0.847	0.555
F3	0.985	0.790	0.967	0.985	1.004	0.601
F4	0.976	0.875	0.981	0.989	0.885	0.666
F5	0.989	0.637	0.968	0.986	1.047	0.420
F6	0.985	0.747	0.976	0.989	0.947	0.509
F7	0.988	0.800	0.965	0.980	1.030	0.566
F8	0.934	0.913	0.966	0.973	0.778	0.766
F9	0.992	0.669	0 .966	0.987	1.110	0.405

218

F10	0.990	0.743	0.952	0.983	1.208	0.575
F11	0.991	0.626	0.95	0.983	1.169	0.368
F12	0.978	0.662	0.981	0.985	0.834	0.492
F13	0.990	0.806	0.969	0.982	1.065	0.523
F14	0.982	0.637	0.975	0.983	0.851	0.477

1.7 Swelling Study of Microsphere

A 100mg of Maraviroc mucoadhesive microspheres from every batch became located in 500ml of zero.1 N HCL and allowed to swelled for the require length of time, at 37± zero.50C the use of USP dissolution equipment 2 at 100rpm.The Maraviroc microparticles have been eliminated each hour c programming language up to eight hour, blotted cautiously with clear out out paper and their modifications in weight have been measured at some stage in the swelling till equilibrium became received [22]. Finally, the swelling ratio (SR) of every microsphere formula became calculated in step with the subsequent equation

SR= (We-W0)/W0

Where W0 is the preliminary weight of the dry Maraviroc microparticles and We is the load of swollen Maraviroc microparticles at equilibrium swelling withinside the media.
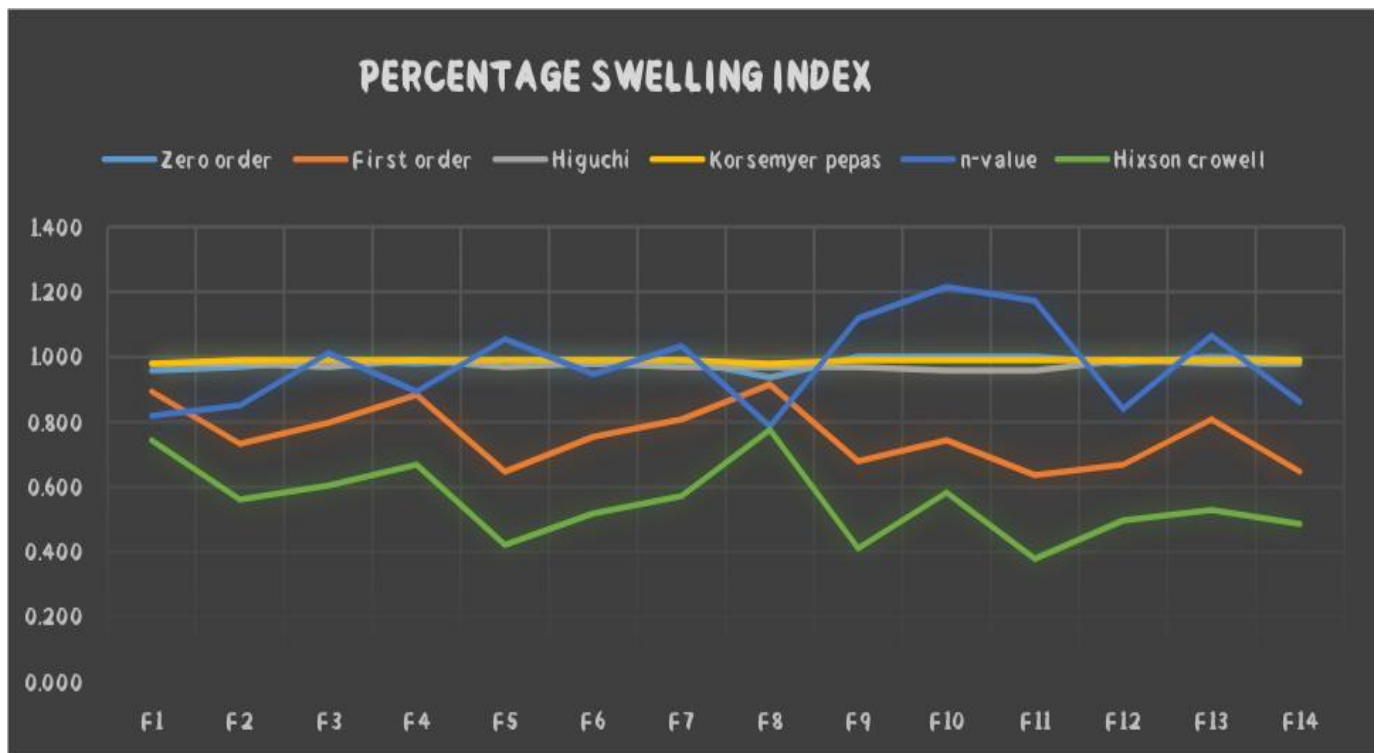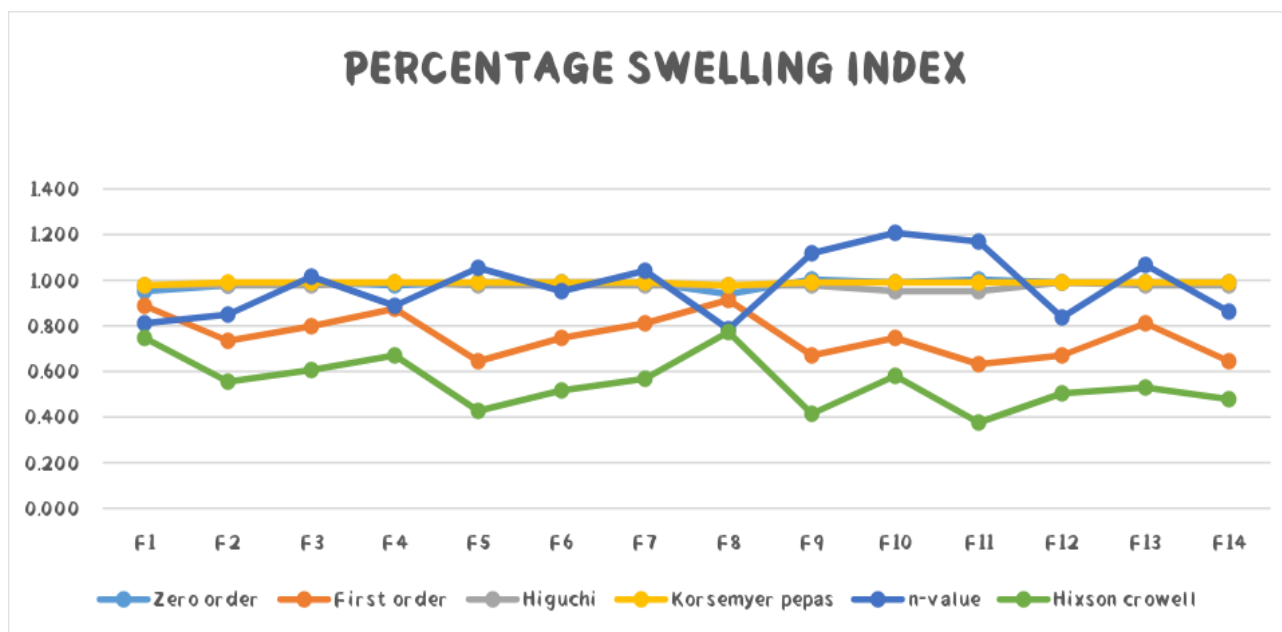
1.8 Mucoadhesive Test

The mucoadhesive assets of Maraviroc microspheres became evaluated through in vitro wash off check. A Piece of goat intestinal mucosa became tied at the glass slide the use of a thread. About a hundred microspheres have been unfold onto every moist rinsed tissue specimen and at once consequently the assist became hung onto the arm of USP disintegration equipment. Now working the disintegration check machine, the goat intestinal mucosa became given a sluggish everyday up and down motion in 900ml of zero.1N HCL buffer at 37±zero.50C. At the quit of one hr and at hourly periods up to eight hrs the gadget became stopped and the wide variety of Maraviroc microspheres nevertheless sticking onto the intestinal mucosa became counted [23].Percent mucoadhesion became calculated through the the use of following fformul % MUCOADHESION = (No. of particle stays on mucosa/ No. of implemented microsphere) ×a hundred

1.9 In Vitro Dissolution

The in vitro dissolution research of organized Maraviroc microspheres have been achieved the use of USP kind II (paddle) dissolution check equipment. Weighed quantity of Maraviroc loaded microspheres have been delivered into 900 ml dissolution medium of zero.1N HCl for eight hrs at 37±zero.five°C at a rotation pace of fifty rpm. 5ml of aliquots have been withdrawn at predetermined time periods and an equal extent of clean zero.1N HCl became changed to hold extent constant. The samples have been analyzed spectrophotometrically at 210 nm after appropriate dilution to decide the Cumulative percent of Maraviroc launch [24]. Release kinetic and mechanism of Maraviroc drug launch the Maraviroc launch facts from all of the mucoadhesive microspheres formula have been geared up in numerous kinetic fashions like 0 order; first order, Higuchi's version and korsemeyer- peppas equations to decide the corresponding launch fee and mechanism of drug launch. A criterion for choosing the exceptional match version became primarily based totally on goodness of match, excessive R2(regression coefficient) value [25].

2.0 Stabillity Dissolution

To determine the Maraviroc and mucoadhesive formula balance,improved balance research have been carried out in step with ICH guidelines.The optimized mucoadhesive microspheres formula (F9) became decided on for balance have a look at on the idea of in vitro drug dissolution research; drug entrapment efficacy and invitro wash off check. In the investigation, balance research have been achieved at 40 ± 20C/ 75 ± five% in closed excessive density polyethylene bottles for three months. The samples have been eliminated each month interval up to three months and evaluated for bodily modifications, drug launch, entrapment efficiency,at some stage in the stableness research [28].

III. RESULT AND DISCUSSION

Maraviroc loaded mucoadhesive microspheres were prepared by ionotropic gelation technique employing calcium chloride, barium chloride and aluminium sulphate as cross linking agent. The obtained Maraviroc microspheres were discrete, spherical in shape and freely flowing. The percentage yield of the different alginate mucoadhesive microsphere formulations were found to be 87.96% for calcium-alginate microspheres and 87.13 % for Barium alginate and 87.25% to 92.75 % for aluminium alginate (Table 2). It was observed that as the Maraviroc to sodium alginate concentration increases, the product yield also increases .The particle size were found to be 730.67 ± 13 μm for calcium-alginate microspheres and 715.33 ± 14μm for barium-alginate microspheres whereas in case of aluminium-alginate, particle size were found within the range of 642.33 ± 36μm to 806.67 ± 38μm respectively. The mean particle size of the prepared Maraviroc Microspheres in presented in Table 2.

Table 2 : Results of in vitro wash off test in 0.1N hydrochloric acid

F1	92 ± 1.53	72 ±2.52	60 ± 2.08	47 ± 1.53	38 ± 2.52	25 ± 2.08	12 ± 1.53	2 ± 0.58
F2	94 ± 0.58	73 ± 2.08	61 ± 1.53	50 ± 0.58	42 ± 1.53	30 ± 2.52	19 ± 1.53	5 ± 0.588
F3	96 ± 1.53	75 ± 2.08	61 ± 2.52	55 ±3.51	51 ± 2.52	31 ± 1.53	22 ±2.52	6 ± 1.53
F4	97 ± 0.58	64 ± 2.52	32 ± 3.06	29 ±2.08	21 ± 2.52	03 ± 2.08	0	0
F5	95 ± 1.53	73 ± 2.52	58 ± 2.08	45 ± 3.51	33 ± 2.52	21 ± 1.53	16 ± 2.52	3 ± 2.08
F6	94 ± 2.52	56 ± 3.06	28 ± 3.51	14 ± 3.06	06 ± 2.08	03 ± 2.31	0	0
F7	97 ± 1.53	80 ± 4.51	73 ± 3.51	45 ± 2.52	32 ± 1.53	25 ± 2.52	17 ± 1.53	4 ± 0.57
F8	91 ± 2.52	56 ± 3.06	38 ± 3.51	23 ± 3.06	15 ± 3.21	06 ± 2.65	0	0
F9	97 ± 1.53	86 ± 2.52	74 ± 2.89	64 ± 3.06	55 ± 3.06	45 ± 2.52	34 ± 3.06	25 ± 2.52
F10	99 ± 0.58	94 ± 2.08	86 ± 3.06	78 ±.08	62 ± 2.52	54 ± 1.53	43 ± 2.08	37 ± 2.52
F11	96 ± 1.53	82 ± 2.52	74 ± 3.51	64 ± 2.52	56 ± 3.06	41 ± 3.51	35 ± 2.08	20 ± 2.52
F12	92 ± 2.52	63 ± 3.51	45 ± 2.52	34 ± 1.53	26 ± 2.08	17 ± 25.6	03 ± 1.53	0
F13	95 ± 2.52	72 ± 2.08	60 ± 2.52	51 ± 3.51	45 ± 3.06	27 ± 2.08	13 ± 2.52	2 ± 1.15
F14	97 ± 1.53	78 ± 3.06	67 ± 1.53	57 ± 2.52	50 ± 3.21	35 ± 3.51	29 ± 2.08	11 ± 1.53

2.2 Release Behavior

The Maraviroc release behavior of alginate mucoadhesive microspheres, produced by ionotropic internal gelation with different cross-linking agents depend upon the valency and size of the cations of the respective cross-linking agent. Their release profiles in 0.1N HCl pH 1.2 were depicted in Figure 1-2. Calcium alginate and barium-alginate microspheres (F1 and F2) were able to sustain the maraviroc release up to 8 hours whereas aluminiumalginate microspheres were able to sustain the drug released up to 10 hours. It has been observed that calcium, barium-alginate microsphere showed comparatively rapid Maraviroc release as compared to aluminium-alginate formulations. The results obtained can be explained on the basis of the extent of cross-linking in the microspheres. $Ca2+$ and $Ba2+$ being divalent, form two-dimensional bonding structure with sodium alginate inside the alginate matrices. But since $Ba2+$ has the largest size as compared to the other two cations ($Ca2+$ and for $Al3+$), it is expected to form strong alginate mucoadhesive microspheres with smaller voids and low water uptake. Therefore, the exchange of larger $Ba2+$ in the microspheres with $Cl+$ of dissolution medium (Hydrochloric acid, pH 1.2) and also their removal was hindered, thus resulting in delayed swelling where as in case of $Ca2+$ alginate microspheres, the smaller size of $Ca2+$ as compared to $Ba2+$ ensure rapid removal of $Ca2+$ from the microspheres due to ion exchange process with $Cl+$ of hydrochloric acid buffer medium and thus leading to greater water uptake and rapid release In case of $Al3+$ alginate Maraviroc microspheres, the delay was due to the capacity of $Al3+$ ion to form three-dimensional bonding structure with the sodium alginate inside the mucoadhesive microspheres. This strong three dimensional bonding results in an extended cross linking throughout the mucoadhesive microspheres, producing hard alginate mucoadhesive microspheres with low water uptake and thus leading to slow removal of $Al3+$due to ion exchange with $Cl+$ in the hydrochloric acid. As a result, the swelling of the microsphere are delayed leading to slow disintegration as well as slow dissolution. Consequently increasing the concentration of alginate and $Al3+$ ion as cross-linking agent, prolonged the maraviroc release was observed up to 10 hours because alginate could form more rigid coat with trivalent ($Al3+$) ion as compared to divalent ($Ba2+$).The order of decreasing Maraviroc release rate observed with different cross linking agents was as follows

Aluminum sulphate > Barium chloride > Calcium chloride

Drug release kinetic data for maraviroc mucoadhesive microspheres was shown in Table No. 1. All the formulations (F1 to F14) follow zero order release kinetics with regression values ranging from 0.950 to 0.992. All the formulations were subjected to KorsmeyerPeppas plots, 'n' value ranges from 0.811 to 1.208 indicating that the maraviroc drug release was from the microspheres followed the anomalous transport and super case-II transport mechanism
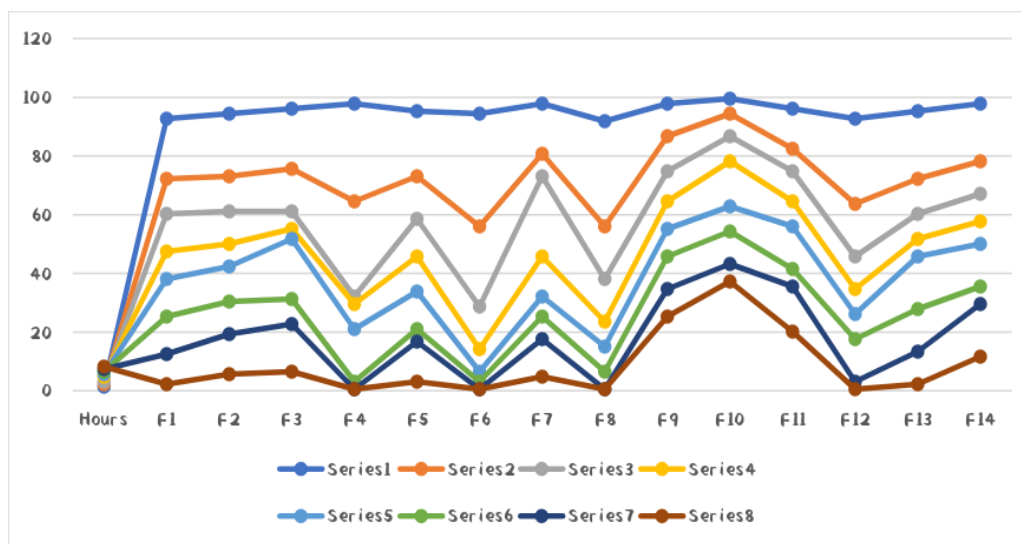
Fig. 4: Swelling behavior of formulation F8 to F14 in 0.1 N HCL

IV. CONCLUSION

The sodium alginate based mucoadhesive microspheres were prepared by Ionotropic gelation method for the controlled release of maraviroc. The swelling of microsphere and drug release depends upon the polymer concentration and extent of crosslinking in the polymer matrix. The effect of polymer, cross linking agent and its concentration and curing time on in vitro release of sodium alginate mucoadhesive microspheres was well investigated. The results show that as the concentration of sodium alginate and cross linking agent increases, entrapment efficiency increases and Maraviroc release rate decrease. Drug release followed the anomalous transport and super case-II transport mechanism. Thus, it can be concluded that this technique could be used to prepare multiparticulate drug delivery system for oral controlled release of Maraviroc.

V. ACKNOWLEDGMENT

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Effect of Camphor and Patchouli Oil to Control Fruit Fly Pest (*Bactrocera* sp.) on Chillies (*Capsicum annum* L.)

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ABSTRACT

Fruit flies are the main pests on chili plants that are very difficult to control. These pests greatly affect the production of chili plants by attacking the fruit. Fruit fly pest attacks can result in yield losses of about 23%-60% and can even cause crop failure. Controls that are often carried out today are chemical control, chemical control in the long term can cause environmental damage, pest resistance and pest resurgence. One of the environmentally friendly controls is the use of camphor compounds and patchouli oil which are able to resist the arrival of fruit fly pests without any pesticide residues in agricultural products. The results showed that 1.5 ml of camphor, 1 ml and 1,5 ml of patchouli oil were repellent so that they could be used as an alternative to control fruit fly pests on chili plants.

Keywords : Fruit fly, Camphor, Patchouli Oil, Repellent.

I. INTRODUCTION

Capcisum annum is a leading horticultural commodity in Indonesia which is rich in anti-oxidant compounds and is believed to be able to protect the body from free radicals. Cultivation of chili plants is always a decrease in crop production. This is influenced by several factors, among others, farmers who generally still use varieties with low yield potential, inadequate technical implementation, and disease disorders. Meanwhile, the obstacle in the field that greatly affects production and quality decline is the disturbance of fruit fly pests [1].

Fruit fly pests can cause yield losses of about 23%-60% [2]. One species of fruit fly that is known to be very destructive is *Bactrocera* sp. Symptoms are seen on the fruit stalk, the tip of the fruit and the center of the young chili fruit will turn yellow. If the attack occurs at the base of the fruit (close to the fruit stalk) usually the stalk will turn yellow and the fruit will fall before the fruit fly eggs hatch. Attacks on the tip of the fruit and the center of the fruit cause the chilies to turn yellow and rot and slightly wet. If you pay attention to the infected fruit, there are black dots / small holes punctured by the ovipositor of the female

fruit fly. If split open, inside the fruit there are small fruit fly larvae like white caterpillars.

Some of the controls that have been carried out to control fruit flies are the use of methyl eugenol attractant compounds and the application of chemical pesticides. However, the use of chemical pesticides at the farm level is sometimes excessive so that it can leave residues on chili peppers and damage the environment, while the use of attractants is also not effective because it only attracts male fruit flies. One of the fruit fly control techniques that is easier, safer and quite effective in suppressing the fruit fly pest population is to use a pungent-smelling compound that can make insects refuse to come on chili plants. Some compounds that are repellent and easily available are camphor and patchouli oil. Camphor is a substance derived from the camphor tree whose wood and leaves are steam distilled to obtain essential oils, contains terpenoids with the chemical formula $C_{10}H_{16}O$, also contains volatile naphthalene (smelling smelling) compounds that can help repel insects.

Patchouli plants contain essential oils which are commonly used in various industries of perfume, cosmetics, pharmaceuticals, essences, and others. Patchouli, vetiver and citronella oils have the ability and function as pesticides (pesticide power) so that they can be used as insect repellents [3]. The use of patchouli oil as an active ingredient in the manufacture of insecticides is due to the presence of secondary metabolite compounds that stimulate chemoreceptors so that insects do not like it.

II. METHODS AND MATERIAL

Research Design

This research was carried out using a Separate Plot Design (RPT), namely the repellent type (P) as the main plot consisting of two levels, namely: P1: Camphor and P2: Patchouli Oil. Various volumes of repellent species (A) as sub-plots consisted of 4 levels,

namely A0 : Control, A1 : 0.5 ml, A2 : 1 ml, A3 : 1.5 ml.

Preparation of Repellent

Camphor compound as much as 100 grams is mashed then soaked in 100 ml of water, then allowed to stand for 24 hours so that the pungent smell of camphor can come out (Every given). Meanwhile, 300 ml of patchouli oil (3 times given) was obtained from the distillation of the patchouli plant belonging to the farmer.

Repellent Containers

Containers are made of plastic clips measuring 7 x 10 cm, then a small hole is made using a pin with the aim of removing the pungent smell of camphor and patchouli oil, then filled with cotton measuring 5 x 6 cm to store/ absorbs camphor soaking water and patchouli oil.

Installation of Repellent

Repellent from camphor and patchouli oil was injected into the plastic containing cotton after the volume of each treatment. The plastic repellent is hung around the plant by clipping/gluing the plastic to the rope beside the chili plant with each repellent distance of 1 meter and a height of 1 meter from the plant surface so that the aroma can repel fruit flies. Subsequent administration was carried out at an interval of 7 days.

Research Parameters

The observation parameters in this study were the percentage of fruit fly attacks on curly chili plants and the types of fruit flies that attacked curly chilies at the research site.

III. RESULTS AND DISCUSSION

The type of fruit fly that attacks curly chili plants in the study area is *Bactrocera dorsalis* (Figure 1) which has characteristics on the thorax of the scutum which

is reddish brown and black in color and transverse bands on each side of the tip of the scutellum. A narrow costal band that descends at the end of the R and the anal line is very narrow, the abdomen has a black line that runs across terga II, a black line that runs along terga III (1), a black line that runs longitudinally on terga III to V so that it forms the letter T (2) .
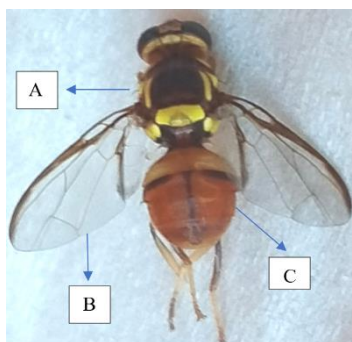
Figure 1. *Bactrocera dorsalis*
A : Thorax, B : Wings, C : Abdomen

The average percentage of fruit fly attacks on chili plants in the field (Table 1) shows that there is an interaction between two types of repellents (main plot) and various volumes (sub-plots) make a very real impact. The average percentage of attacks in the 1st week of observation, P1 (camphor) was lower than P2 (pattern oil) at A1 (0.5 ml), A2 (1 ml), and A3 (1.5 ml). Furthermore, at the 2nd week of observation, P2(Patchouli oil) was lower than P1(camphor) at A1(0.5 ml), and A2(1 ml) but higher than A3(1.5 ml). Then, at week 3, P1 (camphor) was lower than P2 (Patchouli oil) at A1 (0.5 ml), A2 (1 ml), and A3 (1.5 ml).

Table 1. Average percentage of fruit fly attacks on chili plants

Observation	Plot of Main	Plot (%)				NP-BNT
		A0 (0 ml)	A1 (0,5 ml)	A2 (1 ml)	A3 (1,5 ml)	
I	Camphor	$6^g{}_f$	$0,72^d{}_d$	$0,4^b{}_b$	$0,31^a{}_a$	1,34
	Patchouli Oil	$9,5^h{}_g$	$1,3^f{}_f$	$0,8^e{}_e$	$0,7^c{}_c$	
II	Camphor	$6,5^g{}_g$	$1,21^f{}_f$	$0,8^d{}_d$	$0,26^a{}_a$	
	Patchouli Oil	$8,3^g{}_g$	$1^e{}_e$	$0,77^c{}_c$	$0,7^b{}_b$	
III	Camphor	$7,6^g{}_g$	$0,4^c{}_c$	$0,3^b{}_b$	$0,22^a{}_a$	
	Patchouli Oil	$4,3^f{}_f$	$1,2^f{}_f$	$0,6^d{}_d$	$0,6^e{}_e$	
NP-BNT	1,07					

Note: The numbers followed by the same letter are not significantly different on the BNT test level 0.05

Based on observations in the field, it was shown that the interaction between the two types of repellents (main plot) by sharing the volume (sub-plots) had a very significant effect on the percentage of fruit fly attacks on curly chili plants. The lowest attack percentage was found in the camphor treatment with a volume of 1.5 ml. This is influenced by the content of camphor which has a very strong odor so that insects refuse to come. Camphor with the active ingredient naphthalene which is a simple aromatic polycyclic hydrocarbon with a distinctive pungent odor or aroma, this smelly compound is feared by insects and pests [4]. A number of studies have shown that camphor has repellent activity, because it contains monoterpenoid compounds which are believed to help plants in defense against insects, capable of interfering with the biochemical and physiological toxic functions of insects [5]. In addition, camphor also contains lignan compounds that affect the specific physiological functions of insects [6].

Patchouli oil treatment was less effective than camphor, although the aroma was quite strong, this was because the evaporation of the oil was faster after application. The strong aroma of patchouli oil will decrease over time. Essential oils from plants undergo evaporation so that their durability is not long [7]. Patchouli leaf essential oil is repellent to *Aedes aegypti mosquitoes* but its repellent power will decrease the longer it is installed [8].

The results showed that the percentage of fruit fly attacks after the control treatment, 0.5 ml and 1 ml camphor was significantly different from the 1.5 ml camphor treatment. This is because the administration of 0.5 ml and 1 ml of camphor is less causing the aroma produced to be less pungent so that it is less effective at repelling fruit fly pests. A higher

DEET concentration indicates the product is effective for a longer period of time. The higher the concentration of the preparation, the greater the repulsion [9].

The results showed that the more pungent aroma produced by several treatments of camphor was able to inhibit fruit fly attacks compared to other treatments. The smell of smell is very influential on the sense of smell of fruit flies, which is the main stimulus to guide insects in searching for food. The chemoreceptor organs are located on the antennae, so insects can find the direction of the smell [10]. Fruit flies have chemical receptors which are chemical taste organs, one of which is chemoreceptors which are related to the problem of taste (tasting process) and smell (smell process) which are important parts of the insect's sensory system associated with various kinds of behavior, such as eating behavior, mating, habitat selection, and so on. The sensitivity of chemical receptors to several substances is very high so that they can detect odors, essential oils which have volatile characteristics can stimulate fruit fly receptors in their activities.

In the second week of observation, patchouli oil at a volume of 0.5 ml and 1 ml showed the lowest attack compared to camphor. One of the causes of this is environmental factors where rainfall is quite high. Fruit flies on fruits and vegetables will increase in a cool climate, high humidity, besides the influence of rainfall is also quite important, where the population of fruit flies in areas with high rainfall will be followed by a population that has high rainfall [11]. High rainfall also causes fruit fly populations to increase because it is possible that rainfall has a relationship with host plant fertilization and fertilization occurs when it rains often [12].

In addition, patchouli oil contains several secondary metabolites, namely patchoulol, phloroacetophenone[13], Pogostone such as alkaloids

[14], phenolics (flavonoids), polyacetates, and terpenoids (monoterpenoids and sesquiterpenoids). Compound Patchoul which has a repellent effect against *Tribolium castaneum*, *Lasioderma serricorne*, and *Liposcelis bostrychophila* [13], while the pogostone compound also has a reppellent effect on *Myzus persicae* of 0.015 % at 72 hours after application with a concentration of 125 mg/L [15].

IV. CONCLUSION

Based on the results of the study, it can be concluded that 1.5 ml of camphor, 1 ml and 1,5 ml of patchouli oil were repellent so that they could be used as an alternative to control fruit fly pests on chili plants.

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Many Body Interactions on Lattice Dynamical Properties of Stanene, 2D Material

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ABSTRACT

The study of the lattice dynamical properties of materials, phenomenological models describe a complete and straight forward description of the phonon dispersion and phonon eigenvectors in whole Brillouin Zone (BZ) and can be easily applied to the calculation of phonon density of states, elastic constants , dielectric permittivity and other properties of solid .Adiabatic Bond Charge Model (ABCM) was originally developed by W. Weber for studying the lattice dynamics of tetrahedrally bonded bulk group IV Semiconductors such as Si, Ge,Sn and diamond. The result obtained from this model is good agreement with the experimental data for Stanene. We, at present find the lattice dynamical matrix and secular equations using Adiabatic Bond Charge Model. We hope that lattice dynamical properties of Stanene as a 2D material will be good fitted with experimental data.

Keywords : Many body interactions, Adiabatic Bond Charge Model, Lattice dynamics of Stanene as 2D material.

I. INTRODUCTION

The experimental and theoretical studies on grapheme created significant interest in on other Group IV elements, compound of III-V and II-VI Group compound 2D nanostructures. Very recently, we have reported that among Group IV elements, not only C but also Si, Ge and Sn can form stable honeycomb structures [4, 5].The adiabatic bond charge (BCM) method was originally developed by Weber [3] in 1976. For studying the lattice dynamics of tetrahedrally bonded bulk group- IV semi conductors such as Silicon Germanium and Diamond. The model was also adapted by Rustagi and Weber for studying III- V Semiconductor [4] such as Gallium Arsenide. In Weber's approach the atom is considered a non- polarizable ion Core and a shell of Valence electrons. The Valence Charge density is considered as point charges, called bond charges which are located midway (For homopolar case) along the tetrahedral bonds between the nearest neighbors, whereas for (hetero polar) III-V semiconductors they

are nearer to the anions. These bond Charges are allowed to move adiabatically and are assumed to have zero mass. The equations of motion for the ions and their bond charges are evaluated and a dynamical matrix is obtained by considering three type of Interaction (i) Coulomb interactions (ii) Short range central force Interactions and (iii) a rotationally invariant Keating type bond bending Interaction depending on angle. These interactions are depicted in fig.(1)
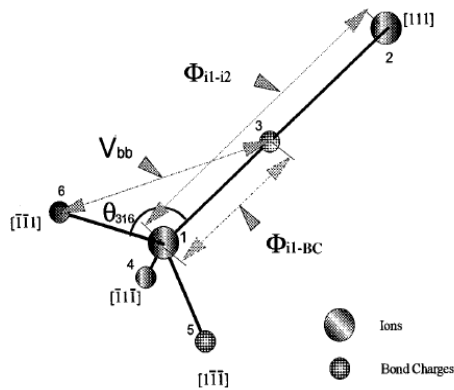
Fig . 1. Structure of unit cell and the interactions in the bond-charge model

Metal-like bonding is represented by the short-range central forces between ions $\left(\Phi_{i1-i2}\right)$ and covalent bonding is represented by the with cations and anions, and form interaction (c) there are different force constants associated with the BC-cation-BC and BC-anion-BC angles Keating interactions between the BC's (V_{bb}).For interaction (b) there are separate terms due to the interactions of the bond charges.

II. Modified Adiabatic bond Charge Model

The two-dimensional honeycomb lattice (Fig. 2) is
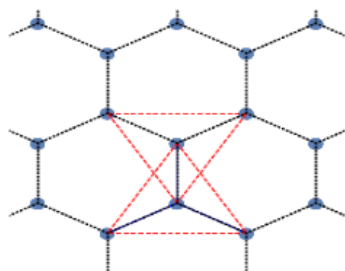
a triangular Bravais lattice with a two-point basis. It is defined by a set of primitive vectors, e.g. $a_1 = \sqrt{3}a(1, 0)$, and $a_2 = (\sqrt{3}/2)a(1,\sqrt{3})$, along with the positions of the atoms within each primitive cell, $c_1 = (0, 0)$, and $c_2 = a(0, 1)$. The length of each bond in the lattice is a. The position vector R of the lattice point is given as

$R=n_1 a_1 + n_2 a_2 \dots\dots$

Where a_1 and a_2 are the independent primitive translational vectors and n_1, n_2 are integers.

Reciprocal lattice vectors are defined as

$$a_i b_j = 2\Pi \delta_{ij} \qquad \dots\dots\dots(2)$$

The honeycomb 2D structure contains two ions and three BCs. Thus the magnitude of BCs is -2Ze and +3ze magnitude of ions due to neutrality of crystals. According to adiabatic bond charge model ,ther are three type of Interactions (i) Coulomb interactions (ii) Short range central force Interactions and (iii) a rotationally invariant Keating type bond bending Interaction depending on angle.In calculation of total potential energy,we added the zero point energy[5-6]. Moreover, with a finite nanocrystal, the Ewald transformation cannot be applied anymore but finite summations have to be computed. Thus the madelung constant α_m is replaced by α_m^{eff} which is given by

$$\alpha_m^{eff} = -\frac{r_0}{4} \cdot \frac{1}{2} \sum_{ij} \frac{\zeta_i \zeta_j}{R^j - R^i} \qquad \dots\dots\dots(3)$$

The total energy per unit cell of honeycomb structure is

$$\Phi_{total} = 3\left[\phi_{ii}(t) + \phi_1(r_1) + \phi_2(r_2)\right] - \alpha^{eff}{}_M \frac{(3Z)^2 e^2}{\varepsilon} + 3\left[V_{bb}^1 + V_{bb}^2 + \psi_1\left(r^1{}_{bb}\right) + \psi_2\left(r^2{}_{bb}\right)\right] + \frac{1}{2}hw_j(q)$$
$$\dots\dots(4)$$

In homopolar crystal $\Phi_1(r_1) = \Phi_2(r_2)$ and $V_{bb}^1 = V_{bb}^2$. In addition, the ions and the BCs interact via the Coulomb interaction characterized by single parameter Z^2/ε where -2Ze is the charge of BC, and ε is the dielectric constant.

To reduce the number of parameters it is assumed that

$\psi_1' = \psi_2' = 0$, $\psi'' = -\psi'' = (B_2 - B_2)/8$ and $(1+p)\Phi_1' + (1-p)\Phi_2' = 0$ along the conditions for minimization of total energy per unit cell, which are $\left(\dfrac{\partial \Phi}{\partial t}\right)_0 = 0$ and $\left(\dfrac{\partial \Phi}{\partial p}\right)_0 = 0$ leads to

$$\phi_{ii}' = -\alpha_m \frac{Z^2}{\varepsilon} \frac{e^2}{t}$$

$$\frac{\phi_1'}{r_1} = 2\frac{d\alpha_m}{dp}\frac{1-p}{1+p}\frac{Z^2}{\varepsilon}\frac{e^2}{t^3} \quad\ldots\ldots(5)$$

$$\frac{\phi_2'}{r_2} = -2\frac{d\alpha_m}{dp}\frac{1+p}{1-p}\frac{z^2}{\varepsilon}\frac{e^2}{t^3}$$

The six parameters of the model are ϕ_{ii}'' , ϕ_1'' , ϕ_2'' , B_1, B_2, and z^2/ε (Four for homopolar crystal).

The Fourier transformed of modified adiabatic bond Charge Model equations of motion

$$m\omega^2 u = \left[R + 9\frac{(Ze)^2}{\varepsilon}C_R\right]u + \left[T - 6\frac{(Ze)^2}{\varepsilon}C_T\right]v \ldots\ldots$$

$$0 = \left[T^+ - 6\frac{(Ze)^2}{\varepsilon}C_T^+\right]u + \left[S + 4\frac{(Ze)^2}{\varepsilon}C_S\right]v \ldots\ldots$$

The above equations the $D_{\alpha\beta}(kk';q)$ can be reduced the ions the bond charge move adiabatically this gives

$$D^{eff} = D^{ion-ion} - \left[D^{BC-ion}\right]^*\left[D^{BC-BC}\right]^{-1}\left[D^{BC-ion}\right]$$

Where the D,s are those parts of the dynamical matrix referenced by their superscript and * denotes Hermitian conjugates. The condition for the non-trival solutions for wave amplitudes of Eq. 6 lead to the characteristic or secular equation;

$$\left|D^{eff}(q) - \omega^2(q)mI\right| = 0$$

$$\omega = \omega_j(q); j = 1,2,3,\ldots.2n$$

This is the secular relation.

III. Conclusion

Two-dimensional (2D) materials are one of the most active areas of nanomaterials research due to their potential for integration into next-generation electronic and energy conversion devices. Graphene, the most widely studied 2D material. Recently, the other 2D group-IV materials, silicene, germanene and stanene, have been realized by epitaxial growth on substrates [1-2], and attracted tremendous interest due to their extraordinary properties. The atoms in a solid are executing oscillations about their equilibrium positions with energy governed by the temperature of the solid .Such oscillations in crystals are called lattice vibrations. The lattice vibrations are responsible for the characteristic properties of matter such as specific heat, thermal conductivity, electrical conductivity, optical, elastic, dielectric properties, diffusion mechanism, phase change phenomena etc. The vibration of the atoms depends on the interatomic interaction within the crystal. To determine the vibrational frequencies and the corresponding modes one needs to calculate the eigenvalues and the eigenvectors of the so-called dynamical matrix, which can be obtained from the interatomic interactions potential [7-10]. If the dynamical matrix is known, the eigenvalue problem is straightforward. The use of phenomenological models in the study of the vibrational properties of IV group of semiconductor 2D material especially Stanene provides a complete and straightforward description of the phonon dispersion and phonon eigenvectors in the whole Brillouin Zone (BZ) with clear physical ingredients and a small computational effort.

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Identity and Understanding of Soma Plant In Perspective of Indian Bioculture And Medicine

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ABSTRACT

The Soma plant conceived to be the most sacred in Rigveda. Its juice (Soma Rasa) was offered to deities and regarded as a sacrificial drink. Its identity has remained a subject of great curiosity, investigations and debates. Its all-pervasive examination is still awaited as the earlier investigators always thought it in isolation and attempted to equate to some plant species in their neighbourhood. The present communication is an endeavour to collate all evidences and thoughts to arrive at home in the state of present circumstances. A literary survey was conducted of the ancient Indian Sanskrit scripts and the modern researches on Soma plant till date. The opinions and understanding of various exponents on the subject matter are introspected to arrive at the present state of knowledge. The various plant species claimed or suspected as 'Soma Plant' are enumerated in the Tables I, II and III. Total 26 plant species have been claimed clearly representing Soma plant, including a fungal and a gymnospermic species. Total 14 species are brought to light as substitutes for proper Soma plant. Common or Sanskrit names have been coined after the epithet 'Soma' for another 13 species. Soma plant has been a subject of many discussions and object of investigations since the Vedic period. Various authors although endeavoured to decipher its identity based on observations and their wisdom, no one could arrive at satisfactory explanation of Soma plant. However, they emerged triumphant in searching out psychoactive plant species and even their active principles. Vedic Soma plant still remains a botanical enigma.

Keywords: Vedic Soma Plant, Indian Bioculture, Ethnomedicine, Psychoactive.

I. INTRODUCTION

The earliest mention of the 'Soma' plant is found in the Rigveda, an ancient Veda (1400 BCE-900BCE) period. Its juice is/was known as 'Somarasa'. It formed an offering to gods as a sacrificial drink. It is considered a drink of immortality and longevity. A ritual use of 'Soma' in Rigveda is as 'the first drink of a newly born child' (Madhi Hasan, 1983). The 'Soma Rasa' (juice), as described in Vedic sources, was characteristically sharp in taste, either consumed in pure form or was mixed with milk, curd, and honey (MacDonell and Keith, 1912). The sweet smelling 'Soma Rasa' was neither intoxicating nor hallucinogenic. It was a stimulant that rendered the consumer alert and awake. It is also claimed that it provoked the thoughts and helped the consumer to compose humans (Kocchar, 1996). Thus, it was thought a divine drink and praised very much nearly by 114 hymns in Rigveda. The magic and most sacred role described in Rigveda is the juice (Soma Rasa) which was administered as 'medicine' to alleviate the mental status of the Aryans. This fact has been often misinterpreted and understood as an intoxicating drink (Padhy *et al.*, 2001). The name 'Soma' is also attributed to the Moon God [Chandra-the god of medicines; authority of Amrita (necter) astrologically controls the mind of a person]. It is also explained in Rigveda as light, dawn, bird, child, support of sky and king (Padhy *et al.*, 2001). The identity and virtues of 'Soma' has been shrouded in mystery and ambiguity over the ancient past. Its genesis is traced to various verses of the Rigveda. The subject matter has been also laminated in the Charaka and Susruta Samhitas. Even in modern period, attempts to decipher its identity and utility are being made. The present account is also an endeavour to shed more light on the ancient subject matter after all-pervasive examination of ancient and recent literary sources.

Ancient Indian Sanskrit Vedic and Post-Vedic sources, apart from modern literature, have been consulted intertwined with the Soma plant or Soma Rasa. Information borrowed from them is collected and evaluated comparatively. The plant species are assigned to their respective families (Table I, II, III) along with their common or Sanskrit names, if any, in the original literary sources. Their all-pervasive scrutiny is completed to arrive at some conclusion based on the present state of knowledge.

(I) Plant Taxa Claimed Or Suspected: Literature pertaining since ancient to present times associated with Soma plant has been consulted. This survey revealed many species, some of which have been not yet focussed well in the past literature. Some authors claimed certain plants to represent original Soma plant (Table-I). There are totally 26 plant species, of which fungal and gynospermic species are presented each by a single species, genus and family. The rest others (23 species) belong to angiosperms. Interestingly majority of species (14) belong to a single laticiferous family, the Asclepiadaceae. Some plant species have been brought to light by different investigators as substitutes for Soma plant (Table II). These all belong to angiosperms. They are represented by 14 plant species belonging to seven families. Maximum species (04) belong to a single latiferous genus *Ficus*. Over the long plant, after the well established concept of Soma plant, Soma plant species were coined for their common or Sanskrit names after the epithet 'Soma'. Such species are totally 13 belonging to 12 genera of different 12 families of angiosperms.

(II) Ancient Vedic Sources: (i) Rigveda (1400 BCE-900 BCE): Rigveda is regarded the first medical utterance especially reflected in the 'Aushadi Sukta' of the 10th Mandala. It describes about 107 applications. It is the most ancient source in which Soma finds place in different 114 hymns (Slokas) in Sanskrit. It is a prime and key source for identification of the plant. It entells in different verses habit, habitat and phytography of Soma plant as: (a) Habit: a creeping, twisting semi-herb with brown, ruddy or tawny in

colouration. (b) Habitat: inhabits mountains and hence called 'Parvataavdh' (mountain grown). Such mountains were known as 'Somaprasha' (Carrying Soma on back). (c) Its stem-axis is described as: hanging down, pendent, branches bright, finger-shaped, jointed, probably angular edges of stem hard; fistular, bearing acidulour milky juice (Padhy *et al.*, 2001). (ii) Atharveda (900 BCE): A relation of a plant 'Kustha' with 'Soma Plant' is also reflected in Atharveda. It also grows in mountains and thought to be a friend of Soma. It is equated with (i) *Costus speciocus* (Koenig) J.E.Sm. (Zingiberaceae) and (ii) *Saussurea auriculata* (DC.) Sch.Bip. (Asteraceae) (Padny *et al.*, 2001).

(III) Manusmruti: It is thought composed in Vedic age. It has not described Soma plant, but mentioned about some juice with performance of Soma Yajnyam (Soma sacrifice) achieving fulfilment of some wish. This was a common practice in ancient India. It is also stated in Manusmruti that a seller of Soma was not to be entertained in an annual ritual of departed soul called 'Sraaddha'. It was considered that if the food is given to a sellar of Soma, it become ordure. Brahman and Kshatriya were expected not sell Soma (Dash and Padhy, 1998). Mushrooms (called Kabaka) are prohited for human consumption in Manusmruti. Soma being a divine drink, can not be equated with *Amanita mascaria,* a fungus springing from impure habitat and substance (Dash and Padhy, 1997).

(IV) Ayurvedic Samhitas: In some Samhitas, of particular interest *viz.*, Charak and Susruta Samhitas, Soma is presented in diverse forms of plant species. In the former, it is included amongst the divine drugs. However, in the latter, as many as 24 varieties are mentioned based on habitat, name, shape and particular potency. Their method of use is said to be identical with one another. In Susruta Samhita, Soma plant is described as: 15-leaved, bulbous, creeper-like in appearance, secreting milky juice and possessing different kinds of leaves. It is also stated that the 15 leaves develop one leaf daily keeping pace with lunar

days of full moon fortnight. It bears total 15 leaves on full moon day, called Poornima. Subsequently, they abscise one by one on no-moon day (Amavasya) and ultimately it is a leafless creeper. This sort of description and behaviour Soma plant is, however, not reflected in the Rigveda. Phytogeographic distribution on different Indian mountains is but mentioned in Susruta Samhita. Presence of milky juice and its consumption for restrorative treatments are as those in Rigveda. In Ayurvedic texts, some plant species with Soma as an epithet have been reflected (Table III).

(V) Modern Literary Sources: Information adduced from Vedic and Post-Vedic texts is not merely of historical importance. In quest for better health and immortality, continuous human triumph are on record since the beginning of civilization throughout the world. Many investigators became interested in this scientific pursuit for the welfare of mankind. It is, therefore, scientific community extended their attempts to trace the identity and utility of Soma plant. The subject matter has also made a re-entry through the subject of Ethnobotany, apart from classic science of plant world. To search out the original plant species of Soma, researches have been carried out from time to time. Some species, in pursuance of it, are documented and claimed to be probably as Soma species as enumerated in the Table-I. As many as 26 species including of a fungus, some gymnosperms particularly species of the genus *Ephedra* (Ephedraceae) and a majority of angiosperms are brought to light. Scientists all over the world became interested in Soma research and divulged some plant species as substitute or probable candidates of more or less similar nature and virtues as enlisted in the Table-II. Even, some plant species have gained in the Table-II. Even, some plant species have gained common names associated with the epithet 'Soma' (Table III) as stated earlier. In the course of time, botanists endeavoured to correlate this sacred plant species with different species found

particularly in the Indian subcontinents (Table-I, II, III).

This trail still continued to have a correct identity and to give a scientific explanation for the validity of Soma plant. A literary resume indicated some arguments in favour or against some claims made in the past. For example, (i) the phytography of the Vedic Soma plant as elaborated earlier is in favour of *Amanita muscaria* (a fungal species). Moreover, Vedic Soma Rosa is/was not thought intoxicating or hallucinogenic as this fungal species. Author of Manusmruti *viz.*, Sedge Manu regarded it as a prohibited food and hence cannot be considered as Soma plant being an offering for gods. Some species of the genus *Ephedra* have been projected by the investigators outside India as the putative source of Soma (Bowman, 1970; Stein, 1993; Madhi Hassan, 1978, 1982; Kellen, 1995; Dannaway, 2011). *Peganam hamala* is also thought a candidate for Soma (Flatery and Schwart, 1989). It is also the case of species pertaining to the genus Rheum (Hummel, 1959). Archaeological evidence is also put forth to show Soma, in its Iranian form 'haoma' as a composite psychoactive substance consisting of *Ephedra* and *Cannabis*, and also as *Ephedra* and Opium *(Papavaer somniferum* Linn.) (Parpola, 1994; Rudgley, 1998; McGovern, 2008). Some support is also lent by Miller (2003) in their being candidates for Soma. Few attempts have been also discussed on the active principle ephedrine of *Ephedra* for chemical explanation (Merlin, 2013).

II. CONCLUSION

(i) The glory of 'Soma Rasa' is elaborated as: (a) Soma Rasa was poured into the fire as an offering to the deities. It was a drink for the priests. The drink inspired and encouraged to compose hymns. (b) It bestows longevity of life and immortality. The king of gods, Indra also gained strength through Soma Rasa. (c) The drink help remove sins from the heart and takes away human sufferings or diseases from the weak person being a medicine of the infirm. It also gives protection against human wickedness and bad omens. It destroys untruth and condemns false dignity. (d) It bestows the rain of heaven, the wealth of the earth, besides fame and reputation. (e) Its drinking help acquire the power to kill others with their glances, etc. (Hillebrandt, 1891).

(ii) A sample of 'Soma' was obtained by plant Watt (1889-1896) from Bombay which was identical to *Periploca aphylla* (Asclepiadaceae). He also got another sample used by Parsis of Bombay, called a 'Homa' (Soma) which turned out to be *Ephedra pachyclada* Boiss. (Ephedraceae). Watt (1890) also opined that *Periploca* species was have a stronger claim than *Ephedra*. He further stated that *Ephedra* is not the plant Watt (1889-1896).

(iii) Roxburgh (1820) described some plant as *Sarcostemma brevistigma* W. & A. and commented that it has so much milky juice of a mild nature and the native people suck the tender shoots to quench their thirsts.

(iv) Clayton (1913) translated hymns from Rigveda on Soma. He recorded that the 'Soma Plant' having been brought to the earth by falcon on a mountain. It is said to have been brought by the daughter of Surya (Gandharvs) or by the offsprings of Parjanya (the rain god).

(v) Madhi Hassan (1963) remarked that the Aryans were not succeeded in finding the original plant as Soma. People used *Ephedra gerardiana* Wall. ex Stapf as a substitute to prepare the sacred Soma beverage. He further suggested that this plant is likely not the original Soma of the Vedas.

(vi) Wassan (1968) contended the fly-agaric mushroom *viz.*, *Amanita muscaria* (L.) Lam. as the Soma plant. However, Dash and Padhy (1997) refuted it to be so as stated earlier.

(vii) Gunnar (1971) explained *Cannabis* (Marihauna, Bhang) as an important medicine, as analgesic, useful for pain and rheumatism, as an anodyne, etc. and opposed to place it in the same class as Opium.

(viii) Karnick (1969) while presenting an historical account of ancient Indian medicinal drugs pointed out medicinal qualities of some plants which are claimed to Soma plant or hallucinogens.

In a nutshell, ancient ethnic communities around the world learnt to exploit herbal wealth in their vicinity for curative as well as offensive purposes. Soma was claimed to be a divine drink and praised considerably in Rigveda. During the course of time, subsequent researchers and authors focussed it as spirituous liquour and some others even a psychoactive by putting forth other substitutes for Soma plant. These substitutes were used in Indian and Iranian societies and have been equated or earmarked as 'Soma Plant' or 'Soma Rasa', many of which are psychoactive. The original concept and description of 'Soma' appeared not attained carefully and the subject matter have been exagerrated. If a man blind by birth is asked about an elephant, his supposition will obviously imaginary. This has also happened in case of 'Soma' and still it is enigmatic today. The plants species claimed or suspected to be Soma plant (enlisted in Table I, II, III) are of many medicinal importance. These should not be considered only as mind-altering plants. Its search aroused curiosity world over about the plant world for a long time which however mostly culminated in discovery of psycoactive properties of many herbs. However, the debate for scientific pursuit should continue. It can be concluded in the words of Acharya Charaka, author of Charak Samhita, that 'Shastram jyoti prakashartham darshanam buddhi atmanah' (meant: 'science is the light and our acumen is the perception').

III. CONFLICT OF INTEREST

The author has no conflict of interest.

IV. ACKNOWLEDGEMENTS

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Table-I: Plant Species Claimed To Be Vedic Soma

Sr. No. 1	Plant Species 2	Classification 3	Common (C)/ Sanskrit (S) Name (Provided in Sources) 4	Literary Source 5
1	*Amanita muscaria* (L.) Lam.	Amanitaceae Basidomycetes (Fungi)		Dash and Padhy, 1978; Rao and Hajra, 1987
2	*Asclepias acida* Roxb.	Asclepiadaceae Angiosperms		Hillebrandt, 1891
3	*Basella alba* L. (Syn.*B.alba* var. *cordifolia* (Lam.) M.R. Almeida	Basellaceae (Chenopodiaceae) Angiosperms		Hillebrandt, 1891
4	*Cannabis sativa* Linn.	Cannabinaceae Angiosperms		Hillebrandt, 1891
5	*Ceropegia bulbosa* Roxb.	Asclepiadaceae Angiosperms		Karnick, 1969
6	*Ceropegia decaisneana* Wight	Asclepiadaceae Angiosperms		Hillebrandt, 1891
7	*Ceropegia elegans* Wall.	Asclepiadaceae Angiosperms		Hillebrandt, 1891
8	*Ceropegia lawii* Hook.*f.*	Asclepiadaceae Angiosperms		Karnick, 1969

Sr. No. 1	Plant Species 2	Classification 3	Common (C)/ Sanskrit (S) Name (Provided in Sources) 4	Literary Source 5
9	*Ceropegia panchganiensis* Blatt. et McG.	Asclepiadaceae Angiosperms		Karnick, 1969
10	*Ceropegia rollae* Hem.	Asclepiadaceae Angiosperms		Karnick, 1969
11	*Ceropegia tuberosa* Roxb.	Asclepiadaceae Angiosperms		Karnick, 1969
12	*Dioscorea bulbifera* Linn.	Dioscoreaceae		Karnick, 1969
13	*Dioscorea esculenta* Linn.	Dioscoreaceae		Karnick, 1969
14	*Eleusine coracanna* Gaertn.	Poaceae Angiosperms		Hillebrandt, 1891
15	*Ephedra intermedia* Schr. & Meyer	Ephedraceae Gymnosperms		Chopra, 1982
16	*Ephedra gerardiana* Wall. ex Stapf	Ephedraceae Gymnosperms		Madhi Hassan, 1963, 1990
17	*Ichnocarpus frutescens* (L.) R.Br.	Asclepiadaceae Angiosperms		Tripathy, 1926
18	*Periploca aphylla* Dcne.	Asclepiadaceae Angiosperms		Hillebrant, 1819; Watt, 1889-1996; Karnick, 1969
19	*Periploca graeca* L.	Asclepiadaceae Angiosperms		Karnick, 1969
20	*Ruta graveolens* L.	Rutaceae Angiosperms		Roxburgh, 1820
21	*Sarcostemma acidum* (Roxb.) Voight (Syn.*S.brevistigma* W. & A.)	Asclepiadaceae Angiosperms	Somlata (S)	Hillebrandt, 1819; Roxburgh, 1820; Karnick, 1969
22	*Sarcostemma brunonianum* Wight & Arn.	Asclepiadaceae Angiosperms		Hillebrandt, 1819; Karnick, 1969

Sr. No. 1	Plant Species 2	Classification 3	Common (C)/ Sanskrit (S) Name (Provided in Sources) 4	Literary Source 5
23	*Sarcostemma intermedium* Dcne.	Asclepiadaceae Angiosperms		Hillebrandt, 1819; Karnick, 1969
24	*Sarcostemma stocksii* Hook. *f.*	Asclepiadaceae Angiosperms		Hillebrandt, 1819
25	*Sarcostemma viminale* (L.) R.Br.	Asclepiadaceae Angiosperms		Hillebrandt, 1819
26	*Vitis vinifera* Linn.	Vitaceae Angiosperms		Hillebrandt, 1819

Table-II: Plant Species supposed To Be Substitutes In Vedic Tradition

Sr. No. 1	Plant Species 2	Classification 3	Common (C) or Sanskrit (S) name 4	Literary Source 5
1	*Butea monosperma* (Lamk.) Taub.	Papilionaceae Angiosperms	Palesa (S)	Clark, 2019
2	*Desmodium gangeticum* (L.) DC.	Papilionaceae Angiosperms	Salaparni (S)	Leonti and Casu, 2014
3	*Desmostachya bipinnata* Stapf	Poaceae Angiosperms	Kusa (S)	Leonti and Casu, 2014
4	*Ficus benghalensis* L.	Moraceae Angiosperms	Nyagrodha (S) Vata (C,C)	Clark, 2019; Leonti and Casu, 2014
5	*Ficus racemosa* L.	Moraceae Angiosperms	Udumbar (S)	Clark, 2019; Leonti and Casu, 2014
6	*Ficus religiosa* L.	Moraceae Angiosperms	Peepal (C) Bodhics (C) Asvatha (S)	Clark, 2019; Leonti and Casu, 2014
7	*Ficus virens* Dryand (Syn.*F.infectoria* Roxb.)	Moraceae Angiosperms	Plaksa (S)	Clark, 2019; Leonti and Casu, 2014

Sr. No. 1	Plant Species 2	Classification 3	Common (C) or Sanskrit (S) name 4	Literary Source 5
8	Mucuna pruriens (L.) DC.	Papilionaceae Angiosperms	Kappicacchu (S) Atmagupta (S)	Leonti and Casu, 2014
9	*Nelumbo nucifera* Gaertn.	Nymphaeaceae Angiosperms		Leonti and Casu, 2014
10	*Sida cordifolia* L.	Malvaceae Angiosperms		Leonti and Casu, 2014
11	*Sida rhombifolia* L.	Malvaceae Angiosperms		Leonti and Casu, 2014
12	*Sida spinosa* L.	Malvaceae Angiosperms		Leonti and Casu, 2014
13	*Tabenaemontana divaricata* (L.) R.Br.	Apocynaceae Angiosperms		Leonti and Casu, 2014
14	*Tinospora cordifolia* (Willd.) Miers.	Menispermaceae Angiosperms		Leonti and Casu, 2014

Table-III: Plant Species Coined Using Epithet 'Soma'

Sr. No. 1	Plant Species 2	Classification 3	Common (C) or Sanskrit (S) name 4	Literary Source 5
1	*Acacia catechu* (L.*f.*) Willd.	Mimosaceae Angiosperms	Soma Valka	Praharaj, 1937
2	*Acacia nilotica* (Linn.) Willd. ssp. Indica (Benth.)	Mimosaceae Angiosperms	Soma Valka	Praharaj, 1937
3	*Bacopa monnieri* (Linn.) Penn.	Scrophulariaceae Angiosperms	Soma Lata	Mishra, 1998; Nayak, 1942
4	*Benincasa hispida* (Thunb.) Cogn.	Cucurbitaceae Angiosperms	Soma Grusthtika	Nayak, 1942
5	*Centella asiatica* (Linn.) Urb.	Apiaceae Angiosperms	Somarja	Nayak, 1942
6	*Cullen corylifolia* (L.) Medik. (Syn.*Psoralea corylifolia* Linn.)	Papilionaceae Angiosperms	Soma Raja	Praharaj, 1937; Nayak, 1942; Mishra, 1998
7	*Ichnocarpus frutescens* (Linn.) R.Br.	Apocynaceae Angiosperms	Soma Lata	Mishra, 1942; Nayak, 1942
8	*Milletia pinnata* (L.) Panigrahi	Papilionaceae Angiosperms	Soma Valk	Praharaj, 1937; Mishra, 1942
9	*Paedera scandens* (Lour.) Merr.	Rubiaceae Angiosperms	Soma Rajee	Roxburgh, 1820
10	*Santalum album* Linn.	Santalaceae Angiosperms	Soma Yani	Nayak, 1942
11	*Sapindus laurifolius* Vahl. (Syn.*S.trifoliatus* Linn.)	Sapindaceae	Soma Valka	Mishra, 1998
12	*Soymida febrifuga* A. Juss.	Meliaceae Angiosperms	Soma Vruksha	Mishra, 1998
13	*Tinospora cordifolia* (Willd.) Mier.	Menispermaceae Angiosperms	Soma Valli	Mishra, 1998; Nayak, 1942; Tripathy, 1926
14	*Vernonia anthelmintica* Willd.	Asteraceae Angiosperms	Somraj	Roxburgh, 1820

Study of Scattering of Non-Linear Wave in Dusty Plasma with Non-Thermal Ions

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ABSTRACT

Research on Scattering of Non-Linear Wave has a wide applications and support - for Spectroscopic behavior of atomic modeling in terms of Plasma models. As the precision and scope of spectroscopic models has increased, the atomic modeling also has had to evolve. With a focus now on ITER and the dusty plasma with non-thermal ions. The characteristics of Dust- Acoustic Solitary Waves (DASWs) and Double Layers (DLs) are studied. Ions are treated as non-thermal and variable dust-charge is considered. The study in further extended to investigate the possibility of DLs. Only compressive DLs are permissible.

Keywords: Plasma Model, Acoustic Solitary Waves, Propagation Constant.

I. INTRODUCTION

In dusty plasma, a third charged species with diameter ranging from Nanometers to several hundred micrometers. The History, occurrence and characteristics of dusty plasmas in space and laboratory environments are well described and do cemented in recent publications. Collective processes such as low frequency mode in dusty plasma have received a great-deal of attention over plasms-20 years. The wave propagation along the azimuthal angle across an external axial steady magnetic field and is referred to as the azimuthal angle across an external axial steady magnetic field and is referred to as the azimuthal surface waves. In this work, we investigate the dispersion relations of azimuthal electromagnetic surface propagative perpendicularly in the same fashion.

II. METHODS AND MATERIAL

2.1. Configuration and General Equations

We consider an infinitely annular column of magnetized plasma with external and internal radii of R_i and R_a respectively surrounded by a cylindrical loss-free metal wave guide with-a cylindrical coaxial anisotropic dielectric wall with internal and external radii of R_d and R_e respectively.

Making use of Maxwell's equation to obtain the dispersive relation that we can obtain as follows-

$$\triangle \times B = \frac{1}{c}\frac{\partial}{\partial t}\ (\vec{\epsilon}\ E) \qquad\qquad \text{---} \qquad (1)$$

$$\triangle \times E = -\frac{1}{c}\frac{\partial}{\partial t}B \qquad\qquad \text{---} \qquad (2)$$

$$\triangle \cdot\ B = 0 \qquad\qquad \text{---} \qquad (3)$$

$$\triangle \cdot\ E = 0 \qquad\qquad \text{---} \qquad (4)$$

Where $\vec{\epsilon}$ is the dielectric tensor and $\vec{E}$ and B are the perturbed values of electric and magnetic fields respectively. In general, in an electronic plasma with an axial external magnetic field, the relation between the dielectric tensor ϵ_{jk} and the susceptibility tensor x_a of a plasma is given by,

$$\epsilon_{jk} = \epsilon_0\ (\delta_{jk} + \chi_{jk})$$

Where

$$\chi_{jk} = \frac{-\omega_{jk}^2}{\omega^2(\omega^2 - \pi_e^2)}\ [\omega^2 s_{jk} - \pi_e^2 b_j b_k + i\omega\pi_r\ \varepsilon_{jk}b_i] \text{-------------------------}(5)$$

ω_{pe} is the electron plasma frequency Ω_2 is the electron cyclotron frequency, b_i is a component of $\vec{b}$ a unit vector $\hat{b}$ in the direction of B_0 and ε_{jki} is the leve - Civita tensor. In a magneto active cold plasma with $\vec{b}$ along the $\vec{z}$ director the dielectric tensor can have the following forms

$$\vec{\epsilon} = \begin{pmatrix} \varepsilon_1 & ig & 0 \\ ig & \varepsilon_1 & 0 \\ 0 & 0 & \varepsilon_1 \end{pmatrix} \text{---}(6)$$

Where, $\varepsilon_\perp = 1 - \dfrac{\omega^2 \mu c}{\omega^2 \Omega_c^2}$

$$\varepsilon_1 = 1 - \frac{\omega_{pe}^2}{\omega^2}, g = \frac{-\omega_{pe}^2 \Omega_e}{\omega(\omega^2 - \Omega_e^2)}$$

For an ideal waveguide oriented along the z axis the dielectric tensor is only a function of the transfer coordinates i.e. $\vec{\varepsilon_d} = \vec{\varepsilon_d}(r.\psi)$,

Where $\qquad \vec{\varepsilon_d} = \begin{pmatrix} \varepsilon_{id} & 0 & 0 \\ 0 & \varepsilon_{id} & 0 \\ 0 & 0 & \varepsilon_{id} \end{pmatrix} \qquad \text{---------------------------} \qquad (7)$

Here, we assume that $\varepsilon_{\perp d}$ and ε_{id} are constant. In the linear approximation, the perturbed fields B and E are assumed to be monochromatic plane waves.

$$B\ (\underline{r.\psi}\ z, t) = \sum_{i=1}^{3} \hat{e}_i B_i(r)\exp\left[-i(\omega t - k_j z - m\psi)\right]..$$

$$E\ (\underline{r.\psi}\ z, t) = \sum_{i=1}^{3} \hat{e}_i E_j(r)\exp\left[-i(\omega t - k_j z - m\psi)\right].$$

$$E\ (\underline{r.\psi}\ z, t) = \sum_{i=1}^{3} \hat{e}_i E_i(r)\exp\left[-i(\omega t - k_j z - m\psi)\right].. \text{-----------------------}(8\text{-}10)$$

Here $\vec{\varepsilon_i}$ is a unit vector in cylindrical coordinates (4) and m is an integer. But substituting (9) and (10) into equation (6) and (7). The system of equation describing the general behavior of electric and magnitude fields in this geometry

$$\left(x^2 + \frac{g^2\omega^2}{\varepsilon_1^2 c^2}\right)\nabla_1^2 E_z - E\frac{E_1}{E1}E_z = ik_z\frac{w}{c}\frac{g}{\varepsilon_1}\nabla_1^2 E_z \qquad \text{------------------------}(11)$$

$$x^2 \nabla_1^2 B_z - B_z = ikz \frac{w}{c} g \nabla_1^2 E_z$$

Where, $x^2 = k^2 z - E_1 \dfrac{w^2}{c^2}$, $E = x^4 - q^2 \dfrac{w^2}{c^4}$

and the transverse Laplacian operator is given by,

$$\nabla_1^2 = \left(\frac{1}{2}\right)\left(\frac{d}{dr}\right) r \left(\frac{d}{dr}\right) - \frac{m^2}{r^2} \qquad \text{---(12)}$$

2.2. Elementary processes in dusty plasmas

Changing of dust particles in plasmas different processes leading to the charging of dust particles immersed in plasmas are considered. Expressions for the ion and electron fluxes to the particle surface caused by different processes (collection of plasmas electrons and ions secondary, Thermionic and photo electric emission of electrons from the particle surface are given problems such as stationary surface). Potential kinetics of charging of plasma charge composition in response of fluctuations due to the stochastic nature of charging process are considered more detailed examination of charging processes can be found. We mostly focus on the processes which are important for the problems addressed in the present review.

2.3. Charging in gas discharge plasma

In a non-equilibrium plasma of law reassume gas discharge the ions, atoms and microscopic charged particle typically remain cold, whilst of electron energies are relatively high, Due to high immobility of the electron their flux begins to charge on the particle leads to the repulsion of electron and ion fluxes are balanced negatively. The emerging negative charge on the particle leads to the repulsion of the electron and ion fluxes are balanced on longer experiences only small inflections around its equilibrium value.

The stationary surface potential of the dust particle is defined as $\psi_3 = -T_e/e$ where T_e is the electron temperature in energy units. Physically this can be explained by the requirement that in the stationary state most of the electron should have kinetic energies to overcome the potential barrier between the particle surface and surrounding plasmas.

2.4. Orbit motion limited approximation

For a quantitative description of the particle charging in gas discharge plasmas probe theory is generally adopted. One of most frequently used approaches is the orbit motion limited (OML) Theory. This approach only from the laws of conservation of energy and angular momentum. Usually, the conditions of applicability of the OML Theory are formulated

$$a << \lambda_D << l_{ge}$$

Where λ_D is the plasma screening length (The corresponding Debye radius) and $l_{i(e)}$ is the mean free path of the ions (electrons). It is also assumed that the dust-particle is isolated in the sense that other dust particles do not affect the motion of electrons and ions in its vicinity. Electron and ion fluxes to the particle surface are determined by the integration of the corresponding cross sections with velocity distribution function $f_{e(j)}(u)$

$$I_{e(i)} = H_{a(i)} \int V C T_{e(i)} f_{e(i)} d^3 v$$

Where $h_{e(i)}$ is the electron (ion) number density for the Maxwell an velocity distribution of plasma particles v_{i3}

$$\int_{e(ij)}(v) = \left[2\pi v^2 T_{e(i)}\right]^{-3/2} \exp.\left(-\frac{v^2}{2v^2 T_{elj}}\right)$$

Where, $v_{je}(i) = \sqrt{\dfrac{Te(j)}{me(i)}}$

is the electron (ion) thermal velocity, the integral in equation (9) performed with the use of formula as. The equilibrium surface potential is then determined by.

$$\exp(-Z) = \frac{\mu}{\tau}(1 + z\tau)(1 + p)$$

Whereas dimensions less parameters

$P = |Z_d|\dfrac{nd}{ne}$ determines the ratio of the charge residing on the doubt components to that on the electron component. The particle charge tends to the charge of an isolated particle where p ≤ 1, which for P > 1 it is reduced considerable is stead of expression. The quantity $\alpha T^{-2}{}_{e(\frac{x_d}{n_e})}$ is used, which differs from P by the numerical factor 1/z.

3.1. Applicability of the orbit motion limited approach

The point is that the motion of the ions approaching the dust particle is determined by the flectional interaction potential U_{eff} which in addition to the attractive electro state potential v(r) between positive ion and negatively charged particle contains a component associated with the certain fungal repulsion due to ion angular moment conservation. The effective potential normalized on the ion kinetic energy $= m_1\dfrac{v^2{}_1}{2}$ is given by $U_{eff}(r,\rho)$ Where ρ is the impact parameter and v(r) < 0 for a given row ρ, the distance r_0 at which $U_{eff}(r_0. \rho) = 1$ corresponds to the distance of the closest approach between the ion and the dust particle.

3.2. Kinetics of dust particle charging

The kinetic equation for dust particle charging is plasma in written as follows,

$$\frac{dZ_d}{dt}\sum_j I_{j=I}$$

Where the summation is made over all the fluxes Ij of charged particle collected or emitted by the dust particle in determined from the condition dZd/dt = o let us consider particle charging in the absence of emission processes. In so during we use the standard equations

$$t^1 - \frac{Wpi}{\sqrt{2\pi}}\left(\frac{\alpha}{\lambda pi}\right)t$$

Where $\lambda_{Di} = \sqrt{Ti / (4\pi e^2 ni)}$ in the ionic Debye radius and Wpi $= VT_i/\lambda D_i$ is the ion plasma frequency we qet instead of the following equation.

$$\frac{dz}{dt} = \frac{1}{\sqrt{\mu T}}\left[\exp(-z) - \left(\frac{\mu}{z}\right)^{\frac{1}{2}}(1 + \tau z)\right]$$

Combined with the initial condition Z(t* = 0) This equation allows m to determine the stationary value of the particle charge z = z((τμ) for $t \to \infty$ and the characteristic time of charge t from the uncharged state.

Notice coincides with equation for $n_e = n_i$. let us define the charging frequency Ω the inverse charging time as the retardation frequency for a small deviation from the stationary

$$\Omega_{th} = \frac{dl}{dz_d}/zdo$$

3.3. Interaction between dust particles in plasma

The potential of interaction between dust particles differs from the coulomb interaction potential between charged particles in a vacuum. When the electrostatic potential distribution ψ(r) in a plasma surrounding a test particle is known. The absolute value of the electrostatic force acting on a particle with a fixed charge Z_d and located at a distance r from the test-particle can be presented in the forum $F_{de} = -d U_{el}®/dr$, where

$$U_{el}(r) = Z_d e\psi(r)$$

Thus, it is necessary to know the distribution ψ(r) of the potential in plasma, As was previously, the potential of an isolated spherical particle in an isotropic plasma in purely columbic at small distances for r << λ D for r≈ λ D, The screening is important and the Debye – Hockel form can be after used, the potential has an inverse power law asymptotic to λ D it is reasonable to use a screened columbic type of the potential

Uel (r) $= \frac{z^{2e}6^{s}}{r} exp. (-\frac{r}{\lambda D})$

Different additional mechanism governing attraction and repulsion between the dust particles can exist as a consequence of the openers of dusty plasma systems. The continuous flow of plasma electrons and ions on the surface of a dust particle leads to a drag experience by neighboring particles.

3.4. Strongly coupled dusty plasmas and phase transitions

The conditions which can be realized industry plasma are quite diverse and depend on relations among. Their characteristics of a many, particle in terracing. System is the coupling parameter F defined as the ratio of the potential energy of interaction between neighboring particles to their kinetic energy

$\tau = \frac{Z^2 e^2}{T\Delta}$, where $\Delta = n^{-1/3}$ characterizes the average inter particle spacing and T characterizes their kinetic energy. The conditions typical of dusty plasma experiments, the number of electrons (ions) $N_{e(j)}^{D}$ in the electron (ion) Debye sphere in large $N_{e(j)}^{D}$ = $ne(j)\lambda_{De}^{3}(j)^{1}$ >>1and hence electron and ion species are ideal

III. RESULTS AND DISCUSSION

Measurements were carried out for the spatial distribution of the degree of linear and circular polarization at the defector for a set of scattering samples having the same scatter size but varying. me show the value for degree of polarization at the pixel

corresponding to the center of the ballistic beam as a function of Σ for two samples, prepared using guerdons suspension of o.+I μ_m diameter.

This is consistent with the observed similar FWHM of spatial spread of degree of polarization for these isotropic scattering samples. The measured spatial distribution of degree of circular polarization for samples with agendum suspension variations of the measured degree of polarization, for larger scattering angles degrees of circular polarization is lower for the scatter having a lower value of refractive index scatters as compared to the scattered having a higher refractive index. These results would indicate that for these anisotropic scattering samples, polarization state can be used to filler out the multiply scattered photons. The reason for this difference in scattering behaviors originates from the difference in the value of the scattering matrix elements of two scattering samples having the same refractive index of the surrounding medium, but indices of scatters. The scattering matrix element S_{ϱ} as a function of scattering angle for these two scattered and for a Rayleigh scattered.

IV. CONCLUSION

Despite a history spanning nearly a century. The investigation of dusty plasma has acquired particular attention only during the last decade. The understanding of the observed effects is in possible without a detailed investigation such as particle charging, interaction between the particles, the main forces acting on the particle one of the most important application problem is the removal of dust particle when manufacturing computer chips by plasma, aided technologies our study short that for different samples prepared using larger sized scatters (a ≥ λ, g ≥ 0.7), scattering of both linearly and circularly polarized light significantly affected by the refractive index of scatters. While for larger scatters with higher value of refractive index, linearly polarized high depolarized much faster than

circularly polarized light was observed for scatters. It appears that the difference in the relative refractive index ratio would be an important factor contributing to the differences observed in the relative behavior of scattering of linearly and circularly polarized light.

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Characterization of Fuel Properties of WCOME/AONP Biodiesel Using Taguchi Technique

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ABSTRACT

The fuels which are derived from the biological process such as anaerobic digestion from the agricultural wastes are called bio fuels. These fuels are better than the fuels which are produced from geological processes which are involved in the formation of fossil fuels such as coal and petroleum. The fuels can also be extracted from the plants and industrial wastes which are renewable in nature. The biomass can also be used as biofuel which gives a good result in testing of engine performance. The biomass is obtained in three forms like solid, liquid and gaseous.

Biodiesel, as a fuel, can be used in vehicles directly, but due to emission effects, it is mixed with the diesel which reduces the level of carbon-dioxide and NOx. In European countries it can be seen the use of biodiesel which are produced from fats and oils using the transesterification process. The aim of the present research work is to compare different Biodiesel blends from different percentages of waste cooking oil as a suitable fuel replacement for Diesel engines. Engine performance based on the blends of Diesel and Biodiesel was recorded and tabulated.

Keywords : Biodiesel, WCOME, Flash and Fire Point, Taguchi

I. INTRODUCTION

The Indian economy is heavily dependent on fossil resources for transportation of all types of goods. But in recent times, there has been a growing realization that the availability of these fuel sources are harmful to the environment and are also depleting. [1] This depletion has led to research in the alternate energy sources sector, where biodiesel or biofuels in general are in the forefront. To obtain a desired component the technology used for this transformation and the component used as feedstock for the biomass, at least three general platforms have been envisioned: the sugar [2], synthesis gas [3], and oil [4] platforms. Today, the best platforms established are from oil and sugar, with bioethanol and biodiesel being the examples of their commercial products respectively. Bio ethanol is produced through microbial fermentation of sugar derived from corn, sugarcane or sugar beet [5].

Esters are created by transesterification process using vegetable oils with alcohol that leads to delivery of Biodiesel [4]. Given the expanding interest for bio powers [6], there is a critical need to research new and more proficient choices for their creation. For instance, the change of lignocelluloses biomass to ethanol and the utilization of oil amassing green growth in the creation of biodiesel are being explored [7, 8]. These methodologies are exceptionally encouraging and will give plentiful non food feedstocks to the creation of bio fills with natural advantages and huge net energy gains. Be that as it may, a remarkable issue in both current and future biofuel creation stages is financial practicality. The execution of bio processing plants has been proposed as a way to build the financial practicality of the biofuel business [9]. In its 'regular' structure, a bio processing plant would utilize a negligible part of the feedstock to co - produce a higher worth, little - market synthetic alongside the biofuel. The higher income from the co - item, which benefits itself from economies of scale accessible in an enormous bio energizes plant, would work on the financial aspects of biofuel creation. An all the more financially reasonable model for a bio treatment facility, nonetheless, ought to consider the utilization of results or waste streams created during the development of biofuel. Glycerol-rich streams created by the bio fills industry can possibly be utilized in this specific situation. As its name proposes bio diesel is a fuel oil got from natural sources. Bio-diesel is a locally delivered, inexhaustible fuel that can be produced from vegetable oils, creature fats, or reused eatery lubes and it can supplant petroleum derivative [10]. Bio-diesel has become more appealing as of late as a result of its natural advantages and the way that it is produced using inexhaustible assets [11]. Biodiesel has exhibited various promising attributes, including decrease of fumes discharges [12]. Albeit momentary tests utilizing flawless vegetable oil showed promising outcomes, longer tests prompted injector coking, more motor stores, ring staying and thickening of the

motor oil. These encounters prompted the utilization of adjusted vegetable oil as a fuel. Despite the fact that there are numerous ways and systems to change over vegetable oil into a Diesel like fuel, the trans-esterification process was viewed as the most practical oil adjustment process [13]. Over 100 years prior, Rudolph Diesel tried vegetable oil as the fuel for his motor [14]. Albeit vegetable oils can be utilized in diesel motors yet because of high consistency, low unpredictability and unfortunate virus stream properties it creates many issues [15]. There are in excess of 350 oil bearing harvests recognized, among which just sunflower, safflower, soybean, cottonseed, rapeseed and nut oils are considered as possible elective powers for Diesel motors [16]. Trans-esterification was notable as soon as 1864, when Rochleder portrayed glycerol readiness through ethanolysis of castor oil [17-18].

II. EXPERIMENTAL PROCEDURE

At 1450rpm rated speed maintaining 22 degree BTDC(Before Top Dead Centre), the experiments are carried out for diesel and biodiesel. The experiments were conducted using B10 (10% WCOME, 100% diesel), B20 (20% WCOME, 80% diesel), B30 (30% WCOME, 70% diesel), B40 (40% WCOME, 60% diesel) under different load conditions on the engine and the results are presented in Table 3. The Injection Pressure was varied (160, 180, 200 and 220 bar). After each experiment the fuel was replaced and cleaned and the engine was left idle for about 30min without operating to stabilize for the next test. Figure 1 shows the whole engine assembly used for the experiment. The engine exhaust (CO, HC, CO2, O2, and NOx) was analysed and calculated by AVL DIG AS 444 gas analyser fitted with DIGAS SAMPLER at the exhaust. The orthogonal array selected for the present research work is given below.

TABLE 1: ASSIGNMENT OF THE LEVELS FOR L16 ORTHOGONAL ARRAY FOR ENGINE PERFORMANCE STUDY

PARAMETERS	UNIT	NOTATION	LIMITS			
			Level 1	Level 2	Level 3	Level 4
Load (A)	%	L	25%	50%	75%	100%
Bio-diesel (B)	%	WCOME	B10	B20	B30	B40
Nanoparticles (C)	ppm	AONP	0	25	50	75
Injection Pressure (D)	bar	IP	160	180	200	220

TABLE 2: DESIGN OF MATRIX FOR ENGINE PERFORMANCE OF WCOME/AL2O3 BIODIESEL USING L16 ORTHOGONAL ARRAY

Exp no.	Design of matrix				Load (A)	Bio-diesel (B)	Nanoparticles (C)	Injection Pressure (D)
	A	B	C	D				
1	1	1	1	1	25%	B10	0	160
2	1	2	2	2	25%	B20	25	180
3	1	3	3	3	25%	B30	50	200
4	1	4	4	4	25%	B40	75	220
5	2	1	2	3	50%	B10	25	200
6	2	2	1	4	50%	B20	0	220
7	2	3	4	1	50%	B30	75	160
8	2	4	3	2	50%	B40	50	180
9	3	1	3	4	75%	B10	50	220
10	3	2	4	3	75%	B20	75	200
11	3	3	1	2	75%	B30	0	180
12	3	4	2	1	75%	B40	25	160
13	4	1	4	2	100%	B10	75	180
14	4	2	3	1	100%	B20	50	160
15	4	3	2	4	100%	B30	25	220
16	4	4	1	3	100%	B40	0	200

III. RESULTS AND DISCUSSIONS

Load and injection pressure have zero effect on the properties of WCOME/AONP biodiesel blends. Hence

these variables can be neglected during the characterization of biodiesel.

TABLE 3: EXPERIMENTAL RESULTS FOR FUEL PROPERTIES OF WASTE COOKING OIL BIODIESEL WITH NANO ADDITIVES AND DIESEL BLENDS

Sl No	Biodiesel (%)	Nano particles (ppm)	Kinematic Viscosity @38°C cst	Density @38°C kg/m³	Flash Point °C	Fire Point °C	Calorific Value kJ/kg
1	B10	0	3.000	834.800	69.500	90.000	41950.000
2	B20	25	3.340	841.700	72.300	93.100	41521.000
3	B30	50	3.707	847.038	74.792	95.5578	41061.497
4	B40	75	4.015	846.532	75.660	95.200	40361.520
5	B10	50	3.064	839.579	70.6666	91.4667	42159.750
6	B20	0	3.300	838.500	71.5050	92.000	41400.000
7	B30	75	3.695	845.816	74.3639	94.4447	41020.382
8	B40	50	4.078	850.7922	76.9444	97.7072	40523.146
9	B10	50	3.064	839.579	70.6666	91.4667	42159.750
10	B20	75	3.400	845.100	73.100	93.700	41690.000
11	B30	0	3.630	842.216	73.558	94.044	40857.211
12	B40	25	4.035	848.371	76.309	96.918	40422.342
13	B10	75	3.129	844.385	71.852	92.959	42370.549
14	B20	50	3.370	843.300	72.700	93.500	41607.000
15	B30	25	3.669	844.627	74.175	94.811	40959.354
16	B40	0	3.993	845.949	75.674	96.134	40321.538

Table 3 shows the experimental results for fuel properties of waste cooking oil biodiesel with varying nano additives and diesel blends. The WCOME was mixed with diesel in a 10% interval with nano additives in a 25ppm interval and then the properties were determined. The main properties under consideration were calorific value, kinematic viscosity and Density. The maximum value of the properties was seen at the biodiesel percentage of 40% and a nano additive of 50ppm except for calorific value which is seen to be maximum for a biodiesel percentage of 10% and nano additives of 75ppm. The results also indicate that the maximum value of properties reaches for the maximum percentage of biodiesel (40%).
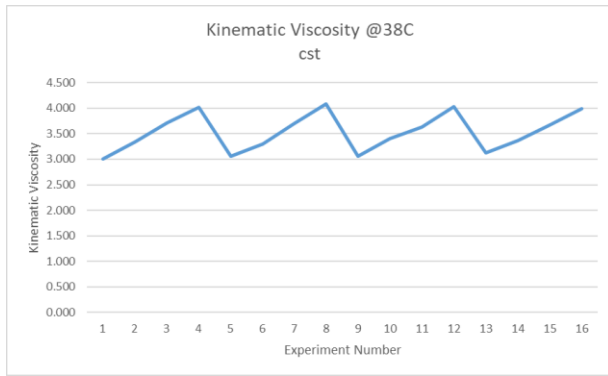
Figure 1: Graphical representation of Kinematic Viscosity vs Experiment Number

Figure 1 gives the graphical representation of kinematic viscosity vs the experiment number. The plot indicates that the value of kinematic viscosity varies with respect to the percentage of the biodiesel in the blends. The presence of nanoparticles improves the kinematic viscosity with increase in the amount of AONP in the blend. This is clearly indicated in the graph with the comparison of changes between exp numbers 5 to 6, 9 to 10 and 13 to 14. The percentages of change are 7.7%, 10.96% and 7.7%.
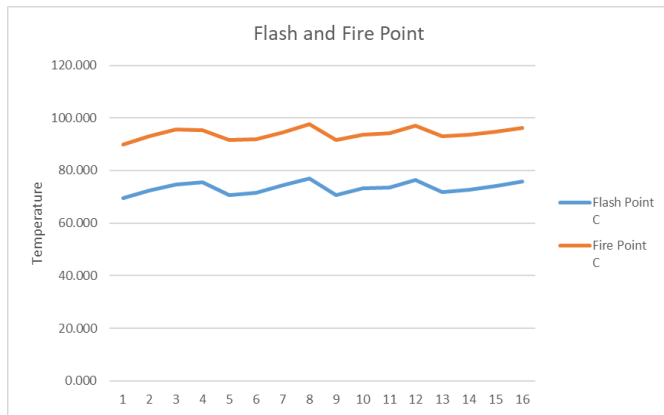

Figure 2 : Graphical representation of Temperature vs Experiment Number

Figure 2 gives the graphical representation of flash and fire point temperature vs experiment number. The plot indicates that the value of flash and fire point vary within a range of values indicating that the percentage of biodiesel and the percentage of nanoparticles have a low impact on the flash and fire point of the samples. The variation of temperature is in the range of 90°C and 97°C for Fire point and between 69.5°C and 76.944°C for the flash point.
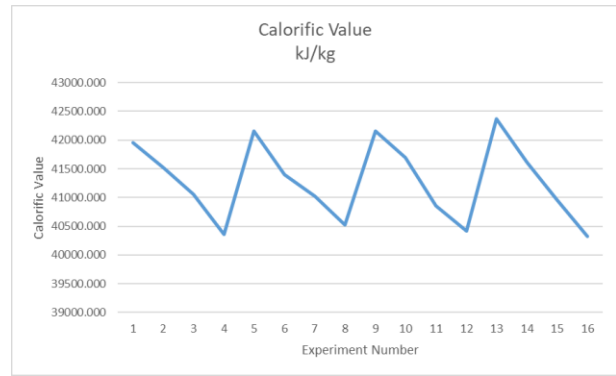
Figure 3: Graphical representation of Calorific Value vs Experiment Number

Figure 3 gives the graphical representation of calorific value vs the experiment number. The plot indicates that the calorific value varies with respect to the percentage of the biodiesel in the blends within a certain range. The presence of nanoparticles improves the calorific value with increase in the amount of AONP in the blend. This is clearly indicated in the graph with the comparison of changes between exp numbers 5 to 8 and 9 to 12. The percentages of change are 4% and 4.3% respectively.

IV. CONCLUSIONS

The present work investigates the suitability of different biodiesel blends as an alternative for diesel fuel. The work was initiated by an extensive literature survey which identified the shortcomings of the present research done on the selected non-edible oils. The research review helped in selecting the non-edible oil and the nano additives for biodiesel production and characterization. The properties of the methyl esters of these samples were compared with diesel to understand their suitability.

Transesterification process was performed on the oils to extract methyl ester of the oils and their properties like density, viscosity, calorific value were measured. After this, the biodiesel was mixed with diesel to get different blends ready for comparison. The properties of the blends were measured and the Engine performance test was performed. The test results noted were Brake Power, Brake Specific Fuel

Consumption, brake thermal Efficiency and Exhaust gas Temperature. The exhaust gas analysis was also performed to understand the effect of biodiesel percentage and nanoparticles on the exhaust gases.

The results, under the given conditions, show that the individual parameter analysis of the engine performance parameters give a single point of optimum value. Considering all the parameters and analyses, the optimum value of the engine performance parameter are 50% load, 20% biodiesel, 25ppm nanoparticles and 200Bar of injection pressure.

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Smart Vehicle Tracking System Using Internet of Things

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ABSTRACT

Due to increase in population the burden on public transportation the remote user needs a smart vehicle monitorinng system which provides the information about the bus, such as a current location of the bus and route between the stops. To overcome all the problems of our traditional transportation, we introduced our proposed system called as " Smart Vechicle Tracking System Using IoT". This system is based on a newly evolved concept of IoT. We implemented a Raspberry pie kit along with a GPS receiver into the bus which sends the current location of the bus to the server and also, we have an android application for showing that location on map. Raspberry pi is low-cost device with the higher performance

Keywords: Smart Vechicle Tracking, IoT, GPS receiver

I. INTRODUCTION

Our systems aim is to overcome all the bus transportation problems and design an android application for the clients who want for the user's real-time data about the appropriate bus. The raspberry pi 3 b+ kit implemented into the bus along with GPS receiver. This GPS innovation helps in following the constant data of the transport like current area and route between the stops. With the transport motor turns over, the gadget begins working and constantly refreshes the area of the transport. It sends area facilitates as longitude and scope esteems to the worker. We fostered an android application which is extremely simple to deal with and use. This application can be utilized by the clients, managerial people groups and drivers of those specific transports. Admin and drivers have to provide the login credentials for some authorization decisions. Users don't require any login information to use our application; simply open the application, go the user section and select their bus number to get current location of that bus and also the route.

II. LITERATURE SURVEY

Because of speedy expansion in individuals, there is need for proficient public transportation framework. There is expanded burden on open transportation like vehicle due to individuals. In this way, a distant client

needs an awe-inspiring construction which gives industrious data of transport. Surprising and unforeseen conditions on the streets sway the smooth development of the vehicle structure and the improvement of vehicles. Moreover, typical issues, for example, gridlock, sudden deferrals, haphazardness in pioneer interest, sporadic vehicle dispatching times happen and considering which the timetable of the explorers are affected and they positively need to keep it together for the presence of their individual vehicle. This pioneer weight can be put forth an attempt not to by presenting a construction which gives tireless data about the space and assessed time of appearance of the vehicles.

III. PROPOSED METHODOLOGY

The BUS TRACKING SYSTEM may valuable for following the course and the area of the transport. It should prompt save the appearance holding up a season of the client. The client will effortlessly know the data of the Route and area of the Bus. The framework ought to give the GUI to showing the areas of the transports. Frameworks ought to give the proper area to the client. The information base ought to get refreshed when the area of the get changed. In all climate conditions the framework should work appropriately and give the proper outcome. The framework ought not get closed down inside the functioning time it should work appropriately.

IV. PROPOSED MODEL

System design refers to the core construction of the application; this specifies all the modules which make up the application and how they connect to one another.
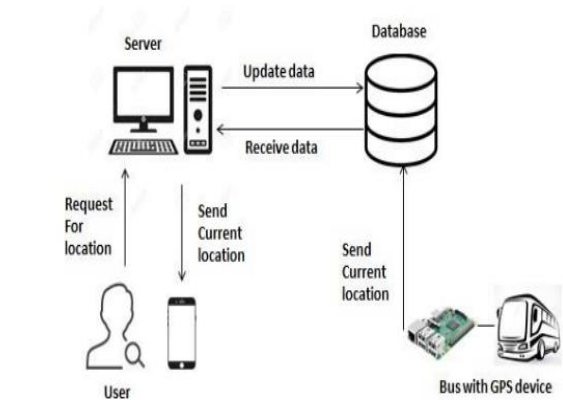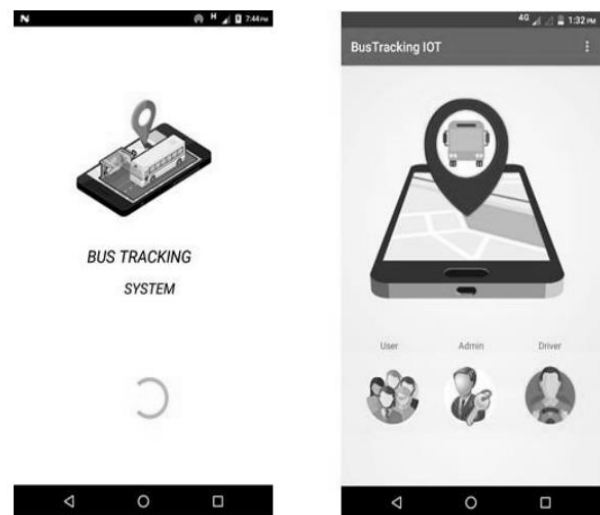

Figure 4.1.1: System Design

V. IMPLEMENTATION

Screenshots:

This is the homepage of BUS TRACKING SYSTEM. Here the user decides whether to login to the website or not.

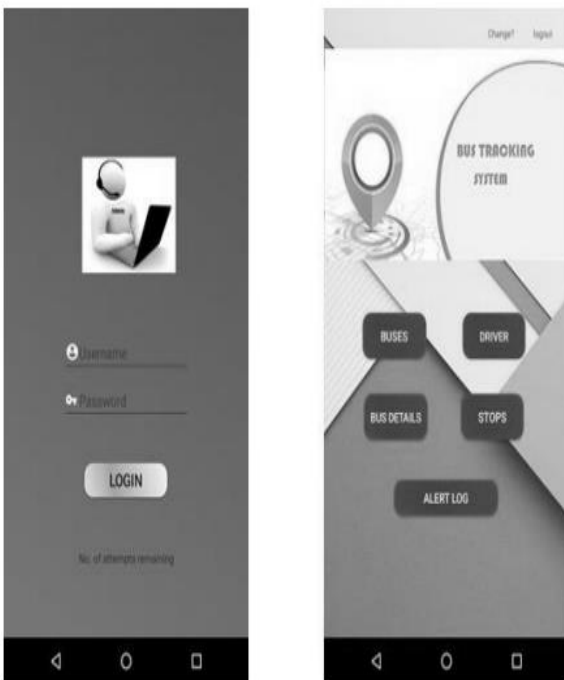
Figure 6.1.2 User module

Figure :6.1.3 Admin module

Figure 6.1.4 Add driver and bus

Figure 6.1.5: Stops and alert log

Figure 6.1.6: Driver module
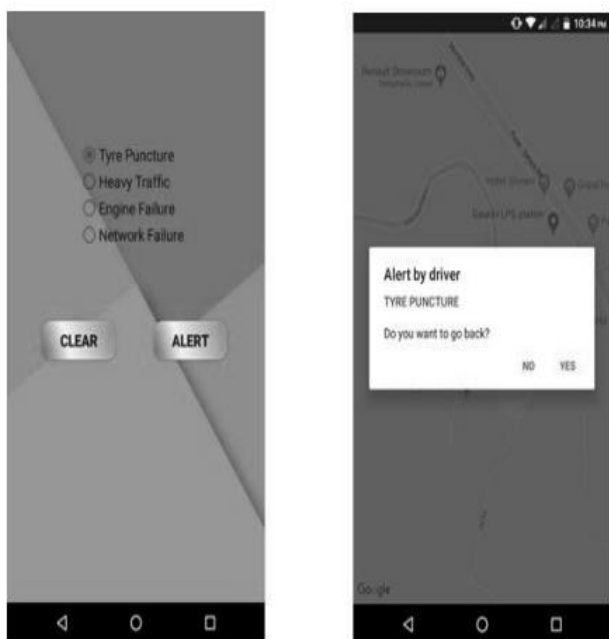
Figure 6.1.7 Send and clear alert

VI. CONCLUSION

The framework tracks the transport at any area whenever. All the current data of transport is put away to the worker and it is recovered to distant clients by means of android application. GPS following monitors transports progressively, telling guardians of youngsters' the particular appearance times that utilizes the transport. This decreases the measure of time understudy need to hang tight for transports to show up, limit their openness to harsh climate and different other risk circumstances they can be confronted while hanging tight for a school transport to show up with the execution of the errand, a complete track ought to be conceivable of the school transports.

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A Novel Frame Work to Improve Security and Performance Issues in Healthcare System using Cloud Computing

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ABSTRACT

Cloud computing became a huge servicing platform to many domains for organizational growth. Virtualization, autonomic, utility computing and service oriented architecture made cloud computing robust. One of the major contributions of cloud computing to the health care systems is prominent one. In this paper we propose a framework that depicts various security and performance issues related to health care domain with the support of cloud computing. Beginning with a device of well known statistics protection the board procedures got from norms of the ISO 27000 own family the principle statistics protection tactics for medical care associations utilising distributed computing could be diagnosed thinking about the number one risks with admire to allotted computing and the sort of facts treated. The distinguished cycles will help a well being with worrying association utilising distributed computing to zero in on the most significant isms methods and lay out and work them at a becoming degree of development thinking about restricted property. We examine dangers and emergencies for medical care suppliers and talk about the effect of distributed computing in such situations. The research is led in an all encompassing manner, considering hierarchical and human angles, medical, it-associated, and utilities-associated takes a chance in addition to joining the angle on the overall gamble the executives. We ruin down risks and emergencies for medical care suppliers and study the impact of dispensed computing in such situations. The research is directed in a complete manner, thinking about hierarchical and human viewpoints, scientific, it-associated, and utilities-associated gambles as well as consolidating the angle on the general gamble the board. On this paper, we assessment about the unique types of problems and problems related with distributed computing in particular execution troubles and disbursed garage protection troubles.

Keywords : Cloud computing, ISMS, Performance, Security, Load Balancing, Health Care System.

I. INTRODUCTION

Distributed computing gives colossal registering administrations to the business for working on the hierarchical development. It takes on the idea of virtualization, administration situated design, autonomic, and utility registering. The cloud has a large number benefits and it is not difficult to carry out with any business rationales. The cloud has a large quantity blessings and it isn't difficult to perform with any business rationales. Cloud conveys administrations from numerous information sources and servers situated on various topographical location yet the client gets unmarried mark of view from the cloud management. As progressions of different regions of innovation increments, various types of problems had been provided in cloud.

In this paper, we assessment about the distinctive types of issues and demanding situations associated with allotted computing especially execution issues and dispensed garage safety problems. Disbursed computing saves time, coins and exertion. At remaining, the paper likewise provides a short conversation approximately one of kind procedures of impromptu introduction of execution in cloud. Cloud is an bobbing up innovation in which the suppliers are offer extraordinary kinds of assistance to basically it areas. Distributed computing is a model for empowering a helpful, on request community admittance to a commonplace pool of configurable processing property (e. g., community, servers, capability, packages and administrations) that may be fast provisioned and added with negligible the executives exertion or expert agency collaboration. Allotted computing offers an internet-based ability, this is used to keep huge measure of information and we will get to information any location we are. Don't hassle conveying any bodily machine with us is the

precept benefit of cloud registering. Due to multi-occupancy, there are many dangers for dispensed garage, as an example, secret records, responsibility of facts and trade of data.

A important assignment for the development of tapping scientific offerings into the cloud is the internal and out understanding and the feasible authorization of protection and safety in allotted computing [1]. However the potential increases executed from the cloud figuring of e-wellness administrations, the records protection continues to be intricate and the security trouble seems to be extra convoluted under the haze model. Disbursed computing as genuinely one of the maximum well-known subjects of information figuring is currently at the listing of factors to get of numerous institutions [3] and one of the maximum significant ebb and go with the flow studies topics [4]. Distributed computing situations supply an awesome danger to present e-well-being administrations in various situations in a possible and straightforward way [5]. One of the primary medical offerings adjustments over the current a few years become the developing hobby in health records safety. Security and safeguarding the protection and safety of well being records are a steady cycle [6]. Specifically the security of wellness data is a primary duty of each medical offerings business enterprise[7]. Thinking about that in line with a security standpoint important cycles and measures must be arranged and accomplished. That is specially widespread whilst re-appropriating facts figuring administrations in a cloud to guarantee a right level of information protection. As a count number of fact a particular structure for protection the executives in distributed computing for hospital therapy does no longer exist. Inside the industrialized international locations clinics are the muse of the clinical offerings framework.

In Germany 18. 620. 422 clinic drugs were led in 2. 017 emergency clinics in 2012 [1]. Like in maximum nations, nearly 50% of the health facility beds are out in the open proprietorship with a growing range of one-of-a-kind scientific clinics [2]. The factor of the scientific clinics is to fix infections, forestall their crumbling, or lighten sickness side effects, with precise body of workers and gear. As a result, scientific clinics are a usually perilous paintings space for patients too as workforce. The emergency sanatorium workforce wishes to control unfriendly events and numerous ability, as an instance, wound contaminations, drug errors, and wrong-website online a medical process [3, 4]. These long-lasting gambles of dangerous circumstances make the clinic area a sizable setting for an appraisal for well-being and chance the executives.

The larger a part of the distributions and concentrates on danger the executives in emergency clinics tended to clinical protection and hazard the board in specific signs, medical subspecialties, or therapy settings, for instance, serious attention or hobby the after. Regardless of this significant series of examination in the area of affected person well-being in unambiguous circumstances there are simply few methodical audits or exhaustive, interdisciplinary methodologies. In mild of an orderly writing audit and companions hypothesized that principally the intercessions and not the authoritative construction and highlights are linked straightforwardly to affected person well-being [8]. In a later work, duckers and ¨ companions make the in a few way disappointing inference that the logical evidence for wellbeing mediations in emergency clinics sincerely is confined and that the systemic nature of the examinations is by using and large powerless [9]. Albeit a new health centre study demonstrates improved consideration regarding the administration of dangers in clinics, we are an extended way from having characterised an normal method for different wellsprings of risks, their exam, evaluation, and remedy [10].

II. RELATED WORK

Not just the dangers straightforwardly connected with patient treatment, yet likewise the persistent legislative medical services change acts and the rising monetary strain on medical services spending are large difficulties for a supportable medical clinic the executives. On the opposite side, data innovation developments are many times considered as a central point to improve quality, productivity, and viability in medical care. As one methodology Electronic Media Records (EMR) vow to further develop productivity what's more, viability of medical care giving cycles. The utilization of electronic information in emergency clinics is pervasive and unavoidable furthermore, the utilization of wellbeing IT is as yet expanding yet as per the latest information still just short of what 33% of the clinics in the US utilize a sort of electronic clinical records .

Due to the sluggish velocity of execution of information innovation the ordinary colossal cost funding funds by using EMR failed to yet workout as expected [14]. With admire to the character of patient consideration there may be just minor development, too [15]. Particularly, scientific experts appear to be commonly hesitant to leave the conventional method of unstructured paper-pencil documentation and to embody it improvements in ordinary affected person attention. Distinct methodologies pass in addition as becoming a member of digital or combined reality [17] as well as smart frameworks [18] in medical care situations. Cloud Computing (CC) is gradually being seen as a crucial development in such way and is with the aid of and massive regarded as one of the most substantial improvements in it.

Be that as it is able to, however the exquisite open doors those statistics innovation invasions to a hospital, those new advancements likewise present dangers to the associations. Safety and safety are the

pertinent risks for clinics in the sort of cloud weather, for the reason that well being information are the most non-public and delicate facts approximately the sufferers. In our project, we broadened the quantity of the in all likelihood use of health it and dispensed computing in clinical clinics, from the "traditional" goals of cost funding budget, fine management, and scientific gamble the board to clinical medical institution emergencies. Desires of the project are to apprehend the unique emergency situations noticed as commonly applicable by using clinic care providers, to evaluate the readiness of clinics to stop, separately, take care of the emergency situations, and to portray and foster it and cloud processing answers for help emergency the board in clinics. The particular focal point of this paper lies on id and remedy of it emergencies.

As a well known rule, an emergency is depicted as "an uncommon situation, or however even discernment, that's past the quantity of ordinary business and which compromises the interest, protection, and notoriety of an affiliation". Moved to medical institution the executives, an emergency are one or various simple occasions which couldn't be sorted with the aid of ordinary proportions of fee the board. A medical hospital emergency is considered as an occasion or a series of events, which may appear either abruptly or which can also carve out possibility to broaden. It brings approximately a massive, urgent difficulty with probably severe ramifications for the emergency hospital and it ought to be tended to proper away.

Clinic emergencies can generally be sorted into normal debacles (i.e., tremors, floods, or flames), critical functional issues (i.e., work force crises, mishaps, and robbery of restrictive information) or remarkable issues (i.e., prisoner circumstances. To distinguish all important emergencies to a emergency clinic, resolving inward problems is additionally vital. As pictured in Figure 1, we ordered emergency clinic emergencies into four regions as per the expert

disciplines impacted by the emergency: clinical consideration, data frameworks (IS), (HR), and supply. In a commitment with the utilization of CC in clinics we present our outcomes from the area of Information Frameworks and Supply.

III. SECURITY AND PERFORMANCE ISSUES

Security Management. In the last years, the continuous increasing dependency of nearly all organizations on appropriate secure information processing was stated practically, in relevant standards and frameworks as well as in the literature. Standards for the management of information security and collections of best practice measures were developed and established. Important standards for the development and operation of an information security management system (hereinafter referred to as "ISMS") are the ISO 270xx as well as the standards of the German Federal Office for Information Security (hereinafter referred to as "BSI") and the IT Grundschutz catalogues of the BSI in the German speaking countries. Core principle of each ISMS standard is the well-known plan-do-check-act cycle which is used to structure ISMS processes.

Security Management in Cloud Computing. Safety, especially, is one of the most argued-approximately troubles inside the cloud computing area and the cornerstone of cloud adoption; numerous institutions look at cloud computing warily due to projected protection risks and security troubles have prevented corporations from truly accepting cloud systems [4]. Studies regarding the integration of safety in cloud computing remains essential. Coping with protection throughout an employer is one of the many business corporation issues that companies must treatment with a view to accomplish their missions. An agency's protection approach and desires need to be framed inside the context of risk . So the specific risks in step with cloud computing want to be assessed and treated in the hazard management method. Particular safety and privacy dangers regarding cloud

Authentication and access control include physical access issues as well as identity and credential management.

shared usage of computing resources (except private clouds if managed by the organization itself)—data in the cloud typically resides in a shared environment, but the data owner should have full control over who has the right to use the data and what they are allowed to do with it once they gain access.

Virtualization has become an indispensable ingredient for almost every cloud and comes with several risks.

Outsourced and distributed computing (except private clouds if managed by the organization itself) depending on the IT outsourcing risk appropriate risk treatment measures need to be developed.

Mobile access/access via internet—it is popular to access the cloud storage by mobile devices; this application suffers data security risk, especially the data leakage and privacy violation problem.

flexible and rapidly changeable services and service providers—the old advice "never touch a running system" cannot be followed anymore in cloud environments built with the intention to enable fast change ,computing, respectively, arise from the following:

According to ISO 27000/27001, ISMS processes, which need to be designed, are

Information security risk assessment process which is an overall process of risk analysis and risk evaluation.

Statistics safety risk remedy technique that's a method to choose and enforce measures to regulate threat, controls are now determined in the course of the process of chance remedy, instead of being selected from ISO 2700.

Aid control method, which ensures that essential sources are decided and provided. Procedures to assure important attention and competence in which the procedure of creating awareness can be appeared as a form of communiqué ,verbal exchange methods, along with inner and outside communiqué as well as advertising for the ISMS, In the health care sector, the general cloud computing risks are concretized as the following.

Availability: as most of the health care providers would be using e-health cloud services, so to work continuously and effectively, services and data should be available all the time without performance degradation.

Reliability: using cloud computing for such a sensitive field requires reliability for the provided services.

Data management: a good database management is required for handling such diversified data.

Scalability: e-health cloud would be having hundreds of health care providers with millions of patients.

Flexibility: different health care providers might be having different requirements.

Interoperability: as there are multiple cloud service providers, services of e-health cloud for a client could be provided by different service providers; therefore they all should work on same framework.

Security: as many service providers could provide the e-health cloud services, and it would be used by many health care providers, therefore their security risk would be very high. When a single health care provider is using its own IT infrastructure then it will not be problem of security as it could monitor its network effectively but on a shared network various authentication methods and access controls would be required.

Privacy: amongst all the issues of e-health cloud, the most important one is privacy.

Organizational change: if e-health cloud is used in a health care organization, then many changes would be done like new policies, procedures, and workflows as well changes in the process of how documentation is done.

Data ownership: in health care sector still there is no clear guideline for ownership of patient's record.

Privacy, trust, and liability issues: as cloud is on Internet, there is a risk of data leakage, private data exposure, and data loss which could result in loss of reputation of health care provider as well as patient's trust.

Usability and end users experiences: e-health cloud success lies in the fact that it is adopted by patients, health care professionals, management, and insurance companies.

Those risks and their consequences need to be analyzed in depth and considered while planning for the usage of cloud services for health care, defining necessary security measures,
and using cloud services.

For this a detailed individual risk assessment needs to be performed.

IV. FRAMEWORK FOR HEALTH CARE SYSTEM

Groups need to discover and control many activities to be able to characteristic effectively and effectively. Any interest the usage of sources desires to be managed to allow the transformation of inputs into outputs the use of a hard and fast of interrelated or interacting sports that is also known as a method. In other words, a process is a set of interrelated or interacting sports which transforms inputs into

outputs. This segment describes the proposed procedure framework designed to guide information protection efforts in preferred as well as an identity of middle isms approaches for cloud computing in health care.

At the same time as coping with statistics security of health care businesses that are the usage of cloud computing needs to do not forget extra beside the middle methods "chance assessment" and "chance remedy." based totally on our experience with such agencies the following isms processes appear to be in particular vital. Requirements control process. Specially for health care the suitable safety of private records wishes to be ensured considering particular felony and compliance requirements like national information protection legal guidelines and health care precise necessities. Additionally questions like "who owns the records?" must be spoke back in this context.

Process to Control Outsourced Processes

Given that cloud computing in its various models is a form of outsourcing of information computing services, the process to control those outsourced processes is key to information security. As recognized from classic outsourcing the compliance of the carrier issuer with the defined necessities should additionally be audited frequently at the same time as the usage of cloud offerings. An multiplied utilization of different and converting subservice companies is frequently used to increase the ability of the carrier provision to keep it always in step with the demand. As a result of this the changing subservice companies and offerings as well as the region of the computing are commonly non transparent for the customer. The concerned service vendors, places, and countries wherein the information computing is achieved in addition to specific safety necessities and measures should be described inside the contract among fitness care business enterprise and cloud provider issuer.

Information Security Incident Management Process

For all massive or informative incidents, fundamental facts (what, who, when, in which, chance, and results) must be logged in order that it may be handed on to the relevant humans (notify), so that you can advise and/or take the essential nearby movement. Thinking about many involved parties using cloud computing incident management tactics for all involved parties and their interfaces should be described to make certain appropriate statistics of the fitness care organisation the usage of cloud computing of applicable incidents. Also for biomedical researchers, those strategies are vital due to the fact their paintings includes photo evaluation, records mining, protein folding, and gene sequencing which requires computing capacity in addition to the right management of information safety.

V. ISSUES IN PERFORMANCE

Assignment in reliability and fault tolerance there are many demanding situations in cloud computing that deals with the building of incredibly reliable complicated packages on allotted resources in huge scale and when you consider that there are extensive offerings, appropriate choice of cloud services as per the requirement, is becoming tough. In this survey paper, we describe frameworks concerning reliability and fault tolerance.

BFT Cloud

BFT cloud is a byzantine fault tolerance framework [3] for constructing sturdy structures in voluntary-aid cloud environments. In trendy, the reliability of cloud programs is greatly inspired through the reliability of cloud modules. This paved the manner to construct high dependable cloud packages. To build dependable cloud applications on the voluntary-useful resource cloud infrastructure, it is extraordinarily crucial to layout a fault tolerance mechanism for managing several faults that consists of node faults like crashing, community faults like disconnection, byzantine faults [4] like malicious behaviours, etc. To consciousness the essential task, we recommend a revolutionary approach, referred to as byzantine fault tolerant cloud (BFT Cloud), for tolerating exclusive types of disasters in voluntary useful resource clouds. BFT cloud employs replication strategies for overwhelming screw ups. BFT cloud also can be included into cloud nodes as a middleware.

Challenge in Load Balancing

Load balancing is dividing the amount of work that a pc has to do between or greater computer systems in order that more work gets accomplished in the equal quantity of time and, in general, all users get served quicker. Load balancing may be carried out with hardware, software, or a aggregate of each. Load balancing optimizes useful resource use, maximizes throughput, minimizes reaction time, and avoids overload [8]. The usage of more than one components with load balancing, in preference to a single thing, might also growth reliability through redundancy. While you apply load balancing throughout runtime, it's far known as dynamic load balancing this will be found out both in an instantaneous or iterative manner in line with the execution node choice.

In the iterative techniques, the very last destination node is determined thru numerous generation steps. Within the direct methods, the final destination node is selected in one step. Those processes goal to decorate the general performance of the cloud and offer the consumer extra gratifying and efficient services.

Goals of Load Balancing

- Goals of load balancing are discussed by authors as
- Significant improvement in performance
- Maintenance of the system stability.
- Increase flexibility of the system.

- Build a fault tolerant system by creating backups.

VI. RESULTS PART

A number of specific crises in hospitals were characterizing the debates in the workshops. In particular in the area of medical malpractice, the "Use of medical devices or implants with defects or insufficient approval" and the "Occurrence of hygiene crises due to organizational deficits" were highlighted by the participants among others. All hospitals are threatened periodically by these problems which pose a significant risk to the economic survival. The fact that the participants (rather from the medical field) consider the crisis "Failure of the edp
system" as one of the top-rated five crises from the field of Medical Care underlines the increasing importance of information systems in health care.

In the second expert workshop, the major crises were collected from the field of information systems and categorized according to their impact on hospitals. In particular, the failure of the information technology infrastructure was identified as crisis. Furthermore, it may be discerned that the threat of cybercrime such as Trojans, viruses, and also social hacking poses a relevant threat to the hospitals. Other major crisis scenarios resulting from menace arise from the treatment of patients. Also in the workshop with participants primarily from the information technology area some crises that affect the IT-support of patient treatment were identified.

Another important aspect within hospital crisis management is the dependence on a variety of external resources. As mentioned hospitals are not only crisis-prone, they also depend on a variety of critical infrastructures. This results in a crises-evaluation in the field of supply.

The energy supply in hospitals is an detail that calls for a specific control, because a modern-day reduction

for some minutes or a blackout ought to have a substantial effect because of inoperative scientific device, hampered communications and transportation, stopped heating, and water deliver. All scenarios ought to generate a crumble in the services. Hospitals wouldn't be capable of paintings if they do now not have a manner to counter the interruption; because of this, it is crucial to have a plan to mitigate and counter any emergency and also to lessen any ability threat. The "lack of strength for greater than 48 hours" changed into highlighted by way of the members as specially critical. Consequently, present gasoline reserves have only to make sure the operation as much as 24 hours . Other key factors from this workshop field have been an epidemic of "fire" and the "spills of dangerous materials". When these events arise they have got a substantial impact on hospitals.

VII. CONCLUSION AND FUTURE WORKS

As shown in this work from the perspective of a health care organization using cloud computing the processes of information security risk assessment, information security risk treatment, the control of outsourced processes, requirements management and information security incident management are key to making sure the precise records safety. Considering this end result and restrained assets as properly as making sure an green use of these assets, now no longer each ISMS procedure ought to be installed and operated on the equal stage of adulthood.

Therefore a fitness care organisation the use of cloud computing ought to recognition at the diagnosed strategies of records safety danger evaluation, records safety danger treatment, the manipulate of outsourced strategies, and necessities control. Particularly for those strategies an ok stage of adulthood is needed. In this context future, paintings is important to increase a more designated framework of ISMS strategies (input, output, and interfaces) and their interplay at an interest stage to ensure the precise interplay of the

ISMS strategies. While now no longer each ISMS procedure wishes the equal stage of adulthood, additionally an technique ought to be evolved to identify the correct stage of adulthood the use of a right adulthood stage version. By thinking about a adulthood stage version for ISMS strategies blended with an technique for the willpower of the important adulthood stage, the appropriateness of an ISMS can be made obvious and useless charges of records governance may be avoided.

Concluding, cloud computing is an emerging generation enables business enterprise and satisfies patron needs thru providing on-name for offerings in a shared environment. Cloud computing is turning into a popular and critical answer for building noticeably dependable programs on disbursed belongings. This paper specially makes a speciality of an outline of cloud computing collectively with the general overall performance troubles. Additionally we had provided a specific idea on reliability and fault tolerance with the aid of using BFT cloud. It's far observed via the numerous troubles related to load balancing collectively with the answers.

Studies on the diverse safety troubles concerning data computing in health care environments has been achieved in the beyond. Whilst distinct researchers reputation on specific issues like get admission to govern or cryptographic controls a broader view at the isms strategies is likewise required. As shown in this work from the attitude of a fitness care company the use of cloud computing the strategies of facts security danger evaluation, data security danger remedy, the manipulate of outsourced strategies, necessities control and facts protection incident management are key to ensuring the precise records safety. Considering this end result and restricted property as well as ensuring an inexperienced use of these assets, now no longer each isms procedure need to be set up and operated on the same degree of maturity. Therefore a fitness care agency the usage of cloud computing must reputation at the identified

techniques of data protection danger assessment, records safety hazard treatment, the manipulate of outsourced techniques, and requirements manipulate. Especially for those strategies an adequate level of adulthood is wanted. On this context future, artwork is critical to boom a extra specified framework of isms techniques (enter, output, and interfaces) and their interplay at an hobby degree to make certain the ideal interplay of the isms techniques. Even as now not every isms process needs the same level of maturity, moreover an method should be advanced to perceive the suitable level of maturity the use of a right maturity degree model. With the aid of considering a adulthood degree version for isms strategies mixed with an technique for the self-discipline of the important adulthood stage, the appropriateness of an isms can be made apparent and vain expenses of records governance can be avoided.

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Comparative Analysis of River, Underground and Pond Water during March 2022 in Rewa, (M.P.) India

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ABSTRACT

The current research concerns over the assessment and comparative analysis of River underground and pond water. The investigation is carried over the samples collected during March 2022. Important physicochemical parameters such as pH, colour, odour, TDS, $CaCO_3$, Alkalinity, turbidity, Mg, Fe, SO_4, NO_3, Total Hardness (THs) etc. all got investigated during the analysis. For correlative study obtained results is then compared with the WHO and BIS standard. It is observed that some of the important parameters deviate from acceptable limits making health impacts when used for drinking purposes and other exploration. So, the concerned health problems also got investigated during the investigation.

Keywords: Analysis of River water, Analysis of underground water, Analysis of pond water, WHO, BIS, Rani Pond, water assessment.

I. INTRODUCTION

Water act as a synonym of life as biological existence impossible anywhere on earth without water. Earth is a blue planet and 80% of earth's surface (80% of the total 50,000 million hectares in area) is covered by water, the hard fact of life is that about 97% of its locked in oceans, sea which is too saline to drink and for direct use for agricultural or industrial purposes [1]. The mineral constituents present in water are directly related to agricultural utilization and its parameters value decides the suitability of water for agricultural purpose [2].

The aquatic biodiversity are threatened primarily by human abuse and mismanagement of both living resources and the ecosystems that support them [3]. The healthy aquatic ecosystem is depended on the physiochemical and biological characteristics Fresh water is a critical, finite, vulnerable, renewable resource on the earth and plays an important role in our living environment, without it, life is impossible [4]. Water quality index is one of the most effective tools to communicate information on the water quality to consumer and policy provider. Thus its outcomes are important parameter for the assessment of groundwater[5].The quality of groundwater is affected by many factors such as physicochemical characteristics of soil, rainfall, weathering of rocks [6].

The life-supporting molecule water used for drinking, agricultural, industrial and other purposes can have different physiochemical ranges. Drinking water is related to metabolic and biochemical activities of human, animals and other livings.

Water can have adverse impacts in livings if it is not present with appropriate ranges as suggested by WHO and BIS. The present research involves the comparison of physiochemical parameters of underground water (samples collected from Nirala Nagar, Rewa), pond water and Beehar river water and its characterization in prospect of human health with reference of WHO and BIS standard permissible and acceptable limits in March 2022. Collected sample from Nirala Nagar underground water, Rani pond water and River Beehar water is labelled as S-I, S-II and S-III respectively.

II. METHODS AND MATERIAL

A. Technical Description of Study Site:

Site-I: The sample site of underground water is located in Rewa with latitude 24.55º and longitude 81.31º in Rewa, M.P. India
Site-II: Second sample site of pond water is located at latitude 24.52º and longitude 81.29º in pandantola Rewa, M.P. India, 5.7 Km away from sample site-I
Site-III: Last River Beehar, sample site-III is located at latitude 24.63º and longitude 81.30º.

B. Sample collection

Samples were collected from different sites, underground water (S-I) collected from Nirala Nagar Site, samples of pond water (S-II) from River Beehar and river water sample (S-III) collected from Beehar river. All the water samples got collected in clean (1:1 HNO_3 solution and then rinsed with distilled water) and transparent plastic bottles, after sample collection all the sample bottles were labelled with sample name

tag (S-I, S-II, and S-III respectively for underground, pond and river water).

Figure 1 : Sample collection site.

C. Physiochemical Analysis

The physiochemical analysis of water is done as per standard procedure of APHA and WHO. Physiochemical parameters like pH, temperature, turbidity, electrical conductivity were measured using calibrated digital equipment. Some parameters like color, odour and taste were determined physically, total dissolved solids, alkalinity, chloride, total hardness, dissolved oxygen, biological oxygen demand, nitrate were analyzed as per the procedure given by standard analytical procedures of APHA.

Temperature of sample was measured with help of digital thermometer. pH of a solution can be electrometrically determined using pH meter in association with pH electrodes. Conductivity meter was used to determine the EC. TDS was measured using water quality analyser (TDS measurement apparatus), Hardness of water is measured by titration against EDTA solution and EBT indicator. Calcium is determined by EDTA titration method with usage of sodium solution, $NH_4C_8H_4N_5O_6$ ammonium salt of acid, EDTA solution and calcium hydroxide solution [7]. Total alkalinity is calculated by titration using HCl solution, methyl orange and phenolphthalein indicator [8]. Sodium (Na), potassium (K) and calcium (Ca) was measured by Flame photometer. Chloride content is determined by using K2Cr2O7 solution and titrated against AgNO3 solution Nitrate content is

measured using Phenol disulphonic acid method [9].   standard procedure of APHA.
All other parameters are also measured according to

TABLE 1: STANDARD LIMITS OF VARIOUS PARAMETERS PRESCRIBED BY WHO AND BIS.

Parameters	WHO (2006)		BIS (1993)	
	Max. Desirable	Max. Permissible	Max. Desirable	Max. Permissible
Temperature (^{o}C)	-	-	-	-
pH	7.0-8.0	6.5-9.2	6.5	8.5
Odour	-	-	-	-
Colour	-	-	-	-
TDS (mg/L)	500	1000	500	1000
Ca^{2+} (mg/L)	75	200	75	200
Mg^{2+} (mg/L)	30	150	30	100
NO_3 (mg/L)	-	-	-	45
K (mg/L)	10	12	-	-
THs (mg/L)	100	500	500	1000
Alkalinity ($CaCO_3$ in mg/L				
Cl (mg/L)	200	600	250	1000
SO_4 (mg/L)	200	400	150	400
F (mg/L)	1	1.5	1	1.5

TABLE 2: ANALYZED RESULTS OF ALL WATER SAMPLES

Parameters	Sample-I (Underground water)	Sample-II (Pond Water)	Sample-III (River Water)
Temperature (^{o}C)	18	18	18
pH	7.81	6.89	7.61
Odour	Unobjectnable	Unobjectnable	Unobjectnable
Colour	Colourless	Light yellowish	Colourless
TDS (mg/L)	591	197	114
Ca^{2+} (mg/L)	104	16.0	14.4
Mg^{2+} (mg/L)	38.4	14.4	8.16
NO_3 (mg/L)	6.5	4.8	Nil
K (mg/L)	-	-	-
THs (mg/L)	420	100	70
Alkalinity ($CaCO_3$ in mg/L	360	100	80
Cl (mg/L)	75	30	20
SO_4 (mg/L)	32	12.8	4.2
F (mg/L)	0.1	0.0	0.0

TABLE 3. WATER CLASSIFICATION ACCORDING TO HARDNESS OF WATER AS PER BIS AND WHO.

Water Classification	Range
Soft Water	0 to 60 mg/L
Moderately Hard Water	61 to120 mg/L
Hard Water	121 to 180 mg/L
Very Hard Water	More or equal to 180 mg/L

III. RESULTS AND DISCUSSION

The variation in physiochemical properties of analyzed water samples of underground, pond and river water (S-I, S-II and S-III) is described in reference of WHO and BIS in table 1.

A. Colour, Odour and Temperature
Odour and colour is the physical feature which defines the cleanness of water[10]. Sample S-I and S-III was found to be colourless with no odour however S-II having light yellow colour. The colour of water may be due to presence of *zooplankton* and *phytoplankton* [10].

B. pH Value
pH value of S-I was recorded as 7.81 which is under desirable limit (WHO 2006, BIS 1993). S-II has pH value 6.89which is permissible limit of WHO but found under desirable standard of BIS. Site-III however have desirable limit 7.61 according to WHO and BIS. pH is the H+ ion power Concentration whose higher presence is due to excess use of carbonates and bicarbonates [11].
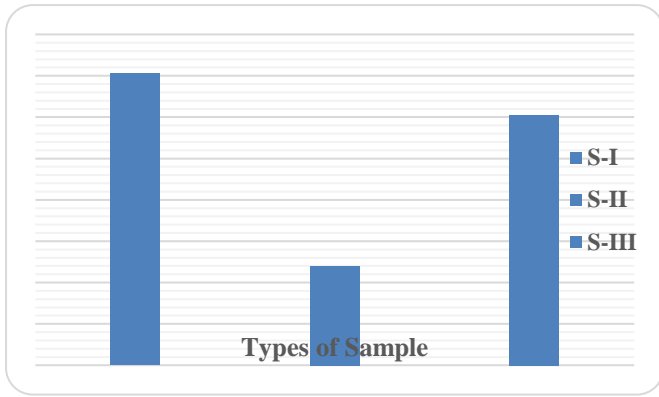
Figure 2: Variation in pH value of water samples.

C. TDS (Total Dissolved Solids)

TDS in S-II and S-III both are with under desirable limit 197 mg/L and 114 mg/L respectively however S-I has TDS 591 mg/L that is value with higher than desirable limit comparison to both standards. High level value of TDS indicates the presence of raised nutrient contents that consequences eutrophication of aquatic system [12].

D. Total Hardness

Sample S-I, S-II, and S-III has net hardness 420, 100 and 70 mg/L respectively. It shown that underground water is very hard and pond and river water is moderately hard.
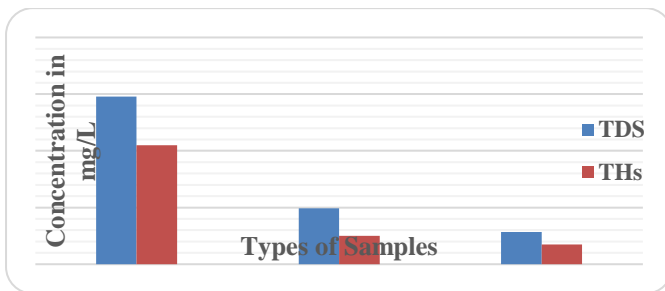

Figure 3: Variation in TDS and THs of water samples.

E. Alkalinity

The highest Alkalinity was recorded in Underground (S-I) water i.e. 360 ppm while in pond and river water have value with 100 and 80 ppm. Increases in total alkalinity during rainy season were due to input of water and dissolution of calcium carbonate ion in the water column [13]. The Alkalinity 124ppm and 180 ppm reported during the comparative study of Beehar river water and underground water of Rewa MP India [14].
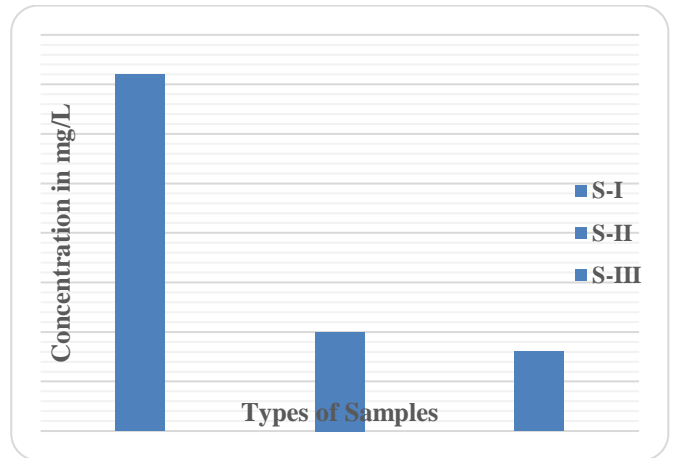

Figure 4: Variation in Alkalinity of water samples

F. Chloride

Chloride content varies 75 mg/L, 30 mg/L and 20 mg/L in sample S-I, S-II and S-III simultaneously. Chloride content in the water passes by solvent action of water on salts dissolved in soil and domestic sewage discharge. The presence of chloride in higher amounts may be due to natural process such as passage of water through natural salt formation in the earth or it may be and indicator of pollution from domestic use [15].

G. Sulphate

32, 12.8, and 4.2 mg/L of SO_4^{2-} concentration was recorded for sample S-I, S-II and S-III respectively. Concentration of sulphate may also changes due to seasonal variation.
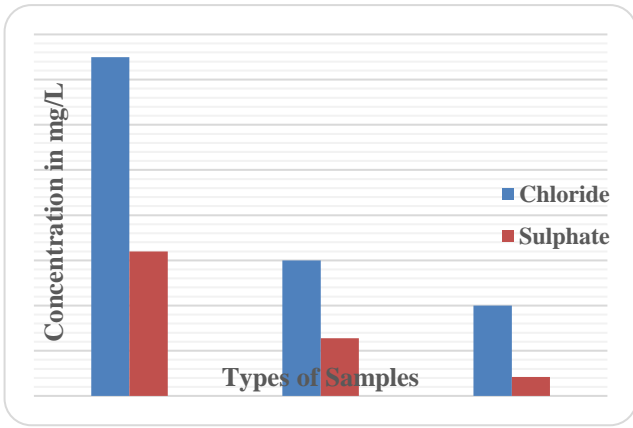
Figure 5: Variation in Chloride and Sulphate of water samples

H. Fluoride

No chloride content was recorded in pond and river water (S-Il and S-III) while 0.1 mg/L was recorded in Underground (S-I) water. The value was under the desirable limit. In study of Kaliyasot River, Bhopal (M.P.) the value of fluoride ranged from minimum 0.33 mg/L at SS2 and maximum 0.86 m g/L at SS5which is relatable to present results [16].

I. Turbidity

Similar value 2.0 of turbidity was revealed in pond and river water (S-I and S-II) while lower value is obtained in Underground water i.e. 1.0 NTU.
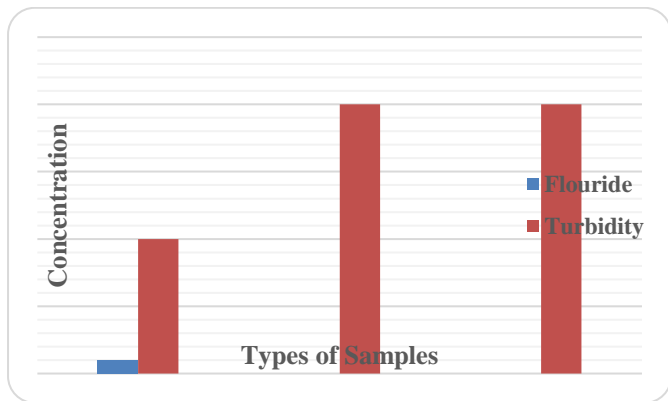

Figure 6: Variation in Fluoride and Turbidity of water samples

J. Calcium

Ca value in S-I was above the desirable limit with value 104 (WHO 2006 and BIS 1993) while S-II and S-III concentration was under the desirable limit.

Previous research found concentration of Calcium in groundwater samples of investigated area varies from 62 mg/L to 88 mg/L with mean value of 74.6 mg/L. Range of Ca content in groundwater depend on the CaCO3 solubility [17].

K. Magnesium

Highest magnesium concentration 38.4 as recorded in Underground water over the pond and river water with value 14.4 and 8.16 mg/L respectively. The finding are got varied with previous data 2.9 mg/L and 12mg/L concentration of Mg was found in Beehar and Underground water during the winter season [18].
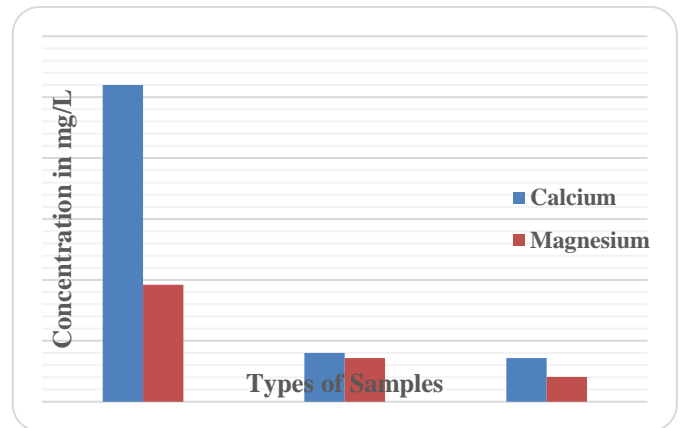

Figure 7: Variation in Calcium and Magnesium of water samples

L. Nitrate

In investigated samples S-III (river water) has no nitrate content, while concentration of 6.5 and 4.8 was recorded in S-I and S-II respectively. Both values are comparable to value of nitrate 1.30 mg/L in April and lowest 0.86 mg/L in October in Kshir Sagar water system of Ujjain M.P. India [19].

The correlation coefficient is a number that reflects how strong a link exists between two parameters. The coefficient might be any number between -1 and 1. Correlation with value 1 shows direct relation, 0 shows no relation while -1 shows inverse relation of the parameters (Table 2. and Fig 9.).
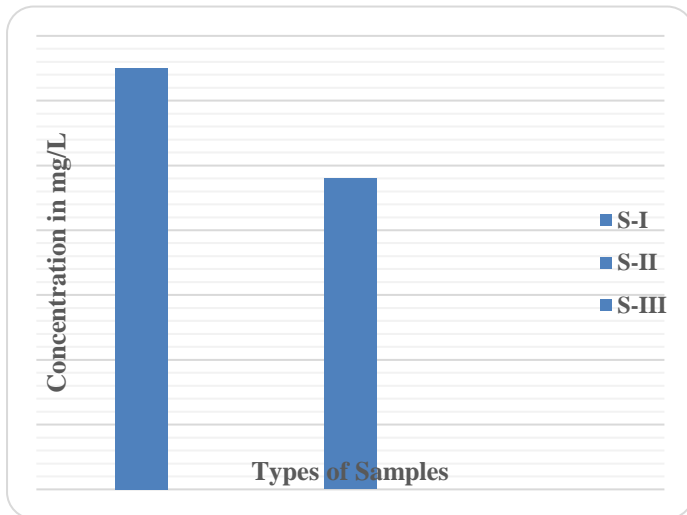
Figure 8: Variation in Nitrate of water samples

M. Correlation Analysis

	pH value	TDS	THs	Calcium	Magnesium	Chloride	Sulphate	Flouride	Turbidity	Nitrate	Alkalinity
S-I	7.81	591	420	104	38.4	75	32	0.1	1	6.5	360
S-II	6.88	197	100	16	14.4	30	12.8	0	2	4.8	100
S-III	7.61	114	70	14.4	8.16	20	4.2	0	2	0	80

Figure 9: Analysed results water Samples (S-I, S-II, and S-III) with various physiochemical parameters
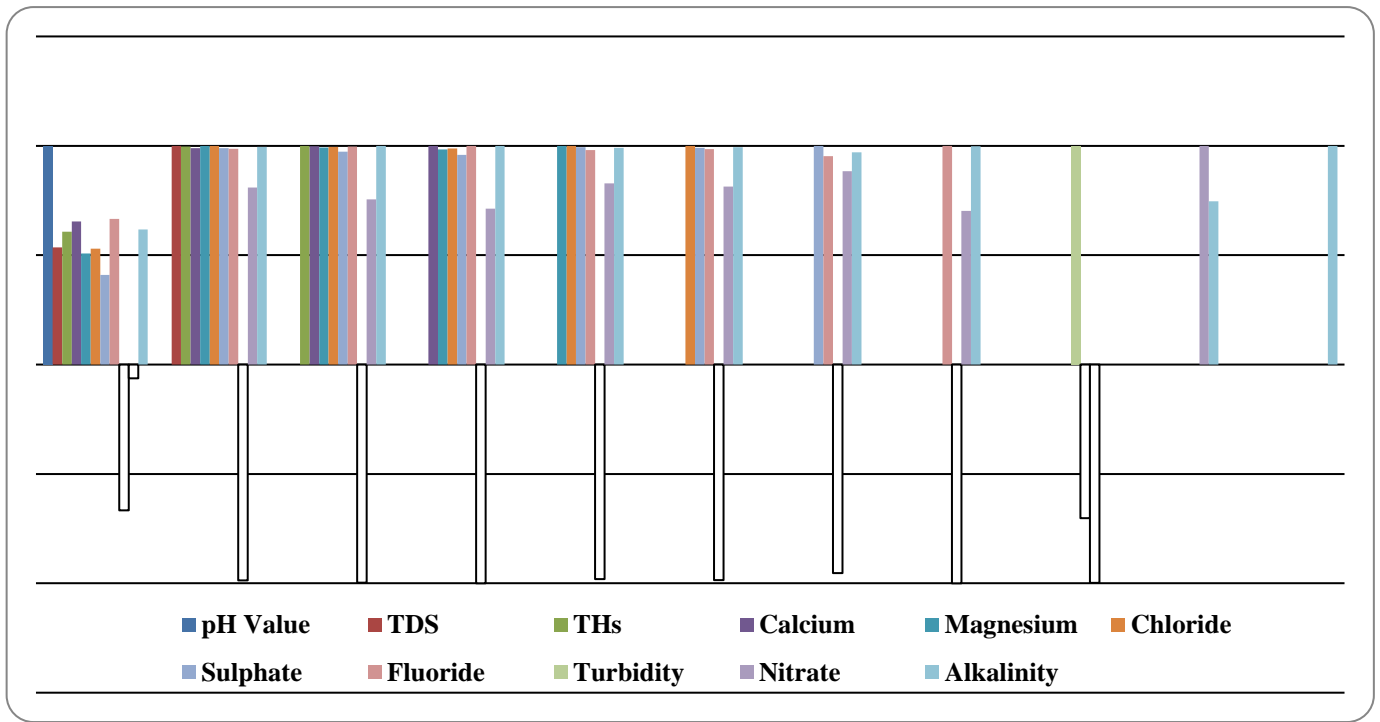
Figure 10: Correlation graph of water Samples (S-I, S-II, and S-III) with various physiochemical parameters

TABLE 4. CORRELATION OF WATER SAMPLES (S-I, S-II, AND S-III) WITH VARIOUS PHYSIOCHEMICAL PARAMETERS.

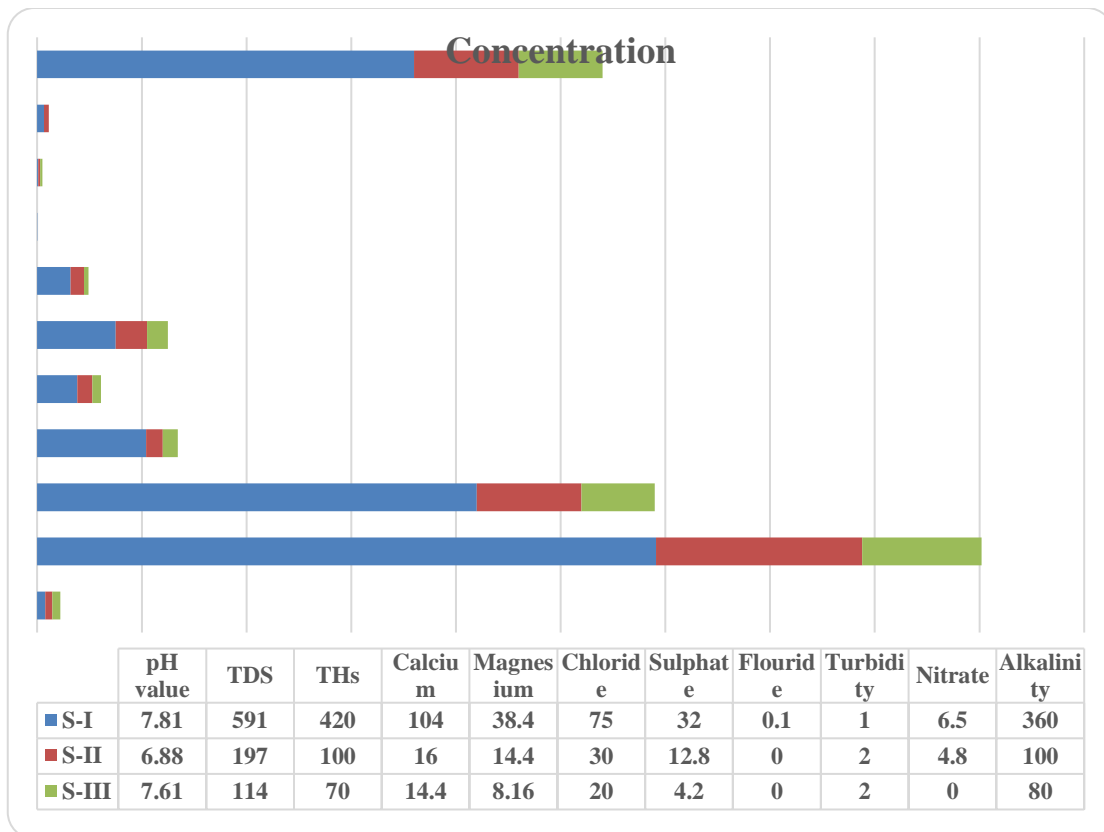| *Parameters*	pH value	TDS	THs	Ca	Mg	Cl	SO₄	F	Turbidity	Nitrate	Alkalinity
pH Value	1										
TDS	0.536049	1									
THs	0.60672	0.996289	1								
Ca	0.654654	0.989072	0.998091	1							
Mg	0.50781	0.999452	0.992894	0.983649	1						
Cl	0.529341	0.999969	0.995575	0.987872	0.999683	1					
SO₄	0.409963	0.989745	0.973777	0.957868	0.993931	0.990846	1				
Fluoride	0.666368	0.986651	0.997006	0.999878	0.98072	0.985329	0.95327	1			
Turbidity	-0.6663	-0.9866	-0.9970	-0.9998	-0.9807	-0.9853	-0.9532	-1	1		

	7	5	1	8	2	3	7				
Nitrate	-0.06292	0.808784	0.755164	0.713238	0.827809	0.81342	0.884499	0.702215	-0.70222	1	
Alkalinity	0.617268	0.995052	0.999911	0.998826	0.991218	0.994234	0.970656	0.997949	-0.99795	0.746354	1

IV. CONCLUSION

In view of present research it is obvious that different samples collected from various water resources have high amount of alkaline material and THs thus it overall alkaline and not potable for drinking purposes. Water sample S-I i.e. Underground water having hardness 420 mg/L is very hard, sample S-II i.e. Pond water of Rani Taalab and Beehar river water (S-III) having hardness value 100 mg/L and 70mg/L respectively are moderately hard. Water with hardness less than 500mg/L is not harmful in nature that's why the all 3 samples are harmless. Up to 1mg/L fluoride is helpful for prevention against tooth decay but only underground water have 0.1mg/L fluoride content which is very less. So all 3 samples shown that it may cause dental problems. Thus it is suggested that it is not suitable for drinking purposes without prior purification and softening.

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छत्तीसगढ़ राज्य के कोरबा जिले में रेशम उद्योग के विकास में विपणन से योगदान समस्या
तथा उनका सुझाव का अध्ययन

होत्री देवी

शोधार्थी पीएचडी वाणिज्य विभाग,

कलिंगा विश्वविद्यालय नया रायपुर (छ.ग.), रायपुर (छ.ग.)

डॉ. अरविंद सक्सेना,

वाणिज्य एवं प्रंबंध विभाग,

कलिंगा विश्वविद्यालय नया

सारांश

रेशम उद्योग भारत की राष्ट्रीय अर्थव्यवस्थाओं में महत्त्वपूर्ण स्थान रखता है। र

छत्तीसगढ़ राज्य के कोरबा जिले में खास तौर पर प्रमुख उद्योग में से एक है। इ

शोध पत्र में छत्तीसगढ़ राज्य के कोरबा जिले के संदर्भ में रेशम उद्योग के विकास

विपणन से योगदान समस्या तथा उनका सुझाव का अध्ययन किया गया हैं। सुं

चमकीली रेशम एक प्राकृतिक फाइबर प्रोटीन से बना पर्यावरण अनुकूल उत्पाद ह

के कारण यह संरक्षित व आरामदायक उत्पाद माना जाता है। यहां ग्रामीणों

आजीविका का मुख्य साधन रेशम उत्पादन करना है, जो प्राकृतिक व पालित

आधारित हैं। लेकिन वर्तमान समय में किसी भी वस्तु का केवल उत्पादन व उपयं

के लिए नहीं बल्कि उसके विक्रय का विस्तार करना भी है । बड़े समूहों में उत्पाद

किए जाने से विपणन का क्षेत्र देश ही नहीं बल्कि विदेशी व्यापार में भी विकरि

किया जा सकता है। वर्तमान में रेशम का उत्पादन आसान है, लेकिन उनका विपण

कार्य अधिक जटील है। अतः हमें चाहिए कि, आधुनिक तकनीकी प्रशिक्षण कार्यक्र

का प्रयोग करके विपणन व्यवस्था को सुधारने की कोशिश की जानी चाहिए। इ

शोध में छत्तीसगढ़ राज्य में रेशम उद्योग के विपणन में होने वाली समस्याअं

चुनौतियों का अध्ययन किया गया है। तथा रेशम उद्योग के विकास में आने वा

समस्याओं को कम करने हेतु सुझाव दिया है।

कि वर्डः- छत्तीसगढ़ राज्य, कोरबा जिले , रेशम उद्योग, विपणन, समस्या,सुझाव

प्रस्तावना

किसी भी देश के विकास में विपणन तकनीकियों की अहम भूमिका होती हैं , जिसके प्रचार-प्रसार से कृषि आधारित उद्योगों को सफलता की उचाइयो पर ले जाया जा सकता है। रेशम उद्योग एक प्राचीन सांस्कृतिक ग्रामीण आधारित उद्योग हैं, जो पहले गांव तक ही सीमित था। अब ये उद्योग देश विदेश तक इसकी मांग बढ़ गई हैं।

रेशम का अर्थ , रेशम (सिल्क)एक सॉफ्ट फाइबर होता हैं, यह फाइबर बहुत हल्का होता है, सिल्क फाइबर का उत्पादन सिल्क वर्म से होता हैं इसलिए इसका नाम एनिमल फाइबर हैं, क्योंकि जब यह कीट है तो यह एनिमल में आयेगा।

विपणन से तात्पर्य, उन गतिविधियों से है जो एक कंपनी किसी उत्पाद या सेवा की खरीद या बिक्री को बढ़ावा देने के लिए करती है। मार्केटिंग में उपभोक्ताओं या अन्य व्यवसायों के लिए विज्ञापन, बिक्री और उत्पादों को वितरित करना शामिल है। कुछ मार्केटिंग किसी कंपनी की ओर से संबद्ध द्वारा की जाती है। निगम के विपणन और प्रचार विभागों में काम करने वाले पेशेवर विज्ञापन के माध्यम से प्रमुख संभावित दर्शकों का ध्यान आकर्षित करना चाहते हैं। प्रचार कुछ दर्शकों के लिए लक्षित होते हैं और इसमें सेलिब्रिटी विज्ञापन, आकर्षक वाक्यांश या नारे, यादगार पैकेजिंग या ग्राफिक डिजाइन और समग्र मीडिया एक्सपोजर शामिल हो सकते हैं।

किसी भी देश की आर्थिक सामाजिक समृद्धि के लिए उद्योग को विकसित करना अति आवश्यक हैं। इसमें सबसे बड़ी भूमिका वस्तुओं के उपभोक्ताओं की होती हैं, इसलिए उपभोक्ताओं को बाजार का राजा कहा जाता हैं। छत्तीसगढ़ के कोरबा जिले में पारम्परिक तसर कोकून से घागा निकालने और उसको वस्त्र बनाने तक का कार्य वर्षों से चलता आ रहा हैं। इससे व्यापारियों में तसर कोकून की मांग हमेशा से रहते आई हैं और मांग की आपूर्ति के लिए वे जिले में प्राकृतिक रूप से उत्पादित तसर कोकून पर आश्रित रहते है। इसी को देखते हुए विभाग ने प्राकृतिक वन क्षेत्रों का उपयोग एवं नए पौधों का वृक्षारोपण को बड़े पैमाने पर प्रोत्साहित किया है। लेकिन परिस्थितियों के अनुकूल किसानों के द्वारा तसर कोकून का गुणात्मक तकनीकियों का प्रयोग कर उत्पादन करने में भी उन्हें अपने उत्पादों को विक्रय कर उचित मूल्य प्राप्त नहीं मिल पाता है क्योंकि यहां ओपन मार्केट की सुविधा नहीं हैं, जिसके कारण यहां का उत्पादन मार खाता हैं।

साहित्य समीक्षा

- गुलजार अहमद खान, और एस नजीर अहमद साहब, 2018 - ''समशीतोष्ण रेशम उत्पादन और प्रासंगिक बाधाओं में उद्यमिता के अवसर'' वास्तविक उत्पादन और लक्ष्यों के बीच इस अंतर को पूरा करने के लिए, किसानों को अपने निवेश, जोखिम और प्रयासों पर अच्छे रिटर्न का एहसास करने के लिए खुद को घरेलू बाजार में केवल उत्पादक-विक्रेता से उत्पादक सह विक्रेता के रूप में बदलने की जरूरत है। किसानों को भी सवालों के जवाब जानने की जरूरत है जैसे कि क्या उत्पादन करना है, कब उत्पादन करना है, कितना उत्पादन करना है, कब और कहां बेचना है, किस कीमत पर और किस रूप में अपनी उपज को बेचना है। युवाओं को इस उद्योग में नए उद्यम उपलब्ध कराकर उन्हें आकर्षित करने की जरूरत है। यद्यपि 90 के दशक की शुरुआत से ही उद्योग राजनीतिक अशांति, विदेशी प्रतिस्पर्धा, कृषि भूमि के निचोड़ने, सफेदपोश नौकरियों, अनियमित विपणन आदि के कारण समस्याओं का सामना कर रहा है। इन समस्याओं के बावजूद, उद्योग अभी भी प्रयास कर रहा है। इस प्रकार वर्तमान समीक्षा पत्र में उद्यमशीलता की क्षमता, सीमित कारकों और

किसानों, युवाओं, अनुसंधान संस्थानों, विश्वविद्यालयों, राज्य विभागों की भूमिका और कश्मीर घाटी में रेशम उत्पादन को अपने पुराने गौरव के लिए विकसित करने के दृष्टिकोण के बारे में विस्तार से चर्चा की गई है।

- रेशमा चंदन, शाइकी 2017- वर्तमान अध्ययन ''अर्थशास्त्र का रेशम उत्पादन और आंध्र प्रदेश के कुरनूल जिले में कोकून का प्रसंस्करण'' का अध्ययन शहतूत पत्ती उत्पादन और कोकून उत्पादन की लागत का अध्ययन करने, विपणन पहलुओं और कोकून के प्रसंस्करण, रेशम उत्पादन उद्योग द्वारा सामना की जाने वाली समस्याओं का अध्ययन करने के लिए किया गया था। कोकून का मूल्य व्यवहार।

- सुषमा शर्मा, सोनिया आचार्य 2021 - ''नेपाल के पश्चिमी भीतरी तराई क्षेत्र में रेशम उत्पादन की उत्पादन गतिविधियां और मूल्य श्रृंखला विश्लेषण अध्ययन'। नेपाल के पश्चिमी भीतरी तराई क्षेत्र में रेशम उत्पादन उत्पादों की संपूर्ण मूल्य श्रृंखला का आकलन करने के उद्देश्य से नवंबर 2019 - फरवरी 2020 में आयोजित किया गया था। इस क्षेत्र में रेशम उत्पादन की शुरुआत कुछ व्यक्तिगत हितों के कारण हुई थी, लेकिन लोकप्रियता और भारी वापसी हुई और खाद्य सुरक्षा और रोजगार के स्रोत के उद्देश्यों को प्राप्त करने के लिए निकला। खोज और शोध के अनुसार, द्वि-वोल्टाइन रेशमकीट (बॉम्बिक्स मोरी) को मुख्य रूप से पाला गया था जो शहतूत के पौधे की पत्तियों पर फीड करता है किसानों के अनुसार दर्ज की गई समस्याएं रेशमकीट पालन और आधुनिक रेशमकीट पालन तकनीकों के दायरे को बढ़ाने के लिए उपयुक्त तकनीक की कमी, उचित सिंचाई सुविधाओं की कमी, और सरकारी सहायता और समर्थन की कमी थी। यह शोध विभिन्न स मस्याओं का समाधान करेगा और क्षेत्रीय रेशम उत्पादन को परिपक्व और लाभदायक बनाने पर जोर देगा।

अध्ययन का उद्देश्य

शोध विषय - रेशम उद्योग के विकास में विपणन का योगदान, छत्तीसगढ़ राज्य के कोरबा जिले के संदर्भ में, निम्न उद्देश्य का अध्ययन किया गया हैः-

1. छत्तीसगढ़ राज्य के कोरबा जिले के रेशम उद्योग में विपणन के योगदान का अध्ययन।

2. छत्तीसगढ़ राज्य में रेशम उद्योग के विपणन में होने वाली समस्याओं / चुनौतियों का अध्ययन।

3. रेशम उद्योग के विकास में आने वाली समस्याओं को कम करने हेतु सुझाव का अध्ययन।

छत्तीसगढ़ राज्य में रेशम उद्योग विकास में विपणन के योगदान

आज का युग प्रतिस्पर्धा का युग हैं , अर्थव्यवस्थाओं को सुदृढ करने के लिए रेशम उत्पाद उद्योग की व्यवस्था करना तथा दूसरा उसका विपणन तकनीकी को बढ़ाना क्योंकि भारतीय किसानों का कृषि स्वरूप उत्पादन आर्थिक विकास के साथ इसमें काफी बदलाव आया है। भारत में रेशम उत्पादन का विपणन अधिक महत्त्वपूर्ण है क्योंकि भारत देश गांवों का स्थान है यहां 64 प्रतिशत भाग कृषि का है। ग्रामीण रेशम आधारित कार्य से अपनी आजीविका प्राप्त करते हैं जो देश की सकल घरेलू उत्पादन का 20 प्रतिशत है। प्रतिस्पर्धा के युग में विपणन संबंधी क्रियाएं दोनों ही वर्तमान समय की मांग हंे ,तभी किसान उत्पादों को अधिक से अधिक लोगों तक पहुंचा सकते है आशायक्ताओं को पूरा कर सकते है। भारत जैसे कृषि प्रधान देश में, यह जानना काफी महत्वपूर्ण है कि क्यों सरकारी योजनाओं में रेशम उत्पादन को महत्व मिल रहा है।

- रेशमकीट के खाद्य पौधे मैदानी इलाकों से शुरू होकर विभिन्न प्रकार की भूमि में उग सकते हैं न्यूनतम वर्षा वाले पहाड़ी क्षेत्रों में।

- विकासशील देशों के सामाजिक-आर्थिक ढांचे में रेशम उत्पादन को महत्व दिया गया क्योंकि इसका अन्य फसलें उगाने के दौरान किसान का खाली समय। तथा इस प्रकार, यह महिलाओं के लिए अधिक उपयुक्त है जो रेशम के कीड़ों को घर के काम के साथ-साथ घर में पाल सकते हैं।

- 'ग्रामीण विकास योजनाओं का समर्थन करता है क्योंकि यह ग्रामीण श्रमिकों को रोजगार देता है।

- ''काम करने वाले ग्रामीण जन के प्रवास को रोकता है, इस प्रकार शहरीकरण को कम करता है''

निम्नलिखित बिंदु रेशम उत्पादन के महत्व पर कुछ और प्रकाश डालते हैं:-

1. व्यक्तिगत स्तर पर /पारिवारिक स्तर पर अच्छा रिटर्न देता है।

2. कम निवेश से शुरू किया जा सकता है।

3. न्यूनतम तकनीकी कौशल के साथ अभ्यास किया जा सकता है।

4. एक एकड़ शहतूत की खेती

5. लोगों के लिए रोजगार पैदा करता है

6. एक हेक्टेयर में से शहतूत की खेती और रेशमकीट पालन से 5,000 का उत्पादन होता है

7. ''वर्ष भर में कम अंतराल पर आय प्रदान करता है।

8. ''छोटे और सीमांत कृषि जोत के लिए अधिक उपयुक्त हैं।

छत्तीसगढ़ राज्य में रेशम उद्योग के विपणन में होने वाली समस्याओं / चुनौतियों

1. मध्यस्थ की अधिकता छत्तीसगढ़ राज्य के कोरबा जिले में रेशम उत्पादन में लगे किसानों एवं अंतिम उपभोक्ता के बीच मध्यस्थ या बिचैलियों की एक बड़ी संख्या होती हैं इससे किसानों को जहां उपज का कम मूल्य प्राप्त होता है वहीं उपभोक्ताओं को ऊंची कीमत चुकानी पड़ती है।

2. तसर कोकून का ओपन मार्केट या खुला बाजार ना होने की वजह से इसका उत्पादन मार खाता हैं।

3. छत्तीसगढ़ राज्य में कोकून के संरक्षण तथा विक्रय के लिए केवल एक ही कोकून बैंक होने की वजह से किसानों को विक्रय करने के लिए बाजार नहीं मिल पाता है।

4. छत्तीसगढ़ सरकार द्वारा रेशम के उत्पाद के विक्रय के लिए किसी भी प्रकार का विपणन चैनल्स का प्रयोग नहीं किया जाता है।

5. क्रेताओं द्वारा तसर कोकून का क्रय थोक मूल्य के आधार पर किया जाता है। जिसकी वजह से किसानों को उचित मूल्य नहीं प्राप्त हो पाता ,क्योंकि सरकार ने रेशम उत्पादों को उनके गुणवत्ता के आधार पर जो वर्गीकृत किया है, उसके लिए कोई उचित निम्न तथा उच्च राशियों का निर्धारण नहीं किया है।

6. गांव में बिक्री किसान कुल उत्पादन का एक बड़ा हिस्सा गांव के महाजन तथा व्यापारियों को बेच देते हैं। अधिकांश किसान महाजनों के ऋण से दबे होते हैं। तथा इस बात के लिए जोर डालते हैं कि फसल उन्हें बेच दे। वह किसान को फसल का उचित मूल्य भी नहीं देते।

रेशम उद्योग के विकास में विपणन सम्बन्धी आने वाली बाधाओं को दूर करने के सुझाव

1. छत्तीसगढ़ के कोरबा जिले में रेशम उद्योग को बढ़ावा देने के लिए सरकार की ओर से बुनियाद मशीन, लगभग 400 किसानों को प्रशिक्षण कार्यक्रम के आधार पर उपलब्ध कराया गया हैं। जिससे उत्पादन बहुत बढ़ गया है ताकि उत्पाद का उचित मूल्य प्राप्त हो सके उसके लिए ओपन मार्केट की व्यवस्था करना अति आवश्यक हैं।

2. किसानों द्वारा जो रेशम उत्पाद निर्माण किया जा रहा हैं, उसका और अधिक लाभ प्राप्त करने के लिए उत्पाद ब्रांड तैयार कर उसे प्रतिस्पर्धा एवं मांग के अनुरूप तैयार किया जाना चाहिए ताकि सही मूल्य प्राप्त किया जा सकें है।

3. कोकून के संरक्षण तथा विक्रय के लिए जो केवल एक ही कोकून बैंक है, उनकी संख्याओं को बढ़ाया जाना चाहिए।

4. रेशम के विक्रय के लिए सहकारी विपणन व्यवस्था को लागू किया जाए, तो इससे कृषकों को रेशम उत्पाद का सही मूल्य प्राप्त हो पाएगा।

संदर्भ ग्रंथ सूची

➢ भुवन कुमार गुप्ता 2012- भारत में रेशम उद्योगः आय और रोजगार के लिए एक बढ़ता हुआ क्षेत्र अनुसंधानिका 4 (2), 61, 2012

➢ शर्मा, एस., आचार्य, एस., रेग्मी, एस., पौडेल, ए., और अधिकारी, जी. (2021)। उत्पादन गतिविधियाँ और नेपाल के पश्चिमी भीतरी तराई क्षेत्र में रेशम उत्पादन का मूल्य श्रृंखला विश्लेषण। इंटरनेशनल जर्नल ऑफ सोशल साइंसेज एंड मैनेजमेंट, 8(2), 362-371।

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Etiological Agents of Urinary Tract Infection (UTI)

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ABSTRACT

Urinary tract infection is one of the most common infectious diseases and has a high financial burden on society. The occurrence of urinary tract infection acquired by the population is higher in young women, almost half of all women will have at least one UTI episode during their lifetime, and about 1 in 3 women will have at least one UTI episode at the age of 24 years. Urinary tract infection increases with age for both sexes. It is estimated that 10 percent of men and 20 percent of women over 65 years of age have bacterial symptoms. Worldwide, Community-associated UTI (CAUTI) prevalence is 0.7% and the main risk factors are age, sexual activity, history of urinary tract infection, and diabetes. UTI is caused by Gram-negative and Gram-positive bacteria, where more than 95 % of UTI cases are caused by bacteria. Gram-negative organisms, primarily from the Enterobacteriaceae family, are responsible for UTI. It includes Escherichia coli (74.20 %), Enterococcus spp (5.30 %), Staphylococcus saprophyticus (1.40 %) Pseudomonas spp. (3.20 %), Klebsiella pneumoniae (6.20 %), and Proteus mirabilis (2.00 %) are among the bacteria that cause UTIs, with other bacteria accounting for 8.70 % .The aim of this review is to provide a summary and critical evaluation of the published evidence about the etiological agents of urinary tract infection.

Keywords : Urinary Tract Infection (UTI), UTI Etiological, Gram Negative Uropathogens, Gram- Positive Uropathogens.

I. INTRODUCTION

Urinary tract infection (UTI) is a bacterial infection that affects any region of the urinary tract. Urine normally does not include bacteria, although the fact that it contains a range of fluids, salts, and waste products. When bacteria enters the bladder or kidney and reproduces in the urine. The global incidence of urinary tract infections (UTI) is estimated to be over 150 million cases per year. Approximately 40% of women and 12% of men will have at least one symptomatic UTI in their lifetime, with 25% of affected women experiencing recurrent UTI (RUTI) [1]. Therefore, most UTI is caused by bacteria, and this condition is called asymptomatic bacteriuria when they occur in the urine without causing

symptoms; when bacterial development contributes to symptoms, this condition is referred to as symptomatic bacteriuria, and depending on localized or systemic extension, urinary tract infections can manifest as bacteriuria with limited clinical symptoms and sepsis [2]. According to studies from European countries and the USA, ca. For UTIs, 15% of all community-prescribed antibiotics are administered. Urinary tract infection is responsible for many annual hospitalizations, especially among the elderly; the number of emergency admissions of elderly people with a primary diagnosis of UTI in the United Kingdom saw a 200 percent rise from 2001/2002 to 2012/2013, in parallel with a similar increase in bedding days, which is the second highest increase (in absolute terms) among groups of conditions. It is suspected, however, that UTIs have been substantially over-coded in recent years: part of the increase could be due to improvements in coding practice, partly due to the increased production of antibiotic resistance. UTIs account for at least 40% of all hospital infections, however, and most of them occur after catheterization, which is known to be one of the key risk factors associated with the onset of UTI [3]. On the opposite side, Infectious disease outbreaks are a major public health concern, especially in developing countries, even though they are on the decline in developed countries. Infectious diseases account for about 40% of morbidity in developing countries, where about 75% of the world's population lives, while it is just 4% in developed countries [4]. Infectious diseases are now one of the leading causes of death worldwide, and attempts to prevent and monitor their spread account for the majority of US global health spending [5]. The bacteria that cause urinary tract infections typically enter the bladder via the urethra. However, infection can potentially spread through the blood or lymphatic system. It is believed that the bacteria are usually transmitted to the urethra from the bowel Figure (1) [6].
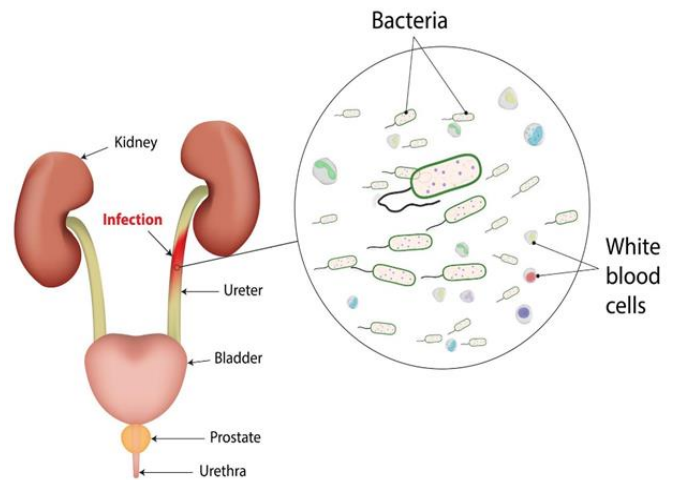

Figure [1] Urinary Tract Infection (UTI)

As shown, urinary tract infection causes the lining of the urinary tract to become red and irritated – inflammation [7]. Most infections involve the lowest urinary tract: the bladder and the urethra. Urinary tract infections do not always cause symptoms [8].
 In all classes of age, these occur. Among infants and newborns, boys are more impacted than girls. Significant underlying congenital defects are usually present when the urinary tract is the source of neonatal sepsis [9 & 10]

II. Objective of the study

The aim of this review is to provide a summary and critical evaluation of the published evidence about the etiological agents of urinary tract infection with focusing on the most common cased Gram Negative and Gram- Positive bacteria that cause UTI.

III. Causes of Urinary Tract Infection UTI

Infection is the penetration of a pathogenic organism into the tissues of the host body, as well as the host's tissues' response to the pathogens and their toxins. Infectious diseases account for 3% of the top ten causes of death and 16% of all deaths per year. Infectious diseases are now one of the leading causes of death worldwide, and attempts to prevent and

monitor their spread account for the majority of US global health spending [5]. Infectious disease outbreaks are a major public health concern, especially in developing countries, even though they are on the decline in developed countries. Infectious diseases account for about 40% of morbidity in developing countries, where about 75% of the world's population lives, while it is just 4% in developed countries [11].

Urinary tract infections are caused by microorganisms; normally, dead bacteria penetrate the urethra and bladder, causing inflammation and infection. While urethral and bladder infections are the most common, bacteria may also pass through the ureters and invade the kidneys. Escherichia coli, a bacterium usually found in the intestine, is responsible for more than 85-90% of bladder infections –cystitis [12].

The urethra may be infected with Chlamydia and Mycoplasma bacteria, but not the bladder. UTIs are given different names depending on where they occur. For example:

- Cystitis is the medical term for a bladder infection.
- Urethritis is an inflammation of the urethra.
- Pyelonephritis is the medical term for a kidney infection.
- The ureters are very rarely the site of infection.

In 5–10% of cases, Staphylococcus saprophyticus is to blame [13].

Healthcare-related urinary tract infections (mostly related to urinary catheters) include a much broader range of pathogens including: E. coli (27 %), Klebsiella (11 %), Pseudomonas (11 %), Candida albicans (9 %), and Enterococcus (7%) among others (6,14 &15].

Infections of the urinary tract caused by Staphylococcus aureus typically occur as a result of infections spread through the blood [16].The urethra may be infected with Chlamydia trachomatis and genital mycoplasma, but not the bladder. Rather than a urinary tract infection, these infections are commonly known as urethritis [17].

IV. Classifications of UTI Clinically

UTI is classified on the basis of clinical symptoms, laboratory data, and microbiological findings and is usually divided into uncomplicated and complicated urinary tract infection and urosepsis. [18].

Traditionally, Urinary tract infection is classified into two groups as symptomatic and asymptomatic. An asymptomatic urinary tract or asymptomatic bacteriuria (ABU) is characterized by the presence of bacteria in the urine without clinical signs or symptoms of a host UTIs [13]. Based on the site of the infection, its severity, and / or the complexity of the infection, UTI symptoms are classified as follows:

Lower UTI: The lower urinary tract was defined as a urinary tract infection without involvement of the renal parenchyma and with normal renal scintigraphy. Lower UTI (cystitis) is an infection of the bladder usually caused by bacteria that travel into the urethra from the digestive system [19].

Upper UTI: Intra-renal abscess, pyelonephritis, perinephric abscess (usually late complications of pyelonephritis). Upper UTI or pyelonephritis is an invasive renal parenchyma infection with symptoms such as a triad of fever, kidney angle tenderness, nausea, and vomiting. It may or may not be a symptom of the upper urinary tract. These infections frequently cause urinary infection and common complications, including kidney failure, development of abscesses, and failure of the kidney. It is typically treated with intravenous antibiotics that treat the infection's urine and systemic components [20].

Uncomplicated & Uncomplicated UTI: This is a consequence of bacterial infection and its prevalence is higher among women than among men. This includes the prevalent type of infection that affects the lower and upper tracts, leading to bladder and

kidney infections, such as cystitis and kidney infection.

Uncomplicated UTI - a structurally and neurologically normal urinary tract infection. Simple cystitis of short duration (1-5 days). Structurally / functionally normal urinary tract infection. Uncomplicated infection is an episode of cystic urethritis after bacterial colonization of the mucous membrane of the ureter and bladder.

Complicated UTI – a functional or structural abnormalities (eg, indwelling catheters, renal stones). Patients with a structural or functional abnormality of the urinary tract. Complicated urinary tract infection (UTI) occurs in men and women at any point in their lives and has a tendency to have dangerous consequences leading to death in dangerous conditions.

These infections are very complex and difficult to treat and they are persistent. The complicated urinary tract infections can lead to results such as structural abnormalities that lesions that ability in the urinary tract to expel urine and this in turn provides a better range for bacterial growth as urine is considered to have an appropriate growth medium and leads to dire consequences. In addition, bladder and kidney malfunction and kidney transplantation are other factors of complicated urinary tract infection (10 & 21].

V. Symptoms of Urinary Tract Infection UTI

A urinary tract infection causes the lining of the urinary tract to become red and irritated – inflammation [22]. Most infections involve the lowest urinary tract: the bladder and the urethra. Urinary tract infections do not always cause symptoms. In all classes of age, these occur. Among infants and newborns, boys are more impacted than girls. Significant underlying congenital defects are usually present when the urinary tract is the source of neonatal sepsis. Frequent symptoms of an infection include:

- Strong, persistent urge to urinate.
- Dysuria (painful urination).
- Passing urine frequently in small amounts.
- Pelvic or rectal pain.
- Strong-smelling urine, [8 & 9].

More specific symptoms may be depending on the affected part of the urinary system:

Kidneys (pyelonephritis): These small organs are located on the back of the body. It is the body's filters that extract waste and water from the blood. These stools are converted into urine. It causes the following symptoms:

- Pain in the upper back and side (flank).
- A high fever.
- Chills and Trembling.
- Sickness and/or vomiting [9 & 22]

Bladder (cystitis): The urinary bladder is an organ that collects urine to be excreted through urination after filtering urine through the kidneys. This is commonly called as lower urinary tract infection or bladder infection and affects the bladder. It causes the following symptoms:

- Pressure or spasm in the groin or lower abdomen.
- Feeling the need to urinate despite an empty bladder
- Discomfort in the lower abdomen
- Frequent, painful urination
- Urine that is bloody or discolored [8 & 10].

Urethra (urethritis): Urethritis is an inflammatory disease that affects the male urethra and is commonly caused by an infectious pathogen that is sexually transmitted. Particularly chlamydia and gonorrhea, typically cause urethritis. However, other kinds of bacteria, can cause urethritis as well.

- Urination that is painful or burning
- Discharge caused by urethra

- Urethritis often has no noticeable symptoms [8, 23 & 24].

VI. Treatment of Urinary Tract Infection UTI

Traditionally, treatment for UTIs has consisted of antimicrobial therapy. Several antibiotics have been used in the treatment, including penicillins, sulfanilamide, nitrofurantoin, and cephalexin [13]. As well as a short course of antimicrobials, such as trimethoprim sulfamethoxazole, is used to treat urinary tract infections [25]. Fosfomycin can be used as an effective treatment for both UTIs and complex UTIs, including acute pyelonephritis [26].

In uncomplicated cases can be treated based on symptoms alone, UTIs are treated with a short course of antibiotics such as nitrofurantoin or trimethoprim / sulfamethoxazole [6]. Many of the antibiotics used to treat this condition are becoming increasingly resistant to. Usually a three-day treatment with trimethoprim / sulfamethoxazole or fluoroquinolone will suffice, while nitrofurantoin requires 5-7 days.Fosfomycin may be used as a single dose but it is not effective [27].

Complicated UTIs are more difficult to treat, with more intensive testing, therapy, and follow-up. It may be necessary to identify and treat the underlying problem. Antibiotic resistance is raising concerns regarding the treatment of difficult and recurrent UTIs in the future [28, 29 & 30]. In addition, in some circumstances, a lengthier course of antibiotics or intravenous antibiotics may be required. Further diagnostic testing may be required if symptoms do not improve in two or three days. Phenazopyridine may aid in the relief of symptoms. Antibiotics are rarely needed in people who have bacteria or white blood cells in their urine but no symptoms, with the exception of pregnancy [31]. In those with frequent infections, a brief course of antibiotics can be taken as soon as symptoms appear, while long-term antibiotics can be administered as a prophylactic precaution in those who get infections frequently [6].

Risk factors for UTI

Risk factors specific to women for UTIs include such as:

Pregnancy: The prevalence of bacteriuria increases by roughly 1% during pregnancy. They also confirmed that the risk of bacteriuria increases with the length of pregnancy, rising from 0.8 percent of bacteriuric women in the 12th gestational week to 2% at the end. The prevalence of asymptomatic bacteriuria in pregnancy ranges from 4-7 percent (range 2-11 percent) and is comparable to that of non-pregnant women [32].

Complication in Pregnant Women: The lack of treatment or improper treatment of UTI can lead to obstetric and neonatal complications, early rupture of membranes, premature delivery and labour, intrauterine growth restriction, low birth weight, abortion, and foetal death are among them. Hypertension, preeclampsia, anaemia, chorioamnionitis, endometritis, septicemias and impairment of renal function have all been linked to UTI [33].

Anemia: Bacteriuria in pregnancy was linked to maternal anaemia. On the other hand, found no link between bacteriuria and anaemia.

Diabetes: A study by Renko et al. which investigated whether asymptomatic bacteriuria (ASB) is more common in diabetic patients than in healthy people [34]. Geerlings et al., evaluated the prevalence of UTI and risk factors for asymptomatic bacteriuria (ASB) in women with and without diabetes, and reported that the prevalence of ASB is higher in all diabetic patients compared to control participants [35].

Sexual Activity: UTI has long been associated with sexual activity; hence, uncomplicated UTI has been dubbed honeymoon cystitis. UTIs are most common in women between the ages of 18 and 29, when they are most likely to initiate sexual activity. In this age group, recent, frequent vaginal intercourse is a considerable risk factor [36]. If a woman develops a UTI caused by UPEC, the same UPEC strain is twice as likely to be detected in a urethral or rectal specimen of her most recent sexual partner as an E.

coli strain isolated from her rectal specimen (IDSA, 1999). According to Buckley et al., (1978) 30% of women experience at least a one log rise in germs in the bladder after sexual intercourse. Women who have been sexually active in the last month are six times more likely to become infected, as are women who have a new sexual partner [37].

Contraception: Women who take spermicides for birth control have a higher vaginal pH and are more likely to be colonized by uropathogens, especially E. coli [38]. In comparison to women who do not use spermicide, these women have a five-fold increased risk of infection. The organisms produce hydrogen peroxide and keep the vaginal environment acidic, preventing colonization. The use of diaphragm may contribute to infection regardless of concurrent spermicide use, but because most diaphragm users also use spermicide, quantifying the increased risk owing to the diaphragm is challenging. The use of a spermicide-free birth control pill or condom is not linked to an increased risk of urinary infection [38].

Catheterization: A catheter-associated urinary tract infection (UTI) is a common nosocomial infection. UTIs are more common in those who can't urinate on their own and have to use a catheter [39]. This could include hospitalized people with neurological issues that make controlling their urination challenging [40]. The implantation of a catheter transports bacteria into the bladder and establishes an additional entry point for bacteria; catheter placement raises the risk of UTI by up to fourfold [41]. Urethral catheterization is responsible for 80% of nosocomial UTIs, while genitourinary manipulation is responsible for 5-10%. Catheters introduce germs into the bladder and promote colonization by providing a surface for bacterial adherence and irritating the mucosa [42].

Unhygienic Practices: One of the risk factors for UTI, according to studies, is widespread use of filthy absorbents and poor washing and drying of reused absorbents across Africa, Southeast Asia, and the Middle East. According to a study of Tanzanian women, only 18 percent of them use sanitary pads, with the rest utilising cloth or toilet paper [43]. Another study indicated that between 31 and 56 percent of Nigerian schoolgirls use toilet tissue or fabric to absorb their menstrual blood rather than period pads [44 & 45]. Only around a third of women in Gambia used sanitary pads on a regular basis [46]. In India, studies have indicated that between 43 percent and 88 percent of girls choose to wash and reuse cotton fabric over disposable pads [47].

7. Etiological Agents of Urinary Tract Infection

It is not surprising that many bacteria can grow in the urinary system, and do so frequently because urine is a good way for bacteria to grow. In most circumstances, bacteria that colonise the urinary tract do not cause disease because the host possesses a variety of quick and effective ways to remove bacteria from the urinary system. Urination, as well as the innate and adaptive immunological responses of the host, are examples of these methods. Bacteria that cause UTIs have specific characteristics that allow them to persist in the urinary system, or they live in a host that is weakened in some way, limiting their ability to remove bacteria.

UTI is caused by Gram-negative and Gram-positive bacteria, according to study by Davenport et al., 2017, more than 95 % of UTI cases are caused by bacteria. Gram-negative organisms, primarily from the Enterobacteriaceae family, are responsible for UTI. It includes Escherichia coli (74.20 %), Enterococcus spp. (5.30 %), Staphylococcus saprophyticus (1.40 %) Pseudomonas spp. (3.20 %), Klebsiella pneumoniae (6.20 %), and Proteus mirabilis (2.00 %) are among the bacteria that cause UTIs, with other bacteria accounting for 8.70 % [48]. Normally, dead bacteria penetrate the urethra and bladder, causing inflammation and infection. While urethral and bladder infections are the most common, bacteria may also pass through the ureters and invade the kidneys. Escherichia coli, a bacterium usually found in the intestine, is responsible for more than 85-90% of bladder infections –cystitis [49]. The urethra may be infected with Chlamydia and Mycoplasma

bacteria, but not the bladder. UTIs are given different names depending on where they occur. For example:

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- In 5–10% of cases, Staphylococcus saprophyticus is to blame [13].

Healthcare-related urinary tract infections (mostly related to urinary catheters) include a much broader range of pathogens including E. coli (27 %), Klebsiella (11 %), Pseudomonas (11 %), Candida albicans (9 %), and Enterococcus (7%) among others. Infections of the urinary tract caused by Staphylococcus aureus typically occur as a result of infections spread through the blood. The urethra may be infected with Chlamydia trachomatis and genital mycoplasma, but not the bladder. Rather than a urinary tract infection, these infections are commonly known as urethritis [15, 16, & 17].

A pathogen is usually defined as a microorganism causing disease to its host, and virulence refers to the severity of disease symptoms [50]. Pathogens are taxonomically varied and include bacteria, unicellular and multicellular eukaryotes. Pathogens have an impact on all living organisms. Bacteria abound on the planet, and they can be found in almost any environment. A kilogram of surface seawater contains over ten billion microorganisms on average [51]. Although the average human is made up of roughly 30 trillion cells, he or she also carries a similar amount of bacteria, the most of which are found in the intestines. The vast majority of bacteria we come into contact with have no negative effects and can even be useful, while a small percentage of them can be harmful to human health. A human pathogen is found in around one out of every billion microbial species. In fact, over 1400 human pathogens have been identified, while it is estimated that there are one trillion microbial species on the planet, the vast

majority of them are unknown [52]. Bacterial pathogens are divided into two categories: main or primary pathogens and opportunistic pathogens.

Primary pathogens: are capable of infecting and causing disease in previously healthy people who have their immune systems intact. These bacteria, on the other hand, may be more likely to cause disease in people who have weakened immune systems.

Opportunistic infections: Individuals with healthy immune systems are rarely infected by opportunistic infections. Anatomical and immunological protections these bacteria can only cause disease when these defenses are damaged or degraded, as a result of congenital or acquired disease, immunosuppressive medication, or surgical methods.

Many opportunistic pathogens, such as coagulase-negative staphylococci and E. coli, are found in the normal human flora and are carried on the skin or mucosal surfaces, where they cause no harm and may even be useful by preventing the colonization of other pathogens. Furthermore, introducing these organisms into anatomical locations where they are not ordinarily prevalent, or removing competing bacteria with broad-spectrum antibiotics, could allow for limited proliferation and disease development. The abovementioned classification applies to the vast majority of diseases; nevertheless, within both groups of bacterial pathogens, there are exceptions and variances. The genetic makeup and pathogenicity potential of different strains of the same bacterial species can differ. The majority of Neisseria meningitides strains, are innocuous commensals and are classified as opportunistic bacteria, but some hyper virulent clones of the organism can cause disease in a previously healthy person. People's genetic makeup and susceptibility to invading microorganisms, on the other hand, differ. Mycobacterium tuberculosis, for example, is a main pathogen that does not infect all hosts [53].

7.1 Gram-Negative Uropathogens

7.1.1 Escherichia coli: is a member of Gram-negative rod in shape, facultative anaerobic and motile in

nature. Theodor Escherich was the first to describe this bacterium in 1885 (Lim, 2010). Escherichia coli cells are typically 1.1–1.5 μm wide by 2–6 μm long and occur as single straight rods [54]. E.coli is the normal intestinal flora in both a human being and warm-blooded animals. They are the most common urinary tract pathogens in both the community and hospitals.

In fact, carbapenem-resistant (ESBL) broad-spectrum beta-lactamase-producing strains are a critical priority by the World Health Organization (WHO) as a bacterial pathogen for which new antibiotics must be designed [55].

Urinary tract infection (UTI) bacterial infections present clinically with a variety of signs and symptoms and may be caused by a group of organisms such as the uropathogenic Escherichia coli being the main causative agent of UTI,It is responsible for more than 80% of all community acquired infections.

7.1.2 Klebsiella pneumonia: is a ubiquitous Gram-negative envelope bacterium that is found on the mucosal surfaces of mammals and the environment. After Escherichia coli, Klebsiella is the second most common cause of UTIs. It's an opportunistic bacterial pathogen linked to urinary tract infection [56]. It was identified in 1882 by Carl Friedlander as an encapsulated bacillus after extracting it from the lungs of people who had died of pneumonia [57].

Approximately 12%-15% of urinary tract infection UTI is caused by K. pneumoniae, and its prevalence is rising at an alarming rate all over the world, particularly in Asia [58].

7.1.3 Pseudomonas aeruginosa: is considered the third most prevalent bacteria linked to catheter-associated UTIs in hospitals. It is a human pathogen that can cause serious urinary tract infection (UTI). P. aeruginosa is a non-fermenter gram-negative bacillus with high intrinsic antibiotic resistance. This trait, combined with its rapid propensity to acquire new antibiotic resistance, makes this pathogen a major concern in infectious disease pathology, particularly when it is nosocomial [59].

Several factors have been associated with a reduced survival rate in patients with bacteremia due to P. aeruginosa: age, low functional status, central venous catheter, need for mechanical ventilation, resistance to carbapenems, APACHE score or high Pitt score, respiratory origin bacteremia, severe sepsis, respiratory failure, shock, thrombocytopenia, bedsores, polymicrobial infection, chronic kidney disease, cirrhosis, steroid use, cancer and AIDS. These factors have been linked to the pathogenesis of P. aeruginosa-induced diseases such as respiratory tract infections, burn wound infections, and keratitis [60].

Symptoms of P. aeruginosa vary based on the type of infection. Infection of the Urinary tract infection may cause: Urge to urinate on a regular basis, Urine that is cloudy or bloody, Urination that hurts, Urine has an unpleasant odour. Pelvic pain is a common ailment [61].

7.1.4 Proteus mirabilis: It's a gram-negative bacterium that belongs to the Enterobacteriaceae family. Proteus mirabilis is a frequent pathogen that causes bacteremia in patients with complicated urinary tract infections (UTIs) [62]. P. mirabilis is responsible for 1-10% of all urinary tract infections, depending on the study's geographic area and patient characteristics. This organism seems to be more common in complicated urinary tract infections (such as those in patients with spinal cord damage or structural abnormalities) and contributes significantly to catheter-associated urinary tract infections (CAUTI), accounting for 10-44 percent of long-term CAUTI [63].

A UTI is the most prevalent Proteus mirabilis infection. A UTI can cause the following symptoms: during urinating, you may experience pain or a burning sensation, urine that is cloudy, urination on a regular basis, pain in the abdomen, chills and fever and Fatigue. Furthermore, severe complications such as fever, discomfort, kidney damage, bacteremia, and death might occur.

7.1.5 E.aerogenes: is a Gram-negative, motile, straight rod bacterium that does not produce spores. Colonies

range in colour from beige to off-white and are often round, elevated, and wet with an entire edge. Enterobacter aerogenes has been described as a major opportunistic and multiresistant bacterial infection for humans during the last three decadesin Europe's hospital wards. Several outbreaks of hospital-acquired illnesses have largely documented this Gram-negative bacteria [64].

More than 90% of bacteria detected in cases of urinary tract infections are Enterobacter aerogenes. In addition, unlike other bacterial species and parasites, enterobacteria are found in humans' typical intestinal fora. Furthermore, enterobacteria have been linked to the majority of human illnesses in recent years, including UTIs. According to the National Nosocomial Infections Surveillance System, Enterobacter aerogenes was responsible for between 5% to 7% of hospital-acquired bacteremias in the United States.Enterobacter was shown to be the fifth most common pathogen in urinary tract infections among ICU isolates [65].

7.1.6 N.gonorrhoeae: N. gonorrhoeae was classified as a high priority pathogen. N. Infections with gonorrhoeae primarily affect the mucous membranes of the urethra and cervix, as well as the oropharynx, rectum, and conjunctivae. The incubation period is 1–14 days, but the sickness usually manifests itself in 2–5 days. Acute urethral infection is the most common simple infection in men. Urethral discharge and uncomfortable urination are common in male patients (dysuria).

The majority of infected women have lesser symptoms, and many are asymptomatic. Both sexes are susceptible to asymptomatic N. gonorrhoeae infections, which can go untreated. It's also to blame for a slew of difficulties and side effects that harm women's reproductive systems. The incidence of Neisseria gonorrhoeae infections has increased in recent years, as has its resistance profile to the various antibiotic classes available. According to the Center for Disease Control and Prevention (CDC), Neisseria Gonorrhoeae infection is one of the most important

threats of antibiotic resistance in the United States and the world [66]. Infection with Neisseria gonorrhoeae has been more common in the last decade, especially among young people. According to the World Health Organization (WHO), the number of new cases of gonorrhoea has increased by 21% since 2005, with an estimated 78 million new cases per year. Prevalence and incidence estimates differed by location and gender. Direct approaches (direct examination, culture, molecular biology) are used to diagnose Neisseria gonorrhoeae infections, which are based on the presence of gonococci or their genomes in various places accessible for sample (urethra, cervix, vagina, rectum, pharynx, and urine [67]. The infection of N. gonorrhoeae begins with gonococci adherence to epithelial cells, followed by local cellular invasion. Gonorrhea possesses a number of surface proteins that help it stick together.

7.1.7 A.baumanni: is a Gram-negative bacteria that causes urinary tract infections. It is a member of the Moraxellaceae family. It's frequently linked to the use of urinary catheters or percutaneous nephrostomy tubes. The organism has the ability to accumulate a variety of resistance mechanisms, resulting in the establishment of strains resistant to all currently available antibiotics [68].

A. baumannii is still a prominent and difficult-to-treat pathogen with complex resistance patterns that present considerable hurdles to clinicians. Regarding the ubiquity and interest in A. baumannii infections, there is a scarcity of well-controlled scientific data to aid clinicians in selecting the best empirical and targeted therapy for a variety of infections [69]. A. baumannii is one cause of urinary tract infection. Accounting for only 1.6 percent of ICU-acquired UTIs. In most cases, this bacterium is linked to catheter-related infection or colonisation. In outpatients, A. baumannii rarely causes a serious UTI.

7.2 Gram- Positive Uropathogens

Gram-positive bacteria are a major cause of urinary tract infection (UTI), especially in the elderly, pregnant women, and those with other UTI risk

factors [70]. Gram-negative bacteria are responsible for 75 to 95% of uncomplicated urinary tract infection UTI. Complicated UTIs often occur in nosocomial settings, especially in people who have anatomical or functional changes in the urinary system, as well as underlying renal, metabolic, or immunological problems [71].

7.2.2 Staphylococcus Aureus (SA): is an uncommon isolate in urine cultures and only responsible for (0.5–6% of positive urine cultures), except in patients with risk factors for urinary tract colonization. It is a human pathogen as well as a commensal bacteria. S. aureus has colonised around 30% of the human population [72]. In the general population, Staphylococcus aureus is a relatively infrequent cause of urinary tract infection. Although S. aureus colonisation and infection of the ascending urinary tract is commonly subsequent to staphylococcal bacteremia emerging elsewhere, in some cases, S. aureus colonisation and infection of the ascending urinary tract is caused by S. aureus. Many types of Gram-positive bacteria have been linked to urinary tract infections. The most common human staphylococcal pathogen, Staphylococcus aureus, is a troublesome pathogen in human medicine. As end urology advances technologically, patients are more frequently fitted with various urinary catheters, increasing the risk of urinary tract infection. Gram positive bacteria, such as MRSA, are more common in complex urinary tract infections and hospitalized patients [73 & 74].

7.2.3 Staphylococcus epidermidis: Staphylococcus epidermis's a gram-positive facultative bacteria that formed slime for endocarditis and septicemia adhesions in humans. It is the most prevalent Staphylococcus species that reside on human skin and are coagulase-negative [75]. S. epidermis's currently accounts for nearly 22% of bloodstream infections in intensive care unit patients in the USA. In addition, infections caused by S. epidermis's prevalent in patients with indwelling central venous catheters. When S. epidermis's isolated from blood or body fluids in people who do not have any predisposing circumstances, it is frequently regarded as a contaminant. This bacterium has been linked to urinary tract infections in people who have indwelling urinary catheters or other urinary tract equipment [76].

While S. epidermidis has long been thought to be a urinary contaminant, this assumption should be approached with caution. The likelihood of a S. epidermidis UTI as the cause of the patient's symptoms should be investigated in a symptomatic patient with recurring positive urine cultures. In addition to antibiotic treatment, a thorough examination for underlying urinary tract problems is required [77].

7.2.4 Enterococcus faecalis: is a gram-positive, commensal bacteria that lives in the human digestive system. Most healthy people have E. faecalis, although it can cause endocarditis and sepsis, urinary tract infections (UTIs), meningitis, and other infections in humans [78]. E. faecalis was previously recognized as Streptococcus faecalis until 1984. Scientists previously classified the bacteria as belonging to the Streptococcus genus. E. faecalis is responsible for nearly 80% of human infections, according to the Centers for Disease Control and Prevention (CDC). When the bacteria gets into people's wounds, blood, or urine, it can cause infection. People with compromised immune systems are especially vulnerable, including those who: have a compromised immune system as a result of sickness or surgery are undergoing cancer treatment are on dialysis or having an organ transplant have HIV or AIDS have undergone a root canal [79].

VII. CONCLUSION

Infectious diseases are now one of the leading causes of death worldwide, and attempts to prevent and monitor their spread account for the majority of US global health spending (Infectious diseases, CSIS, May, 2021). Infectious disease outbreaks are a major

public health concern, especially in developing countries, even though they are on the decline in developed countries. Infectious diseases account for about 40% of morbidity in developing countries, where about 75% of the world's population lives, while it is just 4% in developed countries. Urinary tract infections are caused by microorganisms; normally, dead bacteria penetrate the urethra and bladder, causing inflammation and infection. While urethral and bladder infections are the most common, bacteria may also pass through the ureters and invade the kidneys. Clinically, Urinary tract infection (UTI) is a serious public health problem and is caused by a group of pathogens, but the most common by Escherichia coli, a bacterium usually found in the intestine, is responsible for more than 85-90% of bladder infections –cystitis.

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ABSTRACT

Today we deal with safety and safety problems in every element. So, we have to deal with these problems by utilizing upgraded innovation. In this job, we are utilizing the Deal with acknowledgment component to catch human pictures and to suit with kept data source pictures. If it suits with the licensed individual after that the system will open the door by an electro-magnetic secure. The require for face acknowledgment system that's quick and precise that constantly enhancing which can spot intruders and limits all unapproved individuals from extremely protected locations and helps in reducing human mistake. Deal with acknowledgment is throughout a one amongst the primary Protected System compared to biometric pattern acknowledgment method which is utilized in a big range of applications. The moment and precision element are considered regarding the primary issue which defines the efficiency of automated deal with acknowledgment in real-time atmospheres. Different services have been suggested utilizing multicore systems. By thinking about today difficulty, this offers the total building develop and suggests an evaluation for a real-time deal with acknowledgment system with Ficherface formula. In this formula, it transforms the picture from shade to greyscale picture and splits into pixels and it'll be assigned throughout a matrix develop and people pictures will be kept in the data source. If a photo is spotted after that microcontroller will send out power to the electric motor chauffeur system after that the electro-magnetic secure will open the door and it'll secure once again when there's no power provide to that system. Lastly, this paper wraps up for the progressed applications accomplished by incorporating installed system designs versus the convention.

Keywords : Biometric Pattern, Electro-Magnetic, Microcontroller

I. INTRODUCTION

In this new era of technology where people always try something new to make our life easier and for that we invest a lot of our capital and to protect all this we require a strong security management system that should not require contious monitoring from human and should be self servelance. Security is our right

which no one can deny and justify, which requires lots of works and researches. where security is much more important than anything and lock or other traditional ways of locks are not that successful at present date as digital locks provides sense of information and allows to increase the security to next level security helps us to improve our standard of living.

Face recognition and detection is like an ocean of research and innovation, at present with the applications of image analysis and algorithm-based understanding. Face Recognition based door lock system we have proposed system. Facial recognition involves the detection and identification of the image. It uses an image capturing technique in the system using Fisher face algorithm.

The Raspberry pi camera catches the live facial picture and compares it with the images which is stored in the database and provide a quick response time, it is just as polishing or brushing up the security of an organization to another level. The proposed work "Face Recognition based Door lock" will work as a technique which will be integrated on the door, of the room which we want to be secured. The objective of facial recognition is finding a series of data of similar faces in a set of training images in to the database from the input image, If the image captured will match to any of the image stored in database, then the door will be unlocked else it will remain lock.
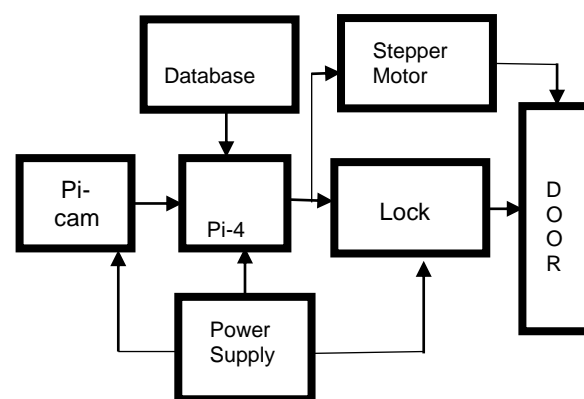
BLOCK DIAGRAM

Fig 1. Block diagram of proposed system

II. LITERATURE SURVEY

Face recognition system are used for Once many decades. it's gained popularity thanks to its applications. [1] designed deal with acknowledgment system utilizing Eigenfaces method that was initially designed by Sirovich and Kirby. This was an advancement for Deal with acknowledgment system and because of this the base of Deal with Acknowledgment Formula was developed. They designed a close to actual time determining system which will spot and track a topics head likewise fete the individual by contrasting particular of deal with to people who are understood. [2] likewise suggested a deal with acknowledgment formula sustained Independent Element Evaluation. The PCA [5] formula is relaxed on the really truth that essential info of picture is included in support smart connection in between pixels whereas ICA is relaxed on the really truth that some essential info might likewise be included within the high- purchase stats. [13] have suggested deal with acknowledgment system utilizing customized ICA for much far better delicacy. [4] suggested a deal with acknowledgment system utilizing PCA to evaluate back Dimensionality and utilized neural network for brace. The neural network based deal with acknowledgment system are naturally influenced and birth like neurons of population which bring indicates from one location to a various. a little bit like neuron a perceptron

determines weighted amount on numerical inputs and identifies if an existing is honoured or otherwise and neural network needs great deal of computational work.

Thus from literary works inspect, it is remove that a great deal of formulas are suggested for deal with acknowledgment system. Therefore this paper suggests Deal with Acknowledgment System by incorporating 2 shown formulas for deal with acknowledgment system PCA and LDA. Both these formulas birth computation of Eigen Worths and Eigen Vectors. Jacobi system is utilized to determine the Eigen Worths and Eigen Vectors. The uniqueness of this method is to prolong acknowledgment price and decreases acknowledgment time. Any type of actual time procedure that requirements deal with acknowledgment system can utilize this method to create Deal with Acknowledgment System utilizing any type of bedded system.

III. PROPOSED METHOD

Camera pi module and implementation of face recognitions algorithm has been provided. In this system a Facial recognition-based door lock system is with the help of Raspberry pi 4B is proposed. And the proposed method for deal with acknowledgment system is fisher deal with technique which is developed to acknowledge the deal with picture by coordinating the outcomes of its function removal. To recognized the tested image is the expectation from the proposed system.

In this research, a data set of 100 facial image taken from 20 students where every student has several different pictures with various facial expression. As stated below proposed system consisting of three phases:
1] Input
2] Processing
3] Output

1]Input phase: -
Input aims to collect resource in the form of facial pictures. The face should be straight in front of camera and make sure that the face is not blocked by other objects. The collection of data is done by the Pi camera module.

1.1 Pi camera
In this proposed system the input data i.e., face images will be taken by the Raspberry Pi camera which is a compatible camera for Raspberry Pi. . All Raspberry Pi video cams can taking high-resolution photos, together with complete HD 1080p video clip, and can be completely regulated programmatically.
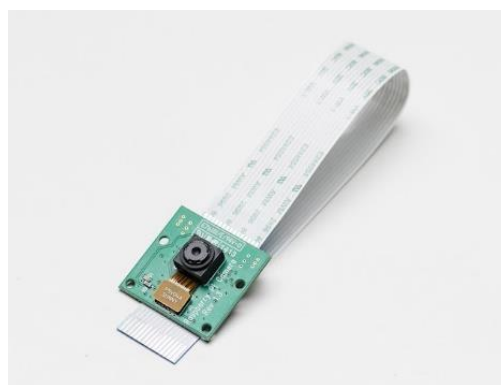

Fig 2. Raspberry pi camera

2] Processing phase: -
In the processing phase the data obtained in the form of face image is then transfer to the next module i.e., Raspberry pi.

2.1 Raspberry pi
The Raspberry Pi is a small device which has many applications and can used in many fields like IoT and automation. it can be programed and reprogramed by various languages like python. In this proposed system Raspberry Pi will take the input i.e., face image and process the given data as per the fisher face method.
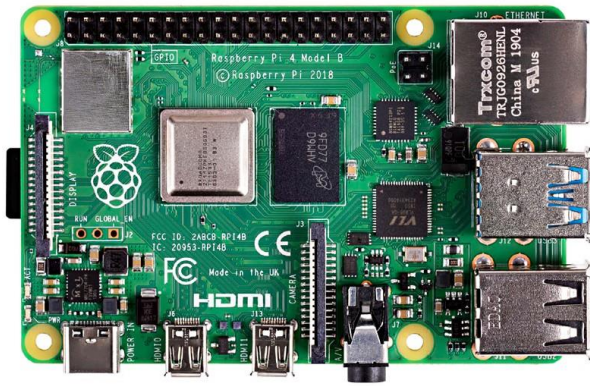
Fig 3. Raspberry Pi

The processing phase is split into 2 phases: preprocessing phase and refining phase that includes function removal and acknowledgment.

• Image Preprocessing

The facial picture which we are using should undergo first from the stage of preprocessing. and it consist of image acquisition and then converting a RBG image intoblack and white. Recognizing face with the help of camera. The picture of this purchase might be a 24-bit RGB picture of JPG style with dimension 92 x 112 pixels.

A deal with picture of RGB is exchanged 8-bit grayscale and BMP style with dimension 40 x 40 pixels. Additionally, the deal with information is divide into 2 components i.e., one a component of a component of the picture are most likely to be utilized as educating picture (educating dataset) and one section of the picture are most likely to be utilized as examination picture (screening dataset).

· Picture Processing

At this picture refining phase, Fisher deal with technique are most likely to be put on obtain function vector of face picture information utilized by system after that to suit vector of characteristics of training picture with vector particular of examination picture utilizing Euclidean range formula.

· Function generation procedure.

Functions to be drawn out might be a function of the deal with picture of people of Papua. the strategy utilized is fisher deal with technique might be a technique that is combine in between PCA and LDA techniques.

Let's see how the mentioned algorithm are utilized in the proposed system

PCA Algorithm
• Step1: prepares the training face obtained facial images E1, E2, E3………., En (training faces).

The deal with pictures should be cantered and of the dimension.

• Step2: prepare the information establish each deal with picture Ei in the data source is changed into a vector and put into a training sets S..

S = {F1, F2, F3, F4……………Fn}

In this instance N = 34. A collection is developed by a changed picture of dimension N*N. For simpleness, the deal with picture is presumed to be of dimension N * N leading to a factor in N^2 dimensional area. An ensemble of pictures, after that, maps to a collection of factors in this hugs area. $[I1] = \begin{bmatrix} c_0 \\ \vdots \\ c_{m^2} \end{bmatrix}, [I2] = \begin{bmatrix} d_0 \\ \vdots \\ d_{m^2} \end{bmatrix}, [I3] = \begin{bmatrix} e_0 \\ \vdots \\ e_{m^2} \end{bmatrix}, [I4] = \begin{bmatrix} f_0 \\ \vdots \\ f_{m^2} \end{bmatrix}$

$[I5] = \begin{bmatrix} g_0 \\ \vdots \\ g_{m^2} \end{bmatrix}, [I6] = \begin{bmatrix} h_0 \\ \vdots \\ h_{m^2} \end{bmatrix}, [I7] = \begin{bmatrix} i_0 \\ \vdots \\ i_{m^2} \end{bmatrix}, [I8] = \begin{bmatrix} j_0 \\ \vdots \\ j_{m^2} \end{bmatrix}$

• Step3: the typical deal with vector $\square(\to_T x)$ needs to be determined by utilizing the complying with formula:

$$\overrightarrow{X} = \frac{1}{X} \begin{bmatrix} c_0 + d_1 + & \cdots + & n_1 \\ \vdots & \cdots & \vdots \\ c_{N^2} + d_{N^2} + & \cdots + & n_{N^2} \end{bmatrix}$$

or written as $\vec{x} = \dfrac{\vec{c} + \vec{d} + \cdots\cdots + \vec{h}}{X}$

• Step4: Calculate the covariance matrix we obtain the covariance matrix C in the following manner,

$$\vec{c_x} = \begin{bmatrix} c_0 & - & x_0 \\ \vdots & \vdots & \vdots \\ c_{N^2} & - & x_{N^2} \end{bmatrix}, \qquad \vec{d_x} = \begin{bmatrix} d_0 & - & x_0 \\ \vdots & \vdots & \vdots \\ d_{N^2} & - & x_{N^2} \end{bmatrix},$$

$$\vec{e_x} = \begin{bmatrix} e_0 & - & x_0 \\ \vdots & \vdots & \vdots \\ e_{N^2} & - & x_{N^2} \end{bmatrix}, \qquad \vec{f_x} = \begin{bmatrix} f_0 & - & f_0 \\ \vdots & \vdots & \vdots \\ f_{N^2} & \cdots & x_{N^2} \end{bmatrix},$$

$$\vec{g_x} = \begin{bmatrix} g_0 & - & x_0 \\ \vdots & \vdots & \vdots \\ g_{N^2} & - & x_{N^2} \end{bmatrix}, \qquad \begin{aligned} \vec{h_x} \\ = \begin{bmatrix} h_0 & \cdots & x_0 \\ \vdots & \ddots & \vdots \\ h_{N^2} & \cdots & x_{N^2} \end{bmatrix}, \end{aligned}$$

$$\vec{i_x} = \begin{bmatrix} i_0 & - & x_0 \\ \vdots & \vdots & \vdots \\ i_{N^2} & - & x_{N^2} \end{bmatrix}, \qquad \vec{j_x} = \begin{bmatrix} j_0 & - & x_0 \\ \vdots & \vdots & \vdots \\ j_{N^2} & - & x_{N^2} \end{bmatrix}$$

Or written as

$$\vec{X} = [\vec{c} - \vec{x'} \ \vec{d} - \vec{x'}, \cdots\cdots\cdots, \vec{j} - \vec{x}]$$
$$= [\vec{c_{x'}} \ \vec{d_{x'}} \cdots\cdots, \vec{j_x}]$$

Step5: Calculate the eigenvectors and eigenvalues by using the method add to the matric X. list the eigenvector then reduction with the PCA method or algorithm.

Given below are some example of training images using
PCA algorithm

Fig 4. examples of training images

LDA Algorithm

Calculate the average of each authorize person

$$a = \frac{1}{2}\begin{bmatrix} p_1 & + & q_1 \\ p_2 & + & q_2 \\ p_{N^4} & + & q_{N^4} \end{bmatrix}, \qquad b = \frac{1}{2}\begin{bmatrix} r_1 & + & s_1 \\ r_2 & + & s_2 \\ r_{N^4} & + & s_{N^4} \end{bmatrix}$$

$$c = \frac{1}{2}\begin{bmatrix} t_1 & + & u_1 \\ t_2 & + & u_2 \\ t_{N^2} & + & u_{N^2} \end{bmatrix}, \qquad d = \frac{1}{2}\begin{bmatrix} v_1 & + & w_1 \\ v_2 & + & w_2 \\ v_{N^2} & + & w_{N^2} \end{bmatrix}$$

Construct the scatter matrix R1, R2, R3, R4
R1 = $(p_m p_m^T + q_m q_m^T)$,
R2 = $(r_m r_m^T + s_m s_m^T)$,
R3 = $(t_m t_m^T + u_m u_m^T)$,
R4 = $(v_m v_m^T + w_m w_m^T)$
and equation within class scatter (ScatV = R1 + R2 + R3 + R4)

The build of likewise matrix in between course scatter, (ScatA)
($ScatA$ =2(a − m) (a − ⟦m⟧) ^T+2(b − m) (b − ⟦m⟧) ^T+2(c - m) (c − ⟦m⟧) ^T+ 2(d− m) (d− ⟦m⟧) ^T
· Compute the reproduction of matrices transpose of qi, (qeT), with ScatV and ScatA up till acquire:
Scc=qeT*ScatA*qe
Svv =qeT *ScatV *qe

- Discover eigenvector (VeScc) and generalized eigenvalues (NeSvv) of (Scc, Svv) and after that kind in ascending purchase.
- Forecast back VeScc with Pe eigenfaces after that developed (Pe * VeScc) Output as Fisherface.
- Normalization Fisher deal with qi*VeScc*N
- Discover the transpose of the normalized Fisher deals with, qi*VeScc*Nt
- Determine Weights for every picture into a normalized fisher deal with, U = qi * VeScc * Nt * A.
- The outcome of the over procedure is the weight of each picture through eigen vector which will be utilized to discover resemblance with deal with picture which will be acknowledged by utilizing Euclidean range formula.

Recognition or acknowledgment formula.

The acknowledge category actions are as complies with:

· Conversion of the deal with picture determined by the dimension of N * N into the column vector develop $[\![r\_i]\!]\_{(N^\wedge)}2$

· Normalization of deal with picture input to the picture of educating by discovering the worth of various matrix _inp by subtracting the typical worth of keep pictures.

· Determines the weight of the offered pictures by multiplying the eigenvalue transpose matrix V^T with the matrix _inpmatrix (U_inp); U_inp V^T _inp

· Determine the range of the distinction in between the picture screening with offered deal with picture utilizing Euclidean range.

$\_i = \sqrt{(||V - V\_inp [\![||]\!]\ ^2)}$; j = 1………M

The outcome of the acknowledgment is the picture that has the tiniest range with the examination picture showed by the system.

IV. CONCLUSION

Deal with acknowledgment system utilizing fisher deal with techniques able to acknowledge the picture of deal with screening properly with 100% portion for the examination picture the like the educating picture and able to acknowledge the picture of deal with screening properly with 93% when the examination picture various from the educating picture. The suggested system with fisher deal with technique not just efficient in carrying out an intro to the examination deal with pictures with various shade elements of the educating picture of the initial picture. To conquer the initially element, can be done by utilizing much far better picture scaling, while for the position issue can relapse by providing more educating pictures with different positions.

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Utilization of Waste Plastic and Rubber for Commercial Purpose

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ABSTRACT

Plastics are non-biodegradable elements that pollute our environment. Plastic garbage has shown to be a health hazard due to its poisonous nature. In today's world, plastic garbage is a major annoyance. As a result, this plastic trash should be repurposed in order to eliminate the harm to the environment. One example is the creation of flexible pavements. Plastic-coated aggregates have been shown to be more resistant to abrasion and wear and tear. Furthermore, due of the increased surface area of interaction among plastic (i.e. polymers) and bitumen, the binding between these plastic coted aggregates and bitumen is particularly strong. These roads function better and have a longer life period.

Keywords : Plastic Waste, Aggregates, Bitumen

I. INTRODUCTION

Plastic goods are used in our daily lives. From greenhouses, coatings, and wires to packing, films, coverings, bags, and containers, we have it all. According to a 2009 UNEP report, the global manufacturing waste electrical and electronic equipment is around 40 million tonnes per year. Because of the various features of plastics, such as their light weight, durability, and strength, the global population and use of plastics has expanded dramatically from 1.5 million tonnes in 1950 to 299 million tonnes in 2013. Global plastic output might treble by 2050, according to estimates. Chemical recycling, also known as feedstock recycling or tertiary recycling, is an alternative technique. Which has lately sparked a lot of attention with the goal of transforming waste plastic into basic petrochemicals

that may be utilised as chemical feedstock or fuels in a number of downstream processes. The cetane and octane values of polyethylene-derived gasoline are exceptionally high. [1] India is third in the world in terms of plastic garbage consumption. Bakelite and plastics can be utilised as an alternative for road and pavement building. This report also informs us about the general qualities and properties of waste plastics and Bakelite.

Plastic debris collected from garbage cans is shredded and mixed to bitumen as aggregate and blended material. To identify the key features and strength parameters of aggregates and bitumen, the relevant experiments were performed. They determined that plastic waste roads are more durable than flexible pavements and may be utilised in high traffic areas; TiO2 is added to minimise vehicle pollution by 10%.

Waste bakelite fine aggregate (WBFA) is used as a substitute material for natural fine aggregate in cement mortar in the following proportions: 0%, 20%, 40%, 60%, 80%, and 100%. Waste bakelite fine aggregate might be utilised in the mortar mix to replace some of the sand. [2]

Asphalt pavements are made of two fundamental components: gravel and asphalt binder. The quantities of these two main components (aggregate and asphalt) in HMA mixes are ideally blended to generate an affordable mix design.

Material evaluation is an important step in the performance and design of the both flexible and stiff pavements. The rut depth is proportional to the number of passes and the temperature. [5]

According to the experimental results, addition plastic waste with small particle size, thin thickness, and at 15% by weight of the total aggregate resulted in improved Marshall stability and resistance to water damage, as well as they can make a contribution to alleviating some of the environmental damage caused by traditional plastic methods of waste disposal. [7]

The use of plastic strengthens the pavement. Furthermore, a rise in the use of plastic may enhance the characteristics of aggregate up to a certain limit. Reusing waste materials such as plastic trash bottles (Polyethylene Terephthalate) with stone mastic asphalt at varied ratios ranging from 0% to 10% by weight of bitumen. The experiment results reveal that the ideal range is 4% to 6%. [8]

Plastics trash coated aggregate is combined with hot bitumen at temperatures ranging from 150oC to 165oC. The resulting temperature mixture of 130oC-140oC is employed in road construction. The temperature for road laying is between 110oC and 120oC. Using an 8ton (min.) capacity roller. Coating is simple, and the temperature required is the same as for road laying. Bitumen is linked to aggregate with the use of plastic, which acts as a binder. The plastic

roadways include transition mats to help tyres go up to and down from the crossing. By dispersing the weight throughout the surface, these techniques help preserve wetland freight routes from rutting. According to the head of the Central Road Research Institute (CRRI), bitumen blended with plastic or rubber increases road quality and life. According to the CRRI's deputy director, polymers blended with bitumen raised construction costs by up to 6% while greatly increasing road lifetime. [9]

Plastic trash disposal has arisen as a significant environmental concern, and recycling is hampered by its non-biodegradable nature. Because plastic does not biodegrade, the amount of plastic garbage in our environment is continually rising. Plastic garbage is frequently the most unattractive type of litter and will remain visible in disposal sites for months without decomposing. [10]

Air blowing of asphalt reduces the penetration value of the asphalt binder, making the asphalt more brittle and prone to cracking during thermal cycling. The goal of this research is to increase the elasticity of blasted asphalt by combining it with 3percent, 5 percent and 7% by weight of thermoplastic waste EVA copolymer (WEVA). [13]

II. MATERIAL SELECTION

1. Aggregates

Fig.1 AGGREGATE[16]

Aggregates comprise the majority of the pavement structure and are the most commonly used materials in pavement construction. The strains induced by wheel loads on the pavement and surface course must be absorbed by the aggregates. They must also withstand the abrasive effect of traffic. These are used in the production of cement concrete, bituminous concrete, and other bituminous pavements, as well as granular base course beneath the superior pavement layers. As a result, the aggregate properties are critical to the roadway engineer. Aggregate qualities that are desired include strength, durability, toughness, and hardness. [20]

2. BITUMENS

Fig.2 BITUMENS [16]

Bitumen is a sticky, black, and viscous liquid/semi-solid. It is composed of extremely condensed polycyclic aromatic hydrocarbons with 95% carbon and hydrogen, 5% sulphur, 1% nitrogen, 1% oxygen, and 2000 ppm (parts per million) of metals. [2]

Bitumen is mostly utilized in exposed activities like road construction. It must deal with a variety of climatic circumstances, including rain. As a result, it should be insoluble in water and act as a waterproofing agent. Bitumen with a lesser water-resistance quality has a lower durability and strength. It also results in poor adhesion. As a result, bitumen should be highly water resistant.

3. Waste plastic

Fig.3 SHREDDED PLASTIC [16]

A plastic substance is any of a large variety of flexible synthetic or semi-synthetic organic solids. And they're frequently made of synthetic materials. Petrochemicals are the most typical source. Waste made of plastic (for ex. bags, cups, bottles) composed of PE, PP, and PS shrunk to a size of 2.36 millimeter to 4.75 millimeter using a shredding (cutting) machine [15]

Polyethylene glycols, also known as macro gels, are created by polymerizing ethylene oxide with water, mono ethylene glycol, or diethylene glycol as the raw material, with alkaline catalysis. After reaching the required molecular weight, the process is stopped by neutralizing the catalyst with acid. Normally, lactic acid is employed, however acetic acid as well as other acids can sometimes be found. [3]

4. Waste rubber

Truck or automotive's tyres are used to make crumb rubber. Whole truck tyres have 18% natural rubber, relative to 9% in automotive tyres and the discarded tyre is shredded into little bits using mechanical blades ranging in size from 1mm to 75m. [15]

III. METHODOLOGY

A) BASIC PROCESS

1. Segregation: Plastic garbage is gathered from a variety of places. In this process plastic and other waste material gets separated. Plastic must have a maximum thickness of 60 microns.

2. Cleaning Process: The plastic trash is cleaned to eliminate dust particles, and then dried to remove water particles.

3. Shredding process: Shredding is the process of plastic cutting into small pieces ranging from 2.36mm to 4.75mm using a plastic shredding equipment such as the agglometer or Scrap Grinder.

4. Collection process: Plastic particles with a diameter of 2.36-4.75 microns are collected and are used in road construction.

B) MAIN PROCESS

Many factors influence the modifier chosen for a project, including construction ability, availability, cost, and predicted performance. Modification is accomplished using two primary procedures: 1. Dry process, 2. wet method. The dry process includes direct incorporation of waste plastic, which is mixed with aggregate prior to actually adding bitumen to create a plastic modified bituminous concrete mix, whereas the wet process requires parallel blending of bitumen and waste plastic to develop a plastic modified bituminous concrete mix. [11]

Plastic waste is crushed into a powder, then blended in varying ratios with bitumen. Plastic raises the bitumen's melting point and makes the road more pliable during the winter, resulting in a longer life. Brittleness is eliminated and elastic nature is enhanced by combining plastic with bitumen. Plastic debris is melted and blended in a specific ratio with bitumen. [10]

There are two major procedures utilised for bitumen mixture flexible pavement, and they are as follows:

1. Dry Process:

Hot stone aggregate [i.e. 170°C] is combined with hot bitumen [i.e.160°C] for the pliable pavement, and the mixture is utilized for road laying. As per IS codes, the aggregate is selected depending on its durability, porosity, and water absorption capacity. The bitumen is selected based on its adhesion, penetrating, and high viscosity qualities. When the aggregate was coated with plastics, it improved in terms of voids, water absorbency, and durability. [10]
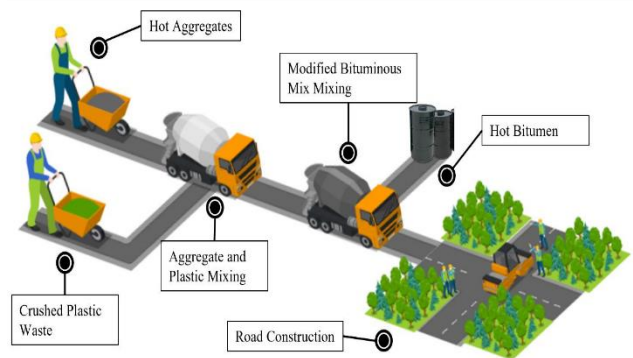

Fig.4 DRY PROCESS [19]

Chopped plastics are spread on heated aggregates to form plastic coated aggregates, which are then combined with hot bitumen to create a plastic coated aggregate- bitumen mixtures for road construction. The plastic covering reduces leakage of water and greatly improves aggregate performance and quality in flexible pavement.

Plastics waste is sprayed on top of aggregate in the modified method(i.e. dry process). Because of the improved bonding and area of contact among plastic and bitumen, this resulted in greater bitumen binding with both the plastic-waste coated aggregate. The polymer coating also helps to eliminate voids. This prevents trapped air from absorbing moisture and oxidising bitumen. This has led in less rutting and wear and tear, as well as no pothole development. [10]

In the dry process, plastics utilization mechanisms and connections between asphalt, aggregates, and plastics are all worth exploring. To

increase work ability throughout construction, the uniformity problem of covering between plastics and aggregates must be overcome. [4]

2. WET PROCESS:

1. The plastic is gathered in 60 micron or smaller pieces, which are desired for the next step. The reason for this is, that smaller plastic particles may easily combine with hot bitumen at temperatures ranging from 160 degree C to 170 degree C.

2. The bitumen is heated to the melting point of plastic, which itself is 160degree Celsius-170degree Celsius.

3. The tiny plastic bits were added to the hot bitumen at fixed temperature and the mixture was manually agitated for around 20-30 minutes. [17]

IV. TESTS

1. Aggregate Crushing Test
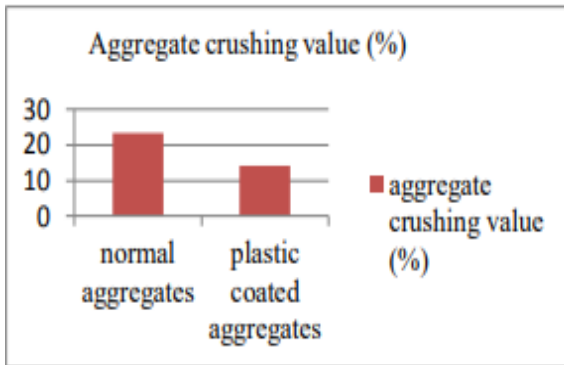
Fig.5 Aggregate Crushing Test [18]

The strength of coarse aggregate may be determined using aggregate crushing tests. The aggregate crushing value is indeed a relative concept of crushing resistance when compressive load is progressively applied. Aggregates with high crushing resistance or a low aggregate crushing value are preferred for good pavement quality. [18]
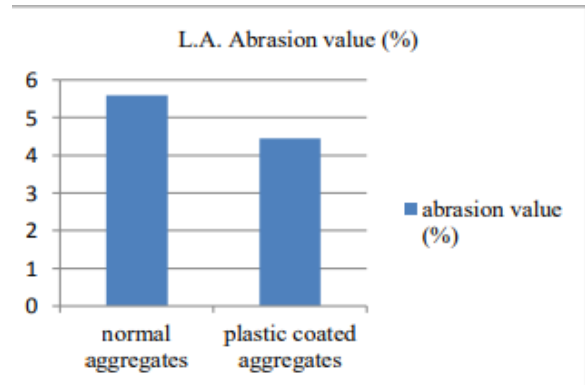
2. Los Angeles Abrasion Test

Fig.6 Los Angeles Abrasion Test [18]

The Los Angeles abrasion test is being used to calculate the percentage wear generated by the rubbing action of both the aggregate and steel balls used for the abrasive charge. During the test, these balls are pounded, and their resistance to wearing and impact is assessed. [18]

3. Impact Test

The impact test is created to assess the hardness of stone or aggregates' resistance to shatter under repeated impact. The aggregate impact test, which has been established by ISI, is often used to evaluate the impact resistance of aggregates. The aggregate impact value is a relative concept of aggregate to impact, each of which has a distinct effect from resistance to rising compressive stress. For aggregate to be utilized in the wearing course of pavements, the aggregate impact value should typically not exceed 30%. The maximum permitted value for bituminous macadam base course is 35 percent and 40 percent for water bound macadam base course. [18]
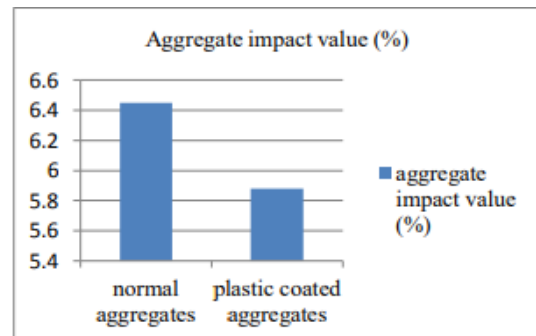

Fig.7 Aggregate Impact Test [18]

TABLE NO.1.MECHANICAL PROPERTIES OF AGGREGATE. [14]

Type of Test Tests	Method	Result	MORTH, 2013 Specification
Aggregate Impact Test	BS812: Part3	18.12%	<27%
Los Angeles Abrasion Test	ASTM: C131	26.7%	<35%
Aggregate Crushing Test	BS812: Part3	22.32%	<30%
Water Absorption Test	ASTM: C127	1.5%	<2%

V. COMPARISON

Plastic coated aggregates have been developed. no soundness, minimal water absorption and voids minimum aggregate impact, crushing value, and abrasion value than regular conventional aggregates.

By boosting the strength and performance of roads, the plastic waste mix will assist to reduce the requirement for bitumen by roughly 10%. [2]

When compared to improved semi dense bituminous concrete mixes including waste plastic, the clean semi dense bituminous concrete mixes had a 10% higher optimal bitumen concentration.2. The Marshall Stability of pristine semi dense bituminous concrete mixes at optimal bitumen % was 1.6 percent lower when comparison to modified semi dense bituminous concrete mixes containing waste plastic. When compared to modified semi dense bituminous concrete mixes containing waste plastic, the bulk

density of plain semi dense bituminous concrete mixes with appropriate bitumen concentration was 0.43 percent higher. [9]

All binders were classified into three series: A, B, and C. Series A and B are binary mixes, i.e., Bitumen (B) + Plastic (P) and Bitumen (B) + Rubber (R), respectively, but Series C is a tertiary mix with changing proportions of plastic and rubber in bitumen.

TABLE NO. 2 [14]

Serial No.	Composition	Penetration (25 C, 100 g, 5 sec)	Ductility (25 C)	Softening Point Specific Gravity (27 C)
Test Method		ASTM: D5-97	ASTM: D113	ASTM: D3
Units		0.1 mm	cm	C
* CM	100% B	67	82	51.2
Series A				
BM1	96% B + 4% P	64.5	79	53.5
BM2	94% B + 6% P	63	74	54.5
BM3	92% B + 8% P	59.5	71	56
BM4	90% B + 10% P	56.5	69	59
Series B				
BM5	95% B + 5% R	61	73	55.8
BM6	90% B + 10% R	57	69	57
BM7	85% B + 15% R	49	59	

Plastic garbage is classified as waste because it is believed to have little to no value. As a result, using such materials for construction will eliminate the costs associated with traditional building materials, lowering the overall cost of construction. [12]

According to IRC 37:2012, a cost analysis of bituminous concrete mix was performed on a stretch of National Highway. The analysis findings are shown in the table.

The anticipated mix cost research revealed that the use of various waste additives in BC mix aids in road construction and makes it more cost effective than non-modified mix. [14]

VI. ADVANTAGES

1. Plastic garbage disposal will no longer be an issue.
2. When compared to regular roads, the expense of upgrading is lower.
3. The load with standing property rose as well.
4. The cost of road construction has also decreased.
5. The road's strength improves as well.
6. Plastic roadways could feature a hollow gap for wiring. Pipelines, for example.
7. Plastic roads absorb less moisture than conventional roads.
8. Improved resistance to rain and stagnation.
9. Increases the aggregate and bitumen's binding strength.
10. When compared to normal, the road's durability improves road.
11. On-site construction time has been reduced. [17]

VII. DISADVANTAGE

1. Cleaning procedure - Toxics present in co-mingled plastic debris begin to leach.
2. The presence of chlorine during the road laying process will undoubtedly result in the release of harmful gas.
3. Plastic heat treatment may result in the discharge of hazardous gases into the atmosphere. [6]

VIII. CONCLUSION

The production of discarded plastics is rising by the day. In their molten form, polymers exhibit adhesion properties. Bitumen's melting point will be raised as a result of the use of plastics.

As a result, using waste plastics for pavement is one of the finest options for easily disposing of waste plastics. Furthermore, plastic is not recyclable, thus employing it in road building will aid in the environmentally friendly disposal of such plastic garbage.

The introduction of modern technologies will not only boost road building but will also make it more cost effective and extend the life of roadways.

Plastic roads will be most practical in countries like India, where temperatures hover around 50oC and torrential monsoons wreak havoc on roadways, causing potholes and ruts.

It is hoped that in the near future, we will have sturdy, long-lasting, and environmentally friendly highways that will rid the world of all kinds of plastic waste.

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Photoluminescence of – $Ca_9Al(PO_4)_7$: Eu^{3+} phosphor

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ABSTRACT

Eu^{3+} activated $Ca_9Al(PO_4)_7$:xEu^{3+}(CAlP:xEu^{3+}) samples were prepared in the present work. This compounds were prepared in different concentrations of Eu^{3+} by combustion synthesis. Photoluminescence and CIE Colour co-ordinates characterization were studied. Data of excitation spectra reveal that the energy band from 380 nm to 410 nm appears at high intensity. The highest luminescence emission intensity found at 1 mole% of Eu^{3+}. A concentration of one mole percent Eu3+ ions was found to be optimal, and red light is emitted from the phosphor which is located at (0.677,0.322) in CIE coordinates.. As CAlP:xEu^{3+} provides red emission which helps in solving colour rendering index.

Keywords : Red Phosphor, Rare doped, CIE coordinates, Combusion synthesis

I. INTRODUCTION

Nowadays, researchers are showing more interest in the development of ecofriendly and energy efficient light sources. For this new phosphor materials are in growing demand. This leads to a closer and detailed look at luminescence properties with more optical applications. Functional materials of rare-earth(RE) co-doped or doped ions, with excellent luminescent results, are being studied widely for the potential applications [i] [ii] [iii]. Among these elements, europium is the most commonly used activator for phosphor materials as well as a red emitter. Eu-activated phosphors like, phosphates, aluminates, silicates and derivatives, for luminescent properties are being studied intensively and used for optical display field [iv]. Because of characteristic optical properties of the synthesized Eu^{3+} doped phosphors they are widely applicable in Plant growth LEDs [v]. Optical thermometer applications [vi] [vii], photocatalysis [viii], fingerprint detection and anti-counterfeiting[ix], Biological Probes [x] [xi]. The decay time of Eu^{3+} containing $Ca_9Al(PO_4)_7$ phosphor shows long decay time approximately 150 times to that of Eu^{3+} [xii]. The present study emphasized on mainly the synthesis of Eu^{3+} containing $Ca_9Al(PO_4)_7$. PL characterization consist of excitation and emission.

II. Experimental

Eu^{3+}activated $Ca_9Al(PO_4)_7$:xEu^{3+}(CAlP:xEu^{3+}) samples were prepared as follows: Firstly, stoichiometric quantity of source materials $NH_4H_2PO_4$ (A.R.), $Ca(NO_3)_2 \cdot 4H_2O$ (A.R.) and $Al(NO_3)_3 \cdot 9H_2O$ (A.R.),

were mixed thoroughly and required amount of $CO(NH_2)_2$ (A.R.) was added as fuel and this is treated as mixture 1. Then Eu_2O_3 (A.R.) was dissolved in dilute HNO_3 to convert into $Eu(NO_3)_3$ completely and this is added in mixture 1. The whole mixture was introduced into muffle furnace which was maintained at 520 °C for10 min. Then these samples were reheated at 650 °C for 3 hand were allowed to cool to reach room temperature. Finalize the preparation of the sample by crushing it into a fine powder to characterize the photoluminescence properties. The measurements of excitation (PLE) and Spectrums of emission (PL) were performed by using a Shimazdu RF 5301 PC (Japan) Spectrofluorophotometer and for excitation, source was used as xenon lamp. For Analysis, all characterizations were made at room temperature by keeping identical instrumental parameters.

III. Results and discussion

Photoluminescence properties

Emission spectra at the room temperature of the crystal $Ca_9Al(PO_4)_7$ doped with different concentrations of Eu^{3+} is shown in figure 1. For the PL excitation, light of 395 nm is used. The prepared crystal emitted the red wavelength of varying intensities, which confirmed the Eu^{3+} as activator had successfully settled into the host lattice of $Ca_9Al(PO_4)_7$. The strong and sharp peaks at 593 and 614 nm were observed related to transitions $^5D_0 \rightarrow {}^7F_1$ and $^5D_0 \rightarrow {}^7F_2$ respectively. These transitions are the specific characteristic emissions of Eu^{3+}. While the $^5D_0 \rightarrow {}^7F_1$ transition is well known to be primarily a magnetic dipole transition when the Eu^{3+} ions are in high symmetry positions, the $^5D_0 \rightarrow {}^7F_2$ transitions are essentially electric dipole transitions that occur only when the Eu^{3+} ions are in locations without inversion symmetry[xiii]. As the doping concentration increases from 0.1mol% to 1mol%, the emission intensities of the peaks also rise and after that decreases. General expectation is that photoluminescence (PL) increases

with the increase in the concentration of Eu^{3+} ions. Concentration quenching occurs above 1mol% of Eu^{3+} ions. Due to this decrease in emission intensity is observed. Higher concentration of Eu^{3+} ions results in non-radiative interaction among ions, this results in the more resonant energy transfer. The higher concentration leads to decrease in the distance between Eu^{3+} ions, which makes transfer of energy by resonance process from one ion to other ion more easily, the energy eventually reaches a trap from which it is dissipated by non-radiative processes rather than by the emission of visible light[xiv] [xv]. In the $Ca_9Al(PO_4)_7$:1mol% Eu^{3+}, the intensity of $^5D_0 \rightarrow {}^7F_2$ transition intensity is at 614 nm which is dominant to $^5D_0 \rightarrow {}^7F_1$ transition intensity at 593 nm. The transition $^5D_0 \rightarrow {}^7F_2$ is dominant over the transition $^5D_0 \rightarrow {}^7F_1$, which indicates that Eu^{3+} ions are present in an asymmetric local environment[xvi]. It is observed that magnetic dipole transition of the same kind i.e. $^5D_0 \rightarrow {}^7F_1$ was obtained for Eu^{3+} ions doped Sr2LiScB4O10, LiYGeO4, and CaMoO4 phosphors[xvii] [xviii] [xix]. The photoluminescence excitation behavior of the prepared Eu^{3+} ions doped CAlP phosphors had been studied by recording characterization spectra. CAlP phosphor excitation spectrum is recorded for Eu^{3+} ions. A high intense excitation band of $^7F_0 \rightarrow {}^5L_6$ transition was observed at 395 nm. From the data of excitation spectra, it was noted that excitation band from 380 nm to 410 nm is appeared at high intensity. The diagram showing various transition in energy level.
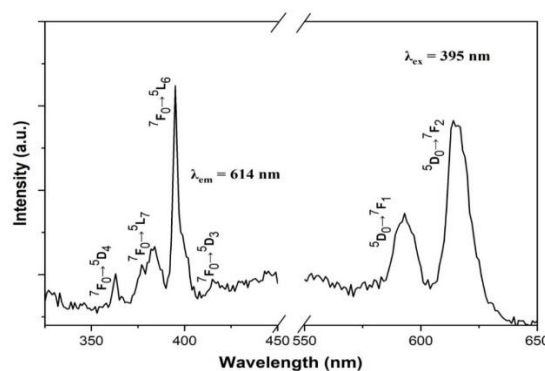

Fig. 1 : The Photoluminescence excitation and emission spectra of the red-emitting phosphors

$Ca_9Al(PO_4)_7:Eu_{3+}$ (λ_{ex}= 395nm, λ_{em} =613 nm) at 650°K
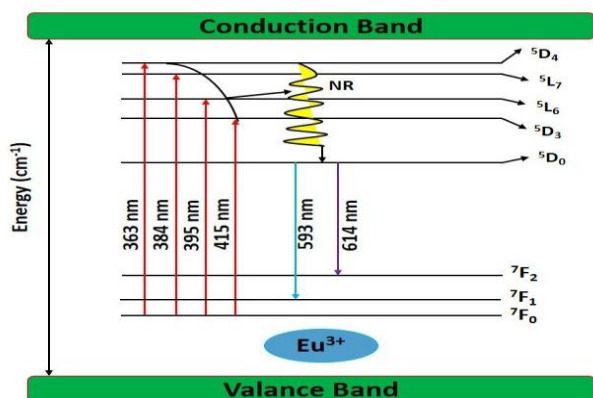

Fig.2 : Energy level diagram showing emission and excitation transitions for Eu^{3+} doped $Ca_9Al(PO_4)_7$
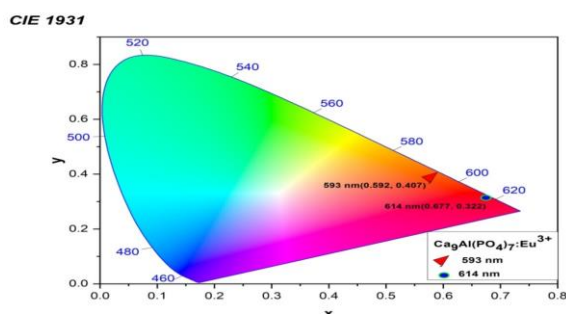

Fig.3 : CIE colour chromaticity coordinate diagram for Eu^{3+} CaAlP

Materials performance: Colour coordinates (CIE)

Using standard procedures, the chromaticity coordinates of 1.0 mol% doped sample annealed at 650°C at CIE standard temperature were determined. The values of x and y coordinates of the system were calculated to be (0.592, 0.407), (0.677,0.322) corresponds to 593 nm and 613 nm respectively. The CIE diagram shown in Figure shows 🔵 , point for the 'red emission' given by $Ca_9Al(PO_4)_7$ doped with Eu^{3+}[xx].

IV. Conclusion

The emission spectra at 614 nm for transition $^5D_0 \rightarrow$ $^7F_2$ was highly intensed for $CAlP:Eu^{3+}$material. It was also noted that, the emission intensity for transition $^5D_0 \rightarrow ^7F_2$ at 614nm dominant over transition $^5D_0 \rightarrow$

$^7F_1$ at 593 nm. At excitation transition was noted at 395 nm The $CAlP:Eu^{3+}$ material of very high luminescence red emission of nearly 614 nm is definitely a display applications material for investigation further use.

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Isolation and Application of Diazotrophic Bacteria as Microbial Inoculants for Sugarcane Crops for Drought Tolerance Nature

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ABSTRACT

Sugarcane, a critical commodity in India, necessitates technical advances in production efficiency to enhance the country's agricultural energy balance. This research included four replications and a total of 24 plots.In this experiment, analytical-grade chemicals and double-distilled water were used throughout the procedure. Each soil sample was tested for its texture, pH, EC, organic carbon content, and phosphorus availability, among other characteristics, before being analysed. Each site had 20-30 cores of 2.5 cm diameter x 15-20 cm length extracted from the sugarcane root rhizosphere soil, with the diameter and length varying from site to site. For the roots and the surrounding earth, we dug 15-20 cm deep into the ground. After being transferred to polythene bags and kept at 37°C overnight, the samples were used to isolate AM fungal spores. In order to statistically analyse the data obtained from diverse features, the RBD design was used.

Keywords – Gluconacetobacter Diazotrophicus and Herbaspirillumspp, Elicitors, Sugarcane, Xanthomonas Albilineans.

I. INTRODUCTION

Nowadays, inoculating plants with beneficial microorganisms is a popular practise in agriculture. It offers crops with a variety of advantages, including enhanced plant growth and disease prevention. The development and production of plant growth-promoting rhizobacteria (PGPR) may be influenced by root exudates from plants, which can have both immediate and long-term consequences. Apart from the above stated strains, PGPR may be found in Azospirillumbrasilense, Bacillus subtilis, and Enterobacter cloacae, Gluconacetobacterdiazotrophicus, Pantoeaagglomerans, and P. fluorescens, as well as Rhizobium leguminosarum, Sinorhizobiummmeliloti, and P. fluorescens, and Pseu

Plant growth might be aided by PGPR in a variety of ways, including biochemical N2 fixation, phosphate solubilization, and the production of phytohormones. The production of antimicrobial compounds or the establishment of induced systemic resistance may also be exploited by PGPR to indirectly increase plant growth as an extra advantage, as previously mentioned (ISR). Sustainability in agriculture cannot be ignored

any longer, and microbial inoculants may prove to be a cost-effective method of maintaining crop output over the long run.[1-2]

II. INOCULANT CARRIERS

Since the beginning of the inoculant manufacturing sector, the industry has been focused on developing more efficient products at a lower cost that satisfy the needs and expectations of farmers everywhere. As an important aspect, microorganisms must be transported by a carrier that maintains cell viability for an extended period of time while also being easy to employ. The first commercially produced inoculant, "Nitragin" (Fig. 1), was made from gelatin, and later on, gelatin was utilized as a transporter for bacteria in nutritional media. In their stead came peat, which was less deadly but retained its status as the "gold" transporter until the late 1990s, when things began to change (Fig. 1)

Solid peat is composed of organic soil that has collected over a long period of time under certain environmental circumstances, resulting in the formation of solid peat. Peat is a common inoculant carrier due to its high quantity of organic matter, which feeds bacteria with essential nutrients via photosynthesis. Aside from that, the peaty matrix protects microorganisms from soil adversities and increases cell viability in conditions of limited water availability and high temperatures. Using adhesives for the peat seed inoculation method is vital because they aid in the bonding of the peaty matrix to the seeds.[4]
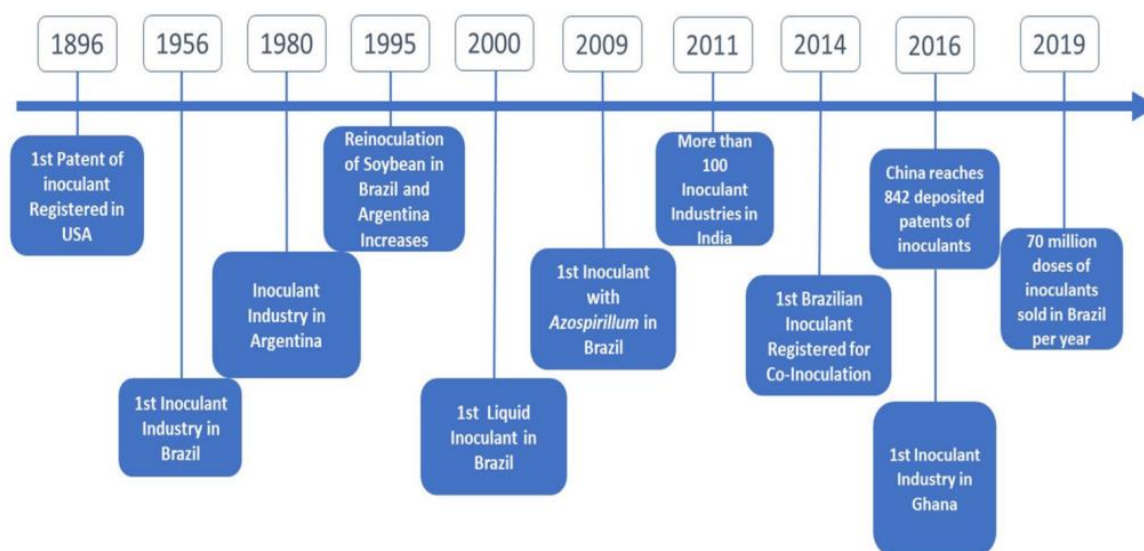

Figure1 : Inoculant development timeline, including some key milestones [4]

III. MATERIALS AND METHODS

AM fungal colonization in sugarcane roots

Using Phillips and Hayman's approach, the proportion of mycorrhizal colonisation in the root was found (1970). The roots of the field path plants were gently rinsed with tap water before being dried. The cytoplasm and nucleus of the host cell were cleaned prior to stain penetration by first immersing the washed roots in a 10% KOH solution. After that, it was autoclaved for roughly 20 minutes at 15 lb/sq.inch pressure. Hydrogen peroxide solution was used for 10 minutes to disinfect the root pieces after they had been digested. This process was repeated three or four times or until no brown colour was seen in the rinsed water. To ensure adequate

staining, the roots were acidified for three to four minutes with two percent hydrochloric acid Root pieces were dyed with 0.05 per cent tryphan blue in lactophenol and cooked for 10 minutes after the acid was drained out without washing with water. Stereozoom microscopy was used to study the ends of these roots. The percentage of AM fungal colonisation in each root segment was determined by analysing 50 root segments from each replication.

$$\text{Percent AM fungal colonization} = \frac{\text{Number of root bits with infection}}{\text{Total number of root bits examined}} \times 100$$

AM Fungal Spore Estimation from Soil

Gerdemann and Nicolson's wet sieving and decanting technique was used to determine the AM fungal spore population (1963). One litre of tap water was used to fully mix 100 grammes of field trail rhizosphere soil sample in order to settle down the heavier particles for a few seconds. To remove big bits of organic debris, the suspension was decanted through a coarse soil-sieve (500-800m sieve). Separately, all of the liquid that had gone through the sieve was collected and swirled to resuspend all of the particles. Filtering the suspension (38-250 microns sieve) was necessary to preserve the appropriate spores. In order to guarantee that all colloidal elements were removed from the sieve, a stream of water was used to wash the sieve. Petridish water and microscopes were used to analyse a little number of debris that was still floating in the air. Each soil sample's spore number was counted and given as a number of spores per 100 grammes of soil.

✓ **Leaf nitrogen**

Each treatment's third leaf from the top was gathered, dried, and powdered on a monthly basis for up to 10 months. The nitrogen content of these samples was then calculated using Humphries (1956)'s Kjeldhal technique and represented as mg per g of dry leaf weight in mg/g.

✓ **Package of Agronomic practices**

As described in the Crop Production Guide, the agronomic procedures were followed (1994).

IV. SOIL ANALYSIS

After collecting soil samples at two, four, six, and ten months, they were shade-dried, powdered and sieved through a 2 mm sieve from each plot. Listed below are the results of the testing done on the soil sample.

Nitrates in reserve the alkaline permanganate process.

Phosphorus readily available Changes made to the molybdate blue ascorbic acid modification procedure

• **Preparation of plant samples**

Biomass output was recorded by taking plant samples every two months for P and leaf samples every six months for N analyses. In order to carry out the investigation, the following procedures were used:

✓ Nitrogen content Microkjeldahl method
✓ Phosphorus content Triple acid and digestion method

V. RESULTS AND DISCUSSION

Variations in root colonisation percentage and spore quantity 100g-1 soil were shown to be significant in this investigation. Soil samples from sugarcane rhizospheres were collected in Atarahi District at 20 different sites and then classified. Eight of the samples tested were classified as clay loam. Samples of clay, sandy clay, and

sandy loam were collected. The soil pH varied from 7.3 to 8.9, and the EC was 0.32 to 0.54 mmhos cm-1 in all samples. Each sample contained between 0.36 and 0.77 percent organic carbon, while the accessible phosphorus concentration varied from 11.18 to 21.10 kilogrammes per ha-1.

Table 1 : Sugarcane rhizosphere soil samples were collected and AM fungus isolated.

S. No.	Place of the sample	Soil texture	pH	EC mmhos cm^{-1}	Organic carbon	Available phosphorus content (kgha^{-1})	Percent root colonization	AM sporepopulation 100 g^{-1} of rhizosphere soil
1	Abdullahpur	Clayloam	8.1	0.43	0.51	17.48	48.0	98.0
2	Adampur	Clay	7.5	0.41	0.46	16.71	50.5	109.0
3	Ahirauli	Clayloam	7.7	0.47	0.60	16.69	51.0	100.5
4	Atarahi	Clayloam	8.0	0.50	0.63	11.18	40.5	80.0
5	Babarakha	Clay	7.5	0.41	0.59	18.59	66.0	126.0
6	Babupur	Clay	7.3	0.39	0.49	19.90	35.5	80.0
7	BadaouliNoniyan	Clayloam	7.4	0.36	0.44	20.04	40.0	84.4
8	Bahadurpur	Sandyclay	7.5	0.34	0.54	18.48	48.0	100.5
9	Bairagar	Clayloam	8.2	0.54	0.77	11.27	50.0	102.0
10	Atkadpur	Clayloam	8.0	0.46	0.70	13.24	50.0	100.5
11	Baghmurtza	Sandyclay	8.5	0.53	0.76	19.38	32.0	65.0
12	Bans Gopalpur	Sandyclay	7.4	0.32	0.47	19.10	39.2	80.5
13	Barrre Patti	Sandyloam	7.3	0.40	0.36	21.10	35.0	86.0
14	Bhakura	Sandyclay	8.44	0.50	0.71	12.00	29.8	67.0
15	Baboopur	Sandyclay	8.67	0.48	0.69	16.00	30.0	80.0
16	Alamgirpur	Clayloam	8.94	0.48	0.72	14.00	40.5	84.0
17	ChakPahalawan Tahir	Clayloam	8.64	048	0.62	18.00	40.0	80.0
18	Chaka Banki	Sandyclay	8.05	0.50	0.65	11.00	41.3	80.0
19	Chaktali	Sandyclay	8.86	0.50	0.61	13.00	34.9	67.0
20	Baijapur	Sandyclay	8.27	0.50	0.49	12.00	34.5	67.0

AM fungal colonisation and spore population have been unaffected by soil natural physico-chemical characteristics, such as pH, EC, and organic carbon content. AM fungal colonisation and spore production were negatively affected by the soil's phosphorus level. Root colonisation percentage and AM spore population in the soil were found to vary from 32.0 to 66.0 percent and 65.0 to 126.0 percent, respectively, for sugarcane roots.

The maximum root colonisation percentage and spore number 100g-1 were found in a sample taken from Babarakha (66.0 and 126.0). Root colonisation and spore count 100g-1 soil were lowest in the sample taken from Baghmurtza (32.0 and 65.0). G. mosseae, G. fasciculatum, G. versiforme, A. laevis, and G. margarita were among the species of G. sporulatum that Gerdemann and Trappe (1974) discovered using a stereozoom microscope on the isolated spores (Table 5.2).'

Mycorrhizal spores are influenced by soil type

More spores were found in clay loam soil (102 in 100 g-1 of soil) than in sandy clay (82.0), sandy loam (80.0) and clay (78.0) types. Fungi G. fasciculatum dominated all of the soil types, with G. mosseae and A. laevis in close second and third place respectively (Table 5.3 and Fig 5.1).

Table 2 : Different AM fungal isolates from sugarcane rhizosphere soil samples were identified and characterised

S.No.	Characters	*Glomusmosseae*	*Glomusfasciculatum*	*Glomusversiforme*	*Acaulosporalaevis*	*Gigasporamargarita*
1	Sizeofspore	120μm	100–120μm	125–150μm	400μm	200–300μm
2	Sporeshape	Globose	Globosehypogeous	Globose	Globose	Ectocarpic
3	Colourofspore	Yellowtobrown	Yellowtoreddishbrown	Yellowtobrown	Outer wall – brownInnerwall– HyalineEllipsoid	White whenyoungandslightlyyellowish atmaturity
4	Sporocarp	Present	Present	Present	Present	Absent
5	Thicknessofsporewall	3–4μm	4–14μm	3–4μm	4–8μm	>20μm
6	Subtendinghyphae	Cylindricflared	Absent	Cylindricorflared	Notobservable	Bulbous(30–50μm)

Table 3 : species-level diversity in soil types and AM fungi

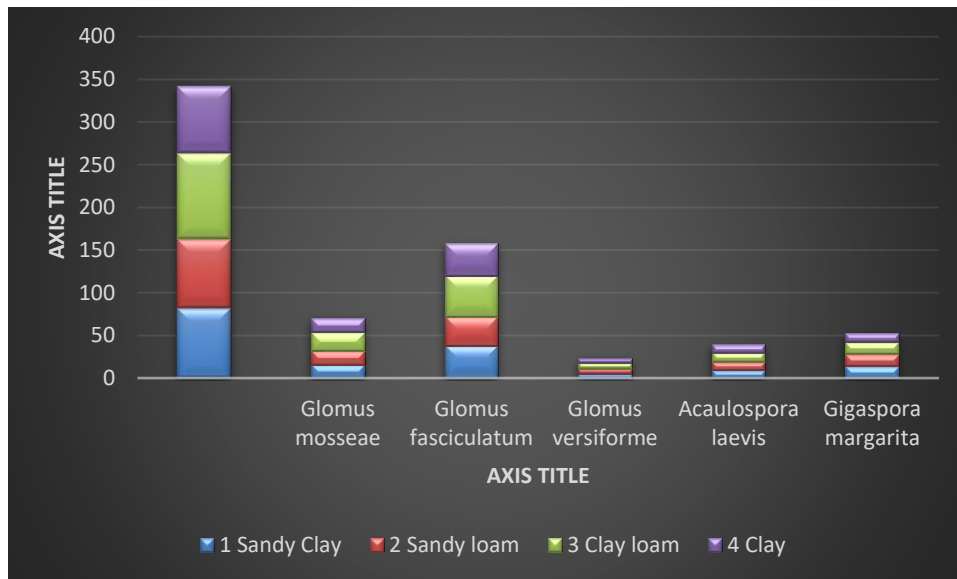| S.No.	Soil texture	Total AM fungal sporepopulationper100g of soilin each soil types	Types of AMfungi				
			Glomusmosseae	*Glomus fasciculata*	*Glomusvermiform*	*Acaulosporalaevis*	*Gigaspora margarita*
1	SandyClay	82.0	16.0	38.0	5.0	9.0	14.0
2	Sandyloam	80	16.0	34	6.0	10	14.0
3	Clayloam	102.0	22.0	48.0	7.0	11.0	14.0
4	Clay	78.0	16.0	38.0	5.0	9.0	10

Fig. 3 : A species-level breakdown of soil types and AM fungus populations.

- **Sugarcane was used to test for the presence of five distinct AM fungus (CoC 24)**

Sugarcane var. CoC 24 was planted 60, 90, and 120 days following the emergence of five AM fungus isolates (G. mosseae, G. fasciculatum, G. versiforme, A. laevis, and Gi. margarita) in pot culture studies (DAP). Based on root colonisation %, spore quantity per 100 g, acid and alkaline enzyme activity, the most efficient AM fungal culture was chosen for further testing. The findings may be found in the following document: (Table 5.4).

From 60th to 120th DAP, the sugarcane root colonisation of AM fungus grew more and more rapidly. Plants inoculated with G. fasciculatum had a higher percentage of root colonisation, the spore number $100g^{-1}$ of rhizosphere soil, the acid and alkaline phosphatase enzyme activities than plants inoculated with G. versiforme, A. laevis or Gi. margarita. Sugarcane inoculations with G. fasciculatum (78.20, 180.00) had the maximum root colonisation and spore number, followed by G. mosseae (61.20, 175.00), G. versiforme (46.20, 165.60), A. laevis (57.00, 170.00), and Gi. margarita (52.60, 164.30) on the 120th day after planting (DAP).

Table 4 : Concentrations of carbon sources that G. diazotrophicus isolates from fungal spores can grow on in semisolid LGI medium

S.No.	Isolates	Sucroseconcentration(%)							Glucoseconcentration(%)						
		Control	2.5	5	10	15	20	25	Control	2.5	5	10	15	20	25
1	GdAVS[1]	-	+	++	+++	++	++	+	-	+	++	+++	++	++	+
2	GdVVS[1]	-	+	++	+++	++	++	+	-	+	++	+++	++	++	+
3	GdAVS[2]	-	+	++	+++	++	++	+	-	+	++	+++	++	++	+
4	GdCVS	-	+	++	+++	++	++	+	-	+	++	+++	++	++	+
5	GdVSVS	-	+	++	+++	++	++	+	-	+	++	+++	++	++	+
6	GdBVS	-	+	++	+++	++	++	+	-	+	++	+++	++	++	+
7	GdMVS[1]	-	+	++	+++	++	++	+	-	+	++	+++	++	++	+
8	GdOVS	-	+	++	+++	++	++	+	-	+	++	+++	++	++	+
9	GdPVS[1]	-	+	++	+++	++	++	+	-	+	++	+++	++	++	+
10	GdPVS[2]	-	+	++	+++	++	++	+	-	+	++	+++	++	++	+

11	GdPVS³	-		+	++	+++	++	++	+	-		+	++	+++	++	++	+
12	GdPVS⁴	-		+	++	+++	++	++	+			+	++	+++	++	++	+
13	GdVVS²	-		+	++	+++	++	++	+			+	++	+++	++	++	+
14	GdMVS²	-		+	++	+++	++	++	+			+	++	+++	++	++	+
15	GdAVS³	-		+	++	+++	++	++	+			+	++	+++	++	++	+
16	GdKVS¹	-		+	++	+++	++	++	+			+	++	+++	++	++	+
17	GdTVS	-		+	++	+++	++	++	+			+	++	+++	++	++	+
18	GdSVS	-		+	++	+++	++	++	+			+	++	+++	++	++	+
19	GdKVS²	-		+	++	+++	++	++	+			+	++	+++	++	++	+
20	GdMVS³	-		+	++	+++	++	++	+			+	++	+++	++	++	+
21	PAL5	-		+	++	+++	++	++	+			+	++	+++	++	++	+

+ − Light pellicle formation; ++ − Thick pellicle formation; +++ − Thick and deep pellicle formation; - − No growth 1234 – Isolate differentiation for the designation PVS; GdVSVS – Isolate from Babarakha superior isolate

♣ Growth in LGI broth

G. diazotrophicus cultures grew exponentially in LGI broth between 168 and 180 hours. G. diazotrophicusGdVSVS had the highest OD value (1.58 hours) of the 21 cultures tested, followed by G. diazotrophicusGdTVS (1.57 hours) and G. diazotrophicus PAL5 (1.58 hours) (1.56). The G. diazotrophicus isolate GdPVS4 was the sluggish grower, with an OD value of 1.37 at 180 hours of cultivation (Table 5.16).

♣ Growth in acetic LGI broth

In acetic LGI broth, the growth of all 20 isolates was greater than in LGI broth. One of the G. diazotrophicus strains, GdVSVS, achieved the highest OD value of 1.63, followed by GdPAL5 (1.60) and four G. diazotrophicus at 180 hours (Table 5.17 and Fig. 5.2).

VI. ANALYZING THE EFFICACY OF G. DIAZOTROPHICUS ISOLATES

For the purpose of screening isolates for their ability to fix nitrogen and dissolve phosphate

All 20 G. diazotrophicus isolates and the reference strain PAL5 showed significant nitrogenase activity. As shown in Fig 5.3, the highest concentration of C2H4/hr/mg cell protein was found in G. diazotrophicusGdVSVS, followed by G. diazotrophicus GdKVS2. Beyond nitrogenase activity, all the strains possessed phosphate solubilizing capacities of at least 0.58 g PO4/0.5 mg insoluble P/mg sucrose used.......... There were 20 isolates of G. diazotrophicus. The one with the highest phosphate solubilizing ability (0.78 g PO4/0.5 mg insoluble P/mg sucrose) was GdVSVS. G. diazotrophicus, GdKVS2 and PAL-5 followed (Table 5.18 and 5.19).
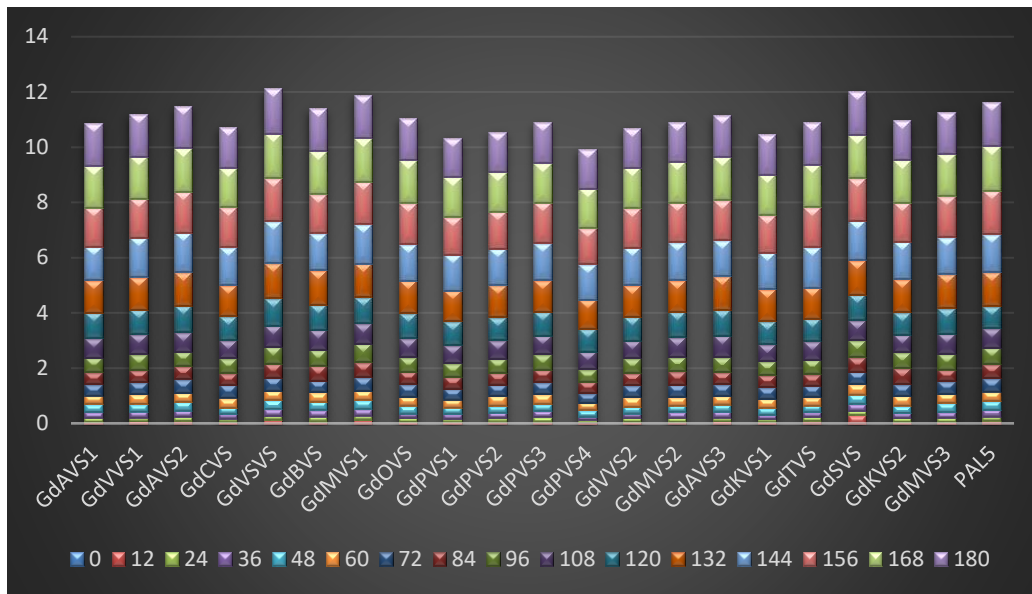
Fig. 4 Ampicillin-resistant G. diazotrophicus spores in acetic LGI broth

VII.CONCLUSION

Mycorrhizae (the relationship between plant roots and fungus) is found in over 80 percent of plant species. Among the many mycorrhizal fungi, AM fungi are the most common and the list of species that are not infected is likely to be much shorter than the infected ones. These fungal associations are beneficial to crop plants in many ways, including increasing nutrient availability, increasing water uptake and inducing resistance to disease and increasing crop yield. It seems that Gluconacetobacterdiazotrophicus plays a significant role in the plant's nitrogen supply via biological nitrogen fixation. G. diazotrophicus is also known for its ability to solubilize phosphorus, produce plant growth hormone indole acetic acid (IAA), and control red rot disease. It was found that G. diazotrophicus and AM fungal inoculation increased sugarcane growth and development by fixing nitrogen in various sugarcane parts (roots stems and leaves) along with producing growth promoting hormones and by solubilizing, mobilising, and protecting sugarcane plants from stress as well as pathogens.

- Samples of sugarcane rhizosphere soil were collected and analysed for physiochemical parameters, and AM fungal spores were successfully recovered, described, and then utilised to isolate G.diazotrophicus from all 20 distinct sugarcane rhizosphere soil samples (endophyte). Sugarcane rhizosphere soil samples were found to be infected with AM fungus, according to the study.
- Five different AM fungal isolates were isolated, characterised and finally identified as Glomus mosseae, Glomus fasciculatum. Glomus versiforme. Acaulosporalaevis. and Gigaspora margarita. Heterogenous soil types were observed in all the 20 different locations, namely sandy clay, sandy loam, clay and clay loam.
- Sugarcane grew better in unsterilized soil compared to sterilised soil in screening trials.
- G. fasciculatum reported as having the greatest root colonisation percentage (78.20), spore number (180.00), acid and alkaline phosphatase enzyme activity respectively (28.00, 26.30 g 24 h-1 of root). The RMD was determined to be 31.80%. Mycorrhizae-dependent sugarcane was classified somewhat reliant, and G. fasciculatum had the greatest MIE in mycorrhizae infection efficiency (MIE) (20.30).

- A pot culture experiment was used to determine the number of infectious propagules in the environment. After six months of storage at all temperatures, 50% of the population had died. After a year in storage, survival rates were 13% at 4°C, 11% at 25°C, and 8% at 40°C.
- It was shown that mycorrhizal root cultures of sorghum may be affected by IAA concentrations as low as 20 ppm and as high as 80 ppm. Root length, biomass, and colonisation percentage were all maximum at 60 ppm IAA after 30 days (16.60 cm, 1.30 g, and 46.60%).
- Co-inoculation of G. diazotrophicus and G. fasciculatum saved at least 50% of N and P, according to the findings of this research.
- An inoculation of AM fungus spores with G. diazotrophicus will need more research before it can be used as an endophyte.

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Cite this Article

Study of Finite Dimensional Topological Vector Spaces

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ABSTRACT

In this present paper, we studied about finite dimensional topological vector spaces. In general analysis it is customary to study linear spaces for which there is defined a "norm," which takes the place of the absolute value of ordinary analysis in defining distance, limit point, continuity, and so on. Linear metric spaces more general than the normed spaces have also been studied by Fréchet, Banach, and several others.

Keywords: TVS, Finite Dimensional Spaces, Linear Topology Spaces, Hausdorff Space.

I. INTRODUCTION

In line with the trend toward general topology, it seems natural to generalize still more by introducing linear topological spaces, that is, linear spaces which are at the same time topological spaces, in which the fundamental "linear*' operations of addition and scalar multiplication are continuous. We shall always assume that the topology is subject to the axioms for a T1-space [1-2].

The topology of T1-spaces may be introduced in various ways; by postulating a system of open sets or of neighborhoods with certain properties, and so on. We shall find it convenient to give a set of postulates for the topology of the linear space L in which "neighborhood" is the fundamental undefined notion. Since L is a topological group, it has a uniform topology and hence it is sufficient to consider neighborhoods of the origin. Moreover, the "uniform structure" implies that L is a completely regular Hausdorff space [3].

II. FINITE-DIMENSIONAL SPACES

Finite dimensional spaces occur often in this business. It is nice to know, and should be no surprise, that they are the same familiar objects that we are used to.

Proposition. Any Hausdorff topology on a finite dimensional vector space with respect to which vector space operations are continuous is equivalent to the usual one.
It is not necessary to assume the topology to be locally convex.

Proof. A basis of V determines a linear isomorphism f : $R^n \to V$, which is continuous by assumption on the topology of V. By definition of continuity, if U is any neighbourhood of 0 in V there exists some disk $B(r)$ with $f B(r) \subseteq U$.

It remains to show that the inverse of f is continuous. For this, it suffices to show that f neighbourhood of 0 [4].

Since the topology of V is Hausdorff, for every point s in $f(\mathbb{S}^{n-1})$ By Lemma 2.1 we may assume U to be balanced. Since U is balanced, the neighbourhood U/2 is contained in U, and does not meet s+U/2. Since the embedding of $\mathbb{S}^{n-1}$ is continuous, we may find a neibhourhood $\sum_s$ of s in $\mathbb{S}^{n-1}$ such that $f(\Sigma_s)$ is contained in s+U/2, and which does not intersect U/2. Since $\mathbb{S}^{n-1}$ is compact, we may find a finite number of Σ_s covering $\mathbb{S}^{n-1}$. The intersection of this finite collection of sets U_s is still a neigbhourhood of 0, and does not intersect $\mathbb{S}^{n-1}$. Since it is balanced, it does not contain any point exterior to $\mathbb{S}^{n-1}$, either. So it is contained in the open disk $\|v\| < 1$.

Proposition. Any finite dimensional subspace E of a TVS is closed.

I am reverting here to the convention that a TVS is locally convex, although it is not a necessary assumption.

Proof. It must be shown that the complement of E in the TVS V is open, or that every point of V has a neighbourhood containing no point of E. The previous Lemma tells us that we may find a neighbourhood of $\overline{0}$ in V whose intersection with E is contained inside a unit sphere. There therefore exists a semi norm ρ of V defining the topology of E. Since

$$\|e\|\rho \leq \|e - v\|\rho + \|v\|\rho, \|e - v\|\rho \geq \|e\|\rho - \|v\|\rho$$

Choose $R = \|v\|_{\rho}$. Then for $\|e\|_{\rho} > 2R$

$$\|e - v\|_{\rho} \geq \|e\|_{\rho} - \|v\|_{\rho} > 2R - R = R$$

Therefore the minimum value m of $\|e - v\|_{\rho}$ on the compact disk $\|e\|_{\rho} \leq 2R$, which is at most $\|0 - v\|_{\rho} = R$, is the minimum value on all of E. The disk $\|x - v\|_{\rho} < m$ is then a neighbourhood of v containing no point of E.

Corollary. If U is a closed linear subspace of a Hausdorff TVS and F a finite dimensional subspace, then

$U + F$ is closed [5].

Proof. Let V be the TVS. The claim is true because the image of F in V/U is closed.

Proposition. Suppose U to be of finite codimension in the TVS V. Then U is closed if and only if every linear function on V vanishing on U is continuous.

Proof. Let $E = V/U$. According to Proposition 2.8 and Proposition 3.1, U is closed if and only if the quotient topology on E is the usual one. But a finite dimensional TVS is Hausdorff if and only if every linear function on it is continuous [6-7].

As a special case:

Corollary. If f is a linear function on V, it is continuous if and only if the hyperplane $f = 0$ is closed.

The following is used in the theory of partial differential equations, among other places, to verify that an eigenspace has finite dimension, and in the theory of complex analytic manifolds to verify that certain cohomology groups have finite dimension.

Proposition. Any locally compact Hausdorff TVS is finite dimensional.

Proof. Let Ω be a compact neighbourhood of 0. Given any $0 < c < 1$ the set $\overline{\Omega}$ may be covered by a finite number of $e_i + c\,\Omega$. Let E be the space spanned by the e_i, which is closed in $\overline{V}$. Let $V = V/E$. The image of Ω in $\overline{V}$ is contained in $c\,\Omega$, which implies that each $c^{-n}\Omega$ is contained in Ω. This implies that $\Omega = V$. But

{0} is the only compact Hausdorff TVS.

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Cloud Computing

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ABSTRACT

Cloud computing is a new calculation model based primarily on grid computing. Cloud computing is often defined as the computer environment where a single computer demanded by a single group is usually given to a different group and if it would like to appear to use computer power or resources such as information or emails, it will access them via the web. This is a paper for anyone who has just discovered about cloud computing and wishes to capture more about cloud computing. During this paper, we have described Cloud Computing, Cloud Computing Architecture, features of Cloud Computing, and various Services and Post Computing model.

Keywords - Cloud computing, On Demand computing, Distributed computing, Data center

I. INTRODUCTION

Cloud Computing provides an environment for sharing resources based on scalable frameworks, middleware's and application development platforms, and business applications. Cloud computing models host free infrastructure services with a host of other platform services, subscription-based infrastructure services with additional application services, and free merchant services but sharing revenue from customers. The term Cloud Computing has been structured in a number of ways by analysts' organizations, academics, business professionals and IT companies. Clouds is a vast reservoir of easy-to-use and accessible resources. These resources can be powerfully redesigned to control dynamic load (scale), which allows for more complete use of the service.

INTRODUCTION

Cloud Computing provides a surroundings for resource sharing in terms of ascendance frameworks, middleware's and application development platforms, and business applications. The operation models of cloud computing grasp free infrastructure services with value another platform services, subscription-based infrastructure services with supplemental application services, and free services for sellers but sharing of revenues generated from shoppers [1].

The term Cloud Computing has been out lined in some ways by analyst corporations, academics, business practitioners and IT corporations. Clouds is an over sized pool of simply usable and accessible virtualized resources.

These resources may be dynamically reconfigured to regulate to a variable load (scale), permitting additionally for an optimum resource utilization
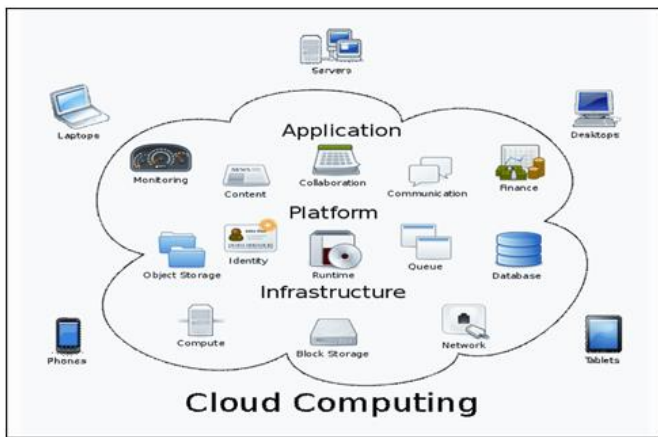
Cloud Computing

Cloud computing is a new computational model which is primarily based on grid computing. Cloud computing are often outlined as a computing surroundings wherever computing wants by one party are often outsourced to a different party and once would like be arise to use the computing power or resources like information or emails, they will access them via web. This paper is for anyone who will have recently detected regarding cloud computing and desires to grasp a lot of regarding cloud computing. During this paper, we described Cloud Computing, Architecture of Cloud Computing, Characteristics of Cloud Computing, and different Services and Deployment model of Cloud Computing Figure 1 . cloud computing There is no doubt that cloud computing is the most popular topic in the IT business. Google, Amazon, Yahoo and other web service providers, IBM, Microsoft and other IT vendors suggest their cloud computing strategy, with many intermediate operators paying close attention to cloud computing, low prices much of the cloud computing platform becomes more business-focused.

Characteristics of Cloud Computing

There are basically 5 essential characteristics of Cloud Computing .

1. On-demand self-services :

Cloud computing services do not require any human controllers, users themselves are able to provide, monitor and manage computer resources as needed.

2. Broad network access :

Computing services are usually provided by standard networks and various devices.

3. Rapid elasticity :

Computing services should have IT resources that can go out and come in as quickly and continuously as needed. Whenever a user needs services it is provided to him and he exits immediately when his need has expired.

4. Resource pooling :

IT services (e.g., networks, servers, storage, applications, and services) are available and shared across multiple applications and in a non-binding manner. Many clients are offered a service from the same visual device.

5. Measured service :

Application usage is tracked for each application and host, which will provide both the user and the service provider with an account of that usage. This is done for a variety of reasons such as monetary monitoring and the efficient use of resources.

II. DEPLOYMENT OF CLOUD COMPUTING

Clouds can usually be installed depending on the owner of the cloud data centers. The cloud space will cover one or more clouds . The following sections provide the division of single cloud sites associated with the presence of a Cloud database and the division of multiple cloud locations according to what type of Clouds space unit is integrated.
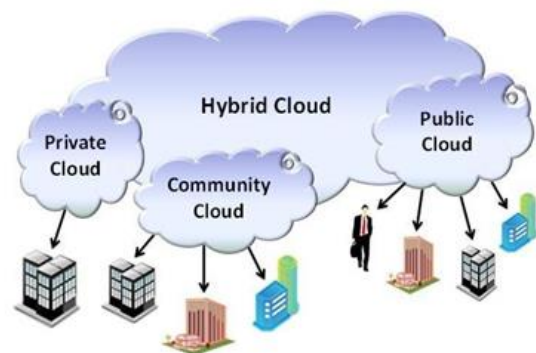
a. **Public cloud** - In public cloud, users have access to external torture services that may be provided by Internet browsers through the web. Users share common cloud infrastructure and that they do not seem to be close to it. although social clouds that measure square are rather less secure, they have significant benefits in cost. For those organizations that can afford a large IT investment and that do not have a lot of confidential information, the public cloud seems to be a reliable option.

b. **Private Cloud** - The secret function of clouds is within the organization's internal business information center. The great thing here is that it is easy to manage safety, maintenance and improvement and provides consistent management compliance with regard to preparation and use. Non-public cloud is often compared to a computer network. Compared to public clouds wherever all services and applications are hosted by the service provi. in the camera clouds these square services are integrated and designed for users at the site level. Utilities and applications square measure owned by the organization itself.

c. **Community Cloud** - A social cloud is a collaborative effort designed to share infrastructure between multiple organizations. It becomes a measure of economic equality and democratic equality. The public cloud is managed and protected by every participating organization or third-party service provider.

d. **Hybrid Computing** - Hybrid cloud is a combination of two or more clouds (private, public, or public) that remain separate entities but integrated with standard or related technologies that allow data and mobile applications (e.g., cloud computing and cloud computing).

Benefits of Cloud Computing Architecture –
The cloud computing architecture is designed in such a way that :
- Solves latency problems and improves data processing requirements.
- Reduce IT operating costs and provide better access to digital data and tools.
- Helps businesses to easily upgrade and deploy their cloud resources.
- It has a flexible feature that gives businesses a competitive advantage.
- It leads to better disaster recovery and provides higher security.
- Automatically updates its resources.
- Promotes remote operation and promotes teamwork.

Service Models of Cloud Computing
Cloud Computing has various different service models such as Infrastructure as a Service (IAAS), Platform as a Service (PAAS), and Software as a Service (SAAS).

i. **Infrastructure as a Service (IAAS)**
Cloud buyers can directly use the IT infrastructure (processing, storage, networks, and other basic computer resources) provided by the IaaS cloud. Iaas cloud provides "Virtualization" to integrate / deploy visual resources in the form of an ad to meet the growing or declining demand for the service for cloud clients. An example of IaaS is Amazon EC2.

ii. **Platform as a Service (PAAS)**
PaaS provides a development platform that supports a complete "Software Lifecycle" that allows cloud users to upgrade their cloud services and applications (e.g., SaaS) directly into the PaaS cloud. The main difference between SaaS and PaaS is that SaaS only handles cloud-based applications while PaaS provides a development platform that handles both completed and ongoing cloud applications. An example of PaaS is the Google App Engine.

iii. Software as a Service (SAAS)

Cloud buyers can free up their apps in the hosting environment, which can be accessed online by various clients (e.g. web browser, PDA, etc.) through in-app clients. Examples of SaaS are SalesForce.com, Google Docs, and Google Mai

III. CONCLUSION

Cloud computing is a new technology that has been widely studied in recent years. Currently there are several cloud platforms employed in each commercial and educational environment. How to use these platforms can be a big problem. Throughout this paper, we tend to describe the definition, styles, and features of cloud computing, cloud computing services, learning model and cloud computing challenges. There are a few problems with the cloud computing. As an example of cloud computing power issues, Performance, Service Level Agreement (SLA), information Confidentiality and balance, information Integrity, load balancing, Synchronization in multiple clusters on a cloud platform, and configuration, cloud platform protection.

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Data Mining, Spidering and Analysis with Python

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ABSTRACT

Data mining and analytics have played an important role in knowledge discovery and decision making/supports in the process industry over the past several decades. As a computational engine to data mining and analytics, machine learning serves as basic tools for information extraction, data pattern recognition and predictions. From the perspective of machine learning, this paper provides a review on existing data mining and analytics applications in the process industry over the past several decades. The state of the art of data mining and analytics are reviewed through eight unsupervised learning and ten supervised learning algorithms, as well as the application status of semi-supervised learning algorithms. Several perspectives are highlighted and discussed for future researches on data mining and analytics in the process industry.

Index theme: Data mining, Data spidering, Data wrangling, Data Analysis, Data Manipulation

I. INTRODUCTION

What is Data Mining?

Data Mining is a set of method that applies to large and complex databases. This is to eliminate the randomness and discover the hidden pattern. As these data mining methods are almost always computationally intensive.We use data mining tools, methodologies, and theories for revealing patterns in data. There are too many driving forces present. And, this is the reason why data mining has become such an important area of study.[1]

Data mining is a process of extracting and discovering patterns in large data sets involving methods at the intersection of machine learning, statistics, and database systems.Data mining is an interdisciplinary subfield of computer science and statistics with an overall goal of extracting information (with intelligent methods) from a data set and transform the information into a comprehensible structure for further use. it also involves database and data management aspects, data pre-processing, model and inference considerations, interestingness metrics, complexity considerations, post-processing of discovered structures, visualization, and online updating.[1]

History of Data Mining

In 1960s statisticians used the terms "Data Fishing" or "Data Dredging". That was to refer to what they

considered the bad practice of analyzing data. The term "Data Mining" appeared around 1990 in the database community.

Importance of data mining

As data mining is having spacious applications. Thus, it is the young and promising field for the present generation. It has attracted a great deal of attention in the information industry and in society.

Due to the wide availability of huge amounts of data and the imminent need for turning such data into useful information and knowledge. Thus, we use information and knowledge for applications ranging from market analysis. This is the reason why data mining, known as knowledge discovery from data.[2]

Data Mining Techniques

a. Artificial Neural Networks We use data mining in non-linear predictive models. As this learn through training and resemble biological neural networks in structure.[1]

b. Decision Trees As we use tree-shaped structures to represent sets of decisions. Also, these rules are generated for the classification of a dataset. These decisions generate rules for the classification of a dataset.[3]
   As there are specific decision tree methods that include Classification and Regression Trees and Chi-Square Automatic Interaction Detection (CHAID).

c. Genetic Algorithms There are the present genetic combination, mutation, and natural selection for optimization techniques. That is design based on the concepts of evolution.[2]

d. Nearest Neighbor Method A technique that classifies each record in a dataset based on a combination of the classes of the k record(s) like. it in a historical dataset (where k ³ 1). Sometimes called the k-nearest neighbour technique.

e. Rule Induction The extraction of useful if-then

Below are 5 data mining techniques that can help you create optimal results.

1) Classification analysis

This analysis is used to retrieve important and relevant information about data, and metadata. It is used to classify different data in different classes. Classification is similar to clustering in a way that it also segments data records into different segments called classes. But unlike clustering, here the data analysts would have the knowledge of different classes or cluster. So, in classification analysis you would apply algorithms to decide how new data should be classified. A classic example of classification analysis would be Outlook email. In Outlook, they use certain algorithms to characterize an email as legitimate or spam.[4]

2) Association rule learning

It refers to the method that can help you identify some interesting relations (dependency Modeling) between different variables in large databases. This technique can help you unpack some hidden patterns in the data that can be used to identify variables within the data and the concurrence of different variables that appear very frequently in the dataset. Association rules are useful for examining and forecasting customer behavior. It is highly recommended in the retail industry analysis. This technique is used to determine shopping basket data analysis, product clustering, catalog design, and store layout. In IT, programmers use association rules to build programs capable of machine learning.[4]

3) Anomaly or outlier detection

This refers to the observation for data items in a dataset that do not match an expected pattern or an expected behavior. Anomalies are also known as outliers, novelties, noise, deviations, and exceptions. Often, they provide critical and actionable information. An anomaly is an item that deviates considerably from the common average within a dataset or a combination of data. These types of items are statistically aloof as compared to the rest of the data and hence, it indicates that something out of the

ordinary has happened and requires additional attention. This technique can be used in a variety of domains, such as intrusion detection, system health monitoring, fraud detection, fault detection, event detection in sensor networks, and detecting eco-system disturbances. Analysts often remove the anomalous data from the dataset top discover results with an increased accuracy.[4]

4) Clustering analysis

The cluster is a collection of data objects; those objects are similar within the same cluster. That means the objects are similar to one another within the same group and they are rather different, or they are dissimilar or unrelated to the objects in other groups or in other clusters. Clustering analysis is the process of discovering groups and clusters in the data in such a way that the degree of association between two objects is highest if they belong to the same group and lowest otherwise. A result of this analysis can be used to create customer profiling.[4]

5) Regression analysis

In statistical terms, a regression analysis is the process of Identifying and Analyzing the relationship among variables. It can help you understand the characteristic value of the dependent variable changes, if any one of the independent variables is varied. This means one variable is dependent on another, but it is not vice versa. It is generally used for prediction and forecasting.

All of these data mining techniques can help analyze different data from different perspectives. Now you have the knowledge to decide the best technique to summarize data into useful information – information that can be used to solve a variety of business problems to increase revenue, customer satisfaction, or decrease unwanted cost.[4]

II. IMPLEMENTATION OVERVIEW

Data variables are the core objects of data mining. Data variable gives us the information about where to look at in Data set.

We have enough scrapped Data From National Immunization Survey-Child, now we are going to spider through the data and do analysis of it.

Experimental work: Data set-National immunization survey-child

- Programming language: Python
- Libraries/moduls used: Pandas,numpy,scipy And
- Compiler:Jupyternotebook,ipython.

variable referencing column name

III. DATA ANALYSIS

Analysis 1

- Average number of influenza vaccines for those children we know received breast-milk as a child and those who know did not.
- Mining the data related to requirement ,we need cells of data containing no of vaccine and child who received breast-milk,are follows

"CBF_01", "P_NUMFLU "

```
def average_influenza_doses() :
ave_milkfed_dose                          =
np.mean(milk_fed["P_NUMFLU            "])
ave_milknotfed_dose                       =
```

np.mean(milk_notfed["P_NUMFLU "]) ave_up = (ave_milkfed_dose, ave_milknotfed_dose)

return ave_tup

average_influenza_doses()

(1.8799187420058687, 1.5963945918878317)

Analysis 2

- . Calculate the ratio of the number of children who contracted chickenpox but were vaccinated against it (at least one varicella dose) versus those who were vaccinated but did not contract chicken pox. Return results by sex.$

def chickenpox_by_sex() :

CPox ={}

CPox["male"] = male

CPox["female"]=female

return CPox

chickenpox_by_sex()

' male ' : 0.009675583380762664, ' female ' : 0.0077918259335489565

Analysis 3

we might look at the correlation between the use of the vaccine and whether it results in prevention of the infection or disease.

- Some notes on interpreting the answer. The had-chickenpox-column is either 1 (for yes) or 2 (for no), and the num-chickenpox-vaccine-column is the number of doses a child has been given of the varicella vaccine. A positive correlation (e.g., corr ¿ 0) means that an increase in had-chickenpox-column (which means more no's) would also increase the values of num-chickenpox-vaccine-column (which means more doses of vaccine). If there is a negative correlation (e.g., corr ¡ 0), it indicates that having had chickenpox is related to an increase in the number of vaccine doses. $

req=["HAD_CPOX", "P_NUMV RC"] $

def corr_chickenpox() :

corr, pval = stats.pearsonr(had_cpox["HAD_CPOX"], had_cpox["P_NUMVRC"])

return corr

corr_chickenpox()

07044873460147986

IV. ENERGY SUPPLY DATA ANALYSIS

1) Manipulation

Convert Energy Supply to gigajoules (Note: there are 1,000,000 gigajoules in a petajoule). For all countries which have missing data (e.g. data with "...") make sure this is reflected as np.NaN values.

Energy["Energy Supply"]*=1000000 Energy

Easy manipulation of data.

Data set-Energy supply and renewable electricity production

2) Spidering and Grabbing

Top 15 countries for average GDP over the last 10 years. This function should return a Series named avgGDP with 15 countries and their average GDP sorted in descending order.

def gdp_avg(row):

```
    data=row[['2006', '2007', '2008','2009', '2010', '2011',
'2012', '2013', '2014', '2015']]
    return pd.Series({"avgGDP":np.nanmean(data)})
avgGDP=GDP_avg.apply(gdp_avg,axis="columns")
avgGDP=avgGDP.sort_values(by="avgGDP",ascendin
g=False)
avgGDP
```

Top 15 countries for average GDP over the last 10 years Country

United States 1.536434e+13

China 6.348609e+12 Japan 5.542208e+12

Germany 3.493025e+12 France 2.681725e+12

United Kingdom 2.487907e+12 Brazil 2.189794e+12

Italy 2.120175e+12 India 1.769297e+12

Canada 1.660647e+12

Russian Federation 1.565459e+12 Spain 1.418078e+12

Australia 1.164043e+12 South Korea 1.106715e+12

Iran 4.441558e+11

Name: avgGDP, dtype: float64

3) Spidering info

.GDP changed over the 10 year span for the country with the 6th largest average GDP $

```
def answer_four():
change_GDP=main_ds[main_ds["Rank"]==4]["2015"]-
main_ds[main_ds["Rank"]==4]["2006"]
    return pd.to_numeric(change_GDP)[0]
answer_four()
```

246702696075.3999

mean energy supply per capita

```
def answer_five(main_ds):
    return    np.mean(main_ds["Energy   Supply   per
Capita"])
answer_five(main_ds)
```

157.6

4) 5Learning data

What country has the maximum percentage Renewable and what is the percentage $

```
def answer_six():
```

```
max_renew=main_ds["%
Renewable"].idxmax(),np.max(main_ds["%
Renewable"])
    return max_renew
answer_six()
```

('Brazil', 69.64803).

New column that is the ratio of Self-Citations to Total Citations. What is the maximum value for this new column, and what country has the highest ratio.

```
def answer_seven():
    main_ds["Citation_ratio"]=main_ds["Self-
citations"]/main_ds["Citations"]
max_cit_ration=main_ds["Citation_ratio"].idxmax(),n
p.max(main_ds["Citation_ratio"])
    return max_cit_ration
answer_seven()
```

('China', 0.6893126179389422)

5) Data sorting

. Create a column that estimates the population using Energy Supply and Energy Supply per capita. What is the third most populous country according to this estimate

```
def answer_eight():
est_pop=main_ds
est_pop["PopEst"]=est_pop["Energy
Supply"]/est_pop["Energy Supply per Capita"]
max_pop=est_pop.sort_values(by="PopEst",ascending
=False)
    return max_pop.index[2]
answer_eight()
```

'United States'

6) Statastical Info

. Create a column that estimates the number of citable documents per person. What is the correlation between the number of citable documents per capita and the energy supply per capita? Use the .corr() method, (Pearson's correlation).

```
def answer_nine():
cit_doc=main_ds
```

cit_doc["Citabledocs per Capita"]=cit_doc["Citabledocuments"]/cit_doc["PopEst"]

cit_doc["Citabledocs per Capita"]=cit_doc["Citable docs per Capita"].astype(float)

cit_doc["Energy Supply per Capita"]=cit_doc["Energy Supply per Capita"].astype(float)

    return cit_doc["Citable docs per Capita"].corr(cit_doc["Energy Supply per Capita"])
answer_nine()

7940010435442946

def plot9(): import matplotlib as plt %matplotlib inline

Top15 = answer_one() Top15['PopEst'] = Top15['Energy Supply'] / Top15['Energy Supply per Capita'] Top15['Citable docs per Capita'] = Top15['Citable documents'] / Top15['PopEst'] Top15.plot(x='Citable docs per Capita', y='Energy Supply per Capita', kind='scatter', xlim=[0, 0.0006])

7) Mapping

def answer_eleven():

grp_cont=main_dsContinentDict = {'China':'Asia', 'United States':'North America', 'Japan':'Asia', 'United Kingdom':'Europe', 'Russian Federation':'Europe', 'Canada':'North America', 'Germany':'Europe', 'India':'Asia', 'France':'Europe', 'South Korea':'Asia', 'Italy':'Europe', 'Spain':'Europe', 'Iran':'Asia', Australia':'Australia', 'Brazil':'South America'}

grp_cont['Continent'] = grp_cont.index.to_series().map(ContinentDict)

grp_cont=grp_cont.groupby("Continent")["PopEst"].agg(["size","sum","mean","std"])

    return grp_cont
answer_eleven()

Continent	size	sum	mean	std
Asia	5	2.898666e+09	5.797333e+08	6.790979e+08
Australia	1	2.331602e+07	2.331602e+07	NaN
Europe	6	4.579297e+08	7.632161e+07	3.464767e+07
North America	2	3.528552e+08	1.764276e+08	1.996696e+08
South America	1	2.059153e+08	2.059153e+08	NaN

V. APPLICATIONS

Market Basket Analysis

Market basket analysis is a modelling technique based upon a theory that if you buy a certain group of items you are more likely to buy another group of items. This technique may allow the retailer to understand the purchase behaviour of a buyer. This information may help the retailer to know the buyer's needs and change the store's layout accordingly. Using differential analysis comparison of results between different stores, between customers in different demographic groups can be done.

Education

There is a new emerging field, called Educational Data Mining, concerns with de- veloping methods that discover knowledge from data originating from educational Environments. The goals of EDM are identified as predicting students' future learn- ing behaviour, studying the effects of educational support, and advancing scientific knowledge about learning. Data mining can be used by an institution to take accurate decisions and also to predict the results of the student.

Fraud Detection

Billions of dollars have been lost to the action of frauds. Traditional methods of fraud detection are time consuming and complex. Data mining aids in providing meaningful patterns and turning data into information. Any information that is valid and useful is knowledge. A perfect fraud detection system should protect information of all the users. A supervised method includes collection of sample records. These records are classified fraudulent or non-fraudulent. A model is built using this data and the algorithm is made to identify whether the record is fraudulent or not.

Intrusion Detection

Any action that will compromise the integrity and confidentiality of a resource is an intrusion. The defensive measures to avoid an intrusion includes user authentication, avoid programming errors, and

information protection. Data mining can help improve intrusion detection by adding a level of focus to anomaly detection. It helps an analyst to distinguish an activity from common everyday network activity. Data mining also helps extract data which is more relevant to the problem.

Lie Detection

Apprehending a criminal is easy whereas bringing out the truth from him is difficult. Law enforcement can use mining techniques to investigate crimes, monitor communication of suspected terrorists. This file includes text mining also. This process seeks to find meaningful patterns in data which is usually unstructured text. The data sample collected from previous investigations are compared and a model for lie detection is created. With this model processes can be created according to the necessity.

Financial Banking

With computerised banking everywhere huge amount of data is supposed to be generated with new transactions. Data mining can contribute to solving business problems in banking and finance by finding patterns, causalities, and correlations in business information and market prices that are not immediately ap- parent to managers because the volume data is too large or is generated too quickly to screen by experts. The managers may find these information for better segmenting,targeting, acquiring, retaining and maintaining a profitable customer

Research Analysis

History shows that we have witnessed revolutionary changes in research. Data mining is helpful in data cleaning, data pre-processing and integration of databases. The researchers can find any similar data from the database that might bring any change in the research. Identification of any co-occurring sequences and the correlation between any activities can be known. Data visualisation and visual data mining provide us with a clear view of the data.

Criminal Investigation

Criminology is a process that aims to identify crime characteristics. Actually crime analysis includes exploring and detecting crimes and their relationships with criminals. The high volume of crime datasets and also the complex- ity of relationships between these kinds of data have made criminology an appropriate field for applying data mining techniques. Text based crime reports can be converted into word processing files. These information can be used to perform crime matching process.

VI. PRO'S AND CON'S

❖ **Pro's of Data Mining**
Better Customer Relationship Management
Being able to ensure good customer relationship management is one of the key advantages of data mining. It helps businesses know what type of customers to approach with different kinds of products. This guarantees the sale of the product and not the pitching of the product.

Forecasting Market Trends
Marketing and retailing depend on the current market trends that are followed by customers. Data mining allows these industries to find the correct trends through market research which, in turn, helps them in choosing their marketing strategies.

Helps Stay Ahead of Competition
With so much new data, well analyzed, your RD department will be at the fore- front of trends and will be able to think about the next product. Data mining offers many advantages over the possibilities of personalization, consistency with the current and future needs of consumers.

Anomaly Detection with more accurate Analysis
The analysis is much more accurate with data mining since it is possible to classify all the information according to the priorities that you previously identified. It is capable of analyzing databases with a huge amount of data. Data mining can become very

useful for various financial institutions. Banks and credit card companies can obtain information on loans and know the creditworthiness of customers.

❖ Con's of data mining

Expensive in the Initial Stage:

With a large amount of data getting generated every day, it is pretty much ev- ident that it will draw a lot of expenses associated with its storage as well as maintenance. This is one of the main disadvantages of data mining.

In order to successfully operate data mining, your company needs the appropriate specialists.Dependingon the type of data you want to collect, a lot of work may be required, or sometimes the initial investment to obtain the technologies needed for data collection can be very expensive.

Security of the Critical Data:

Companies hold a lot of critical information on their customers and employees as well. There's always a risk of being hacked, as a massive amount of valuable data gets stored in the data mining systems. Security issues during data mining

Non-Verified data updation,Security architect evaluation,Dataanonymization,Filtering validating external sources,Data storage location,Distributed frameworks for data.

Data Mining Violates User Privacy:

It is comprehended that data mining uses market-based techniques to gather data on people. Most of the time, private information that companies hold is traded to others or leaked.

Organizations gather information on their consumers in several ways to under- stand their purchasing behaviour and much more.

Lack of Precision or Incorrect Information

The data mining tools analyze data without actually knowing its meaning. Theypresent the results in the form of various visualizations. However, these patterns are not meaningful by themselves, but only after the user has assessed them. eg

If incorrect information is applied for decision-making, it can cause severe out- comes.

VII. FUTURE SCOPE

- In the future, data mining will include more complex data types. In addition, for any model that has been designed, further refinement is possible by examining other variables and their relationships.
- Research in data mining will result in new methods to determine the most in- teresting characteristics in the data. As models are developed and implemented, they can be used as a tool in enrollment management.

VIII. CONCLUSION

Data mining, along with traditional data analysis, is a valuable tool that that is being used in Strategic Enrollment Management to achieve desired enrollment targets in colleges and universities. In situations where it has been applied, it has been proven to successfully predict enrollment, at least to a degree. More research is needed to fully take advantage of the data mining processes and technologies

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The C Language Mini Project to Demonstrate a Simple Progress Bar

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ABSTRACT

Creating a simple loader progress bar using some basic functions and loops in the C programming language. This mini-project makes use of basic C concepts and datatypes to print a pattern in such a way that with proper delay insertion, the end result is a progress bar that indicates the loading process of any task. In the early days, when graphics were not as appealing and fast as today, we used to have two folders on the screen separated by some distance. While our files were being copied, a piece of paper would fly off from the left folder and get inserted into the right folder. Gradually, that pattern of representation was replaced by the progress bar.

KEYWORDS: Core C Language, While Loop, Color Functions, Goto Function, Programming Plane

I. INTRODUCTION

The C programming language is like a vast "sea". The founder of this programming language is Dennis Ritchie. He has himself said that, even though he has been a pioneer of giving the gift of C to this world, he knows less than 10% of it. C language was originally created to overcome the drawbacks of B and BCPL languages. Though C is an old language, it is still regarded as one of the core fundamental programming languages. Other languages have received help from C, the tools required for problem solving in other programming languages have been provided by C. This was a brief history of C programming language.

II. CORE C PROGRAMMING LANGUAGE

If a person wants a complete walkthrough of C language in a gist, here are the majority of the concepts mentioned, which are covered by the C programming language. First of all, the programmer must know how to write a pseudo code. It includes steps to approach the program in sentence format. It may also include flowcharts. Next, one must learn sequence which is nothing but proper sequential steps to write a correct program. Then comes selection which is a collection of a few conditional statements like if...else, multiple if, etc. It is followed by Iteration meaning loops or looping constructs. We mainly have while, do-while, for, and nested for loops in C language. To create menu-driven programs, the switch case concept comes into picture. To organize

records and databases as we do in stationary registers, the next useful concept of arrays and string arrays is implemented. The essence of C and CPP is pointers, a very important concept that follows arrays. Next, we have functions as a topic. By default, C has many in-built functions like printf, scanf, getch, clrscr, strcpy, etc. But we can also build our own functions in C. For e.g. If we want prime numbers to be determined, if we want factorial of a number, if we want to determine whether a number or a string is a palindrome or not, etc. The last three topics are nothing but structure, preprocessor and file handling which lay the foundations of any C mega-project. This was a brief explanation about what C actually does.

III. OVERVIEW OF EVERYTHING USED IN PROGRESS BAR PROJECT

The above two images represent the C code of the progress bar. In the first two lines, we have the hash include statements. Hash is used as a pre-processor. Whatever is written after the hash, which is usually a header file, will be pre-complied by the compiler to

allow us the use of all the functionality that those header files provide. The two files have a .h extension to indicate that they are header files. Among those two header files included, stdio stands for "standard input/output" and conio stands for "Console input/output". Next, we have a text called //Progress Bar by Sakshi, which is a single-line comment used in C. Like all the other programming languages, comments will not be executed. They are just for the programmer's reference. Then, we have void main(). Here, void is the return-type of main() which is a function, main() function plays a crucial role in executing the program and terminating it. Void means nothing, we just want to display the progress bar on our console, we don't expect the function to return any value back. That is the reason void is used as the return type. The main function has a method in which we write the actual code, the space between two curly braces is called as that method.

Now we begin with the actual logic. The first step in the method is variable declaration. Variables are nothing but containers to hold a value depending upon their datatype. Here, we have the int datatype to store integer values which we have assigned to the variables a, push and y respectively. There are two functions clrscr(); and getch(); after variable declaration. Clrscr function is used to clear the screen for fresh outputs every time we compile and run the program. The output of the correct code is achieved but sometimes it gets displayed and the compilers returns to the main blue window so fast that we are unable to comprehend the output clearly. To make the compiler wait, show us the output and return to blue window only after pressing any key, getch function is used. Now, we have arrived at something called as the "gotoxy();" function. According to the applied co-ordinate geometry in C programming, the black output console is an X-Y Programming Plane with bottom of the screen being the X-axis and left side of the screen being the Y-axis. Naturally, the origin will be at the bottom-left corner of the console. In gotoxy(23,19), value of x-coordinate is 23 and that

of y-coordinate is 19. The cursor will hence move to that location on the plane. Before the while loop, the last statement is cprintf. The difference between cprintf and printf is that cprintf supports textcolor and textbackground properties whereas printf does not. The message written in cprintf will be printed as it is on the output console, by default in white textcolor.

IV. WHILE LOOP (TO PRINT A BASE DOTTED BAR OF BLUE COLOUR)

The while loop has the condition as while(a<=65). The initial value of a is 10 which is incremented by 2 using a statement in the loop as a+=2. When the value of a becomes greater than 65, while loop will be terminated. For every value between 10 and 65 which makes the while loop condition true, for as long as the loop will get executed, everything written in that loop will get executed as well. Text colour will be blue, gotoxy(a,y) will result in multiple cursor locations e.g. (10, 13) then (12,13) so on till (64,13). At each of these locations, a small part of the base bar will get printed in blue. Just because we have not inserted a delay, the entire bar is visible instantly. The way the bar is getting printed is because of cprintf function where %c and %c are two placeholders of character datatype and 177 is the ASCII value of the dotted block.

The above image shows the base blue bar printed using this while loop.

V. WHILE LOOP (TO PRINT THE FLOWING GREEN BAR INDICATING THE LOADING PROCESS)

First, let us understand which tasks we are accomplishing using this second while loop and then proceed accordingly. It is to be noted that this second while loop will not get executed until the first while loop is terminated as this loop is below the first loop in the program. First task of the second while loop is to create a loading message below the progress bar to indicate that the process is still running. The second task is to print a flowing progress bar of green colour over the previous blue dotted one. The length of the blue dotted bar and the green-lined bar will be the same. The third and the last task is to generate a percent count on the top-right corner of the previous blue bar to indicate the percent of information loading. The percent will start from 15% till 100% and overwrite on the same location.

Now, as you can see in the second image containing the code of the program, the second while loop has the same condition as the first while loop. But, the value of variable 'a' is now greater than 65 when it exited the first while loop. We want the length and position of both bars to be the same, hence, we need to bring 'a' back to 10 and increment it till 65 again. So, we write a=10 before the second while loop. Now in the second while loop, to achieve the first task, we do gotoxy(35,15) which will bring the cursor below our progress bar. Then using textcolor(YELLOW+BLINK) and cprintf function, we have created "Loading!" message below the bar which will be in yellow colour and will keep blinking till the while loop terminates. To achieve the second task, we have used the bar printing conditions from the first while loop as it is with some minor changes. We have kept the location same, just changed the colour of the bar and the ASCII value from 177 to 186 to print line bar. Also, because we have inserted delay(200), we will not get a complete bar at once but parts of it after regular intervals of time which is the entire essence of

this project. The third task of printing a percent count on top of the bar can be done by initializing the value of a push variable to 15, then incrementing it using push+=3, such that when the entire green bar is loaded, percentage count should be showing 100%. But, it might happen that the count may not reach 100 but some value before or after 100. So, to handle this condition, just before the loop terminates i.e at a=64, we use selection that is the if statement to increase the push value such that it becomes 100 before exiting the second loop. [1] After second loop is terminated, we again go to the location of 'Loading!' and overwrite it with 'Complete' to indicate completion of our task.

Finally, the pictures of how our project bar looks like are below:

Fig 1: At 18% with Loading Message

Fig 2: At 30% without Loading Message because of Blink

Fig 1 has green bar filling the blue one only till 18%. It also has yellow colored text that is the Loading message to indicate that the bar is still flowing. In Fig 2, the yellow Loading message seems to have disappeared but it hasn't. The blink property causes it to blink until the loop finishes executing. Fig 3, Fig 4 and Fig 5 indicate the stages of progress bar completion. The last image clearly shows the Loading message being replaced by Complete message and bar percent count to be 100%

Fig 3: At 51% with Loading Message

Fig 4: At 72% without Loading Message
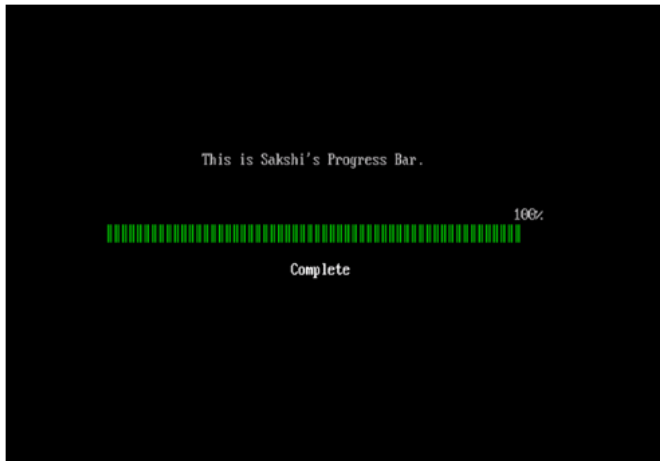
Fig 5: At 100% with Complete Message

VI. CONCLUSION

Thus, a progress bar using C programming language has been explained in this research paper. Some basic functionalities of C language have also been explained. The project is demonstrated with appropriate illustrations and images.

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Cloud Computing Deployment Models : A Comparative Study

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ABSTRACT

Cloud computing has become the embraced in the computer world. Cloud implementation is the process of creating a virtual computing environment. Deployment in the cloud provides organizations with flexible and scalable virtual computing resources. A cloud deployment model is the type of architecture in which a cloud system is deployed. These models differ in terms of administration, ownership, access control, and security protocols. This paper describes the different types of cloud computing service models and deployment models; it also gives us a comparative study of various clouds using many factors. The comparison is simply based on various factors such as reliability, cost, data control, workload, performance, and many other cloud parameters.

KEYWORDS-Deployment model, Service model, Public cloud, Private cloud, Hybrid cloud, Inter-Cloud, Federation cloud, Multi cloud.

I. INTRODUCTION

The demand for cloud computing has led to different types of cloud deployment models. Cloud computing is also known as the fifth utility (along with water, electricity, gas, and telephone) that is available based on user demand. Cloud computing is based on pay as per use of model. In this, a cloud computing model provides an on-demand online computing service as required by the user. [1] With all the new cloud options and the phrase "as a service" seemingly added to everything imaginable, it helps to take a step back and look at the differences between the main types of cloud deployment and the different types of services. cloud computing. Cloud deployment describes how a cloud platform is deployed, how it is hosted, and who has access to it. All cloud computing deployments operate on the same principle by virtualizing the computing power of servers into segmented, software-driven applications that provide compute and storage capabilities. [2] Like all clouds, they have different characteristics like storage capacities, billing systems, and different methods of providing the services of other clouds. The recent problem is that people do not know which cloud is suitable according to their requirements; they cannot choose the right cloud for their services among the different clouds managed by different cloud providers [3]. So, to facilitate these kinds of situations, this paper helps define the comparison of some of the most popular clouds, taking in mind. It's all the important aspects that can help a normal customer, business and

academic organizations to choose the particular cloud from according to your needs. Briefly, this paper presents a comprehensive analysis of cloud computing, explaining its services and deployment models, identifying various features of interest, and comparing them with different deployment models.

II. CLOUD COMPUTING SERVICES

The cloud architecture can be divided into four layers based on their functioning which show in Fig.1.

A. IaaS (Infrastructure as service)
B. PaaS (Platform as a Service)
C. FaaS (Function as a Service
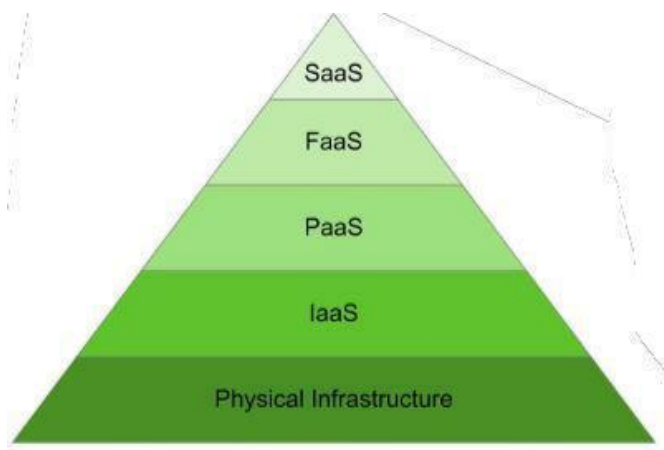D. SaaS (Software as a Service)

Fig 1: Classification of cloud services [4]

A. Infrastructure as a Service (IaaS)

IaaS is the most comprehensive and flexible type of cloud service. Essentially, it provides a fully virtualized computing infrastructure that is provisioned and managed over the Internet. An IaaS provider manages the physical edge of the infrastructure (servers, data storage space, etc.) in a data center, but allows customers to fully customize those virtualized resources to meet their specific needs. With IaaS, the customer can purchase, install, configure, and manage any software they need to use, including items such as operating systems, middleware, applications, business analytics, and

development tools. IaaS eliminates the capital expense of building internal infrastructure.

Examples of IaaS: Microsoft Azure, Amazon Web Services (AWS), Cisco Metacloud, Google Compute Engine (GCE). [2]

B. Platform as a Service (PaaS)

PaaS provides the framework you need to create, test, deploy, manage, and update software products. It uses the same basic infrastructure as IaaS, but also includes the operating systems, middleware, development tools, and database management systems necessary to create software applications. PaaS is extremely useful for any company that develops web-based software and applications. Many of the tools required to develop for multiple platforms (computers, mobile devices, browsers, etc.) can be quite expensive. Customers can access the development tools using PaaS cloud service.

Examples of PaaS: AWS Elastic Beanstalk, Apache Stratos, Google App Engine, Microsoft Azure. [2]

C. Function-as-a-Service (FaaS)

FaaS allows customers to react code reactively, without the need to allocate processing resources ahead of time. The cloud service provider handles the infrastructure, allowing the customer to focus strictly on the application of application codes. Functions are scaled automatically, making them excellent for adapting to dynamic workloads that vary in terms of resource consumption. Customers only pay for the resources they use, making FaaS the truest form of "pay-as-you-go" cloud computing. Most FaaS applications are quite simple and can be deployed very quickly. The cloud customer just needs to upload the complied function code and tell the platform how to provision resources when it executes.

Examples of FaaS: AWS Lambdas, Azure Functions. [2]

D. Software as a Service (SaaS)

SaaS is a fully developed software solution ready to buy and use over the Internet by subscription. The SaaS provider manages the infrastructure, operating systems, middleware, and data necessary to deliver the program, ensuring that the software is available when and where customers need it. Many SaaS applications run directly through web browsers, eliminating the need for downloads or installations. SaaS applications allow businesses to get up and running quickly and scale operations quickly. You do not need to purchase or implement the hardware and software used to deliver your business services.

Examples of SaaS: Microsoft Office 365, Salesforce, Cisco WebEx, Google Apps. [2]

III. CLOUD COMPUTING DEPLOYMENT

MODELS

There are six types of Deployment Models, from them five are main: Private Cloud, Public Cloud, Hybrid Cloud, Community Cloud, Virtual Private Cloud. Inter-Cloud is also a type of Deployment models and it has two types of clouds: Federated Clouds, Multi-clouds. In Fig. 2, it displays the uses of deployment models in Data center and its growth in present era and in future.

A. Private Cloud

The private cloud deployment model is also called as the internal or corporate model. A private cloud belongs to a specific organization. That organization controls the system and manages it centrally. While a third party (for example, a service provider) can host a private cloud server. Most companies choose to keep the hardware in their local data center. From there, an internal team can oversee and manage everything. [1]

B. Public Cloud

The public cloud model is well-known cloud service. This type of cloud is a popular choice for web applications, file sharing, and non-confidential data storage. Public clouds are recommended for software development and collaborative projects. The service provider owns and operates all the hardware necessary to run a public cloud. Vendors keep the devices in massive data centres. The public cloud delivery model plays an important role in development and testing. Developers frequently use public cloud infrastructure for development and testing purposes. Its virtual environment is inexpensive and can be easily configured and quickly deployed, making it perfect for test environments. [1]

C. Hybrid Cloud

Hybrid clouds combine public clouds with private clouds. They are designed so that data and applications move smoothly with each other and the two platforms interact smoothly. It is the perfect solution for a business or organization that needs a bit of both, which are generally industry and size dependent. [2] In essence, a hybrid cloud generally starts out as a private cloud which then extends the integration to use one or more public cloud services. This deployment model makes sense when companies have sensitive data that cannot be stored in the cloud or regulatory requirements that call for data protection, storage, and more. [6]

D. Community cloud

A cloud service that provides services to a community of users or organizations with shared interests or concerns. Organizations using this cloud service have shared missions, governance, security requirements, and policies. Cloud services can be hosted on the premises of the consumer organization, on the premises of the peer organization, at one provider, or a combination of these. This community cloud term is often used in marketing to explain the target consumers of the service, although the actual cloud

could technically be a VPC, private or hybrid cloud model. [6]

E. Virtual private cloud (VPC)

A virtual private cloud (VPC) is a private cloud computing environment which is within a public cloud. Essentially, a VPC provisions logically isolated sections of a public cloud to provide a virtual private environment. Like all cloud environments, VPC resources are available on demand to scale as needed and are highly configurable. [8] This implementation is a compromise between a public and a private model in terms of price and features.

F. Inter-Clouds

Inter-cloud or "cloud of cloud" is a term that refers to a theoretical model for cloud computing services based on the idea of combining many different individual clouds into one seamless mass in terms of on-demand operations. Inter-cloud would simply ensure that a cloud could use resources beyond its reach, taking advantage of pre-existing contracts with other cloud providers. [9].
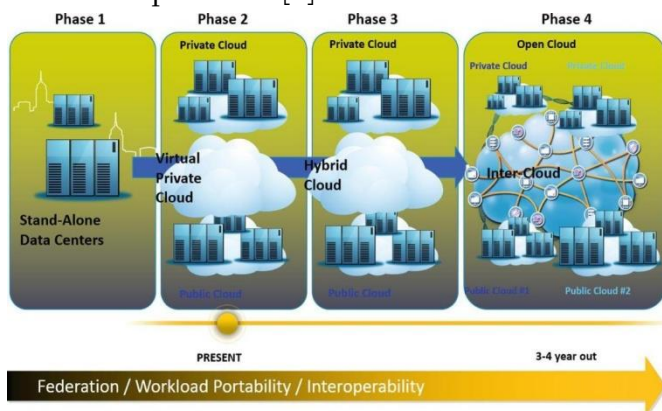

Fig 2: Growth of Cloud models [14]

There are mainly two types of Inter-cloud:

- **Multi Cloud**
- **Federated cloud (cloud federation)**

❖ Multi Cloud

Multi-cloud is the use of two or more cloud computing services from several different cloud providers. A multi-cloud environment could be completely private, completely public, or a combination of both. Businesses use a multi-cloud environment to allocate computing resources and reduce the risk of downtime and data loss. They can also increase the computing power and storage available to businesses. Cloud innovations in recent years have led to a shift from single-user private clouds to multi-tenant public clouds and hybrid clouds. [10]

❖ Federated cloud (cloud federation)

A federated cloud is also called a cloud federation which is manage multiple internal and external cloud computing services for to meet business needs. A federation is the union of several smaller parties that perform a common action. [11]

IV. COMPARISON OF CLOUD DEPLOYMENT MODELS

Here is a comparative table that provides an overview of all six cloud deployment model based on many factors as listed below [1] [5][7] [12].

Table 1: Comparison Table among Six Types of Deployment Models.

	Public	Private	VPC	Community	Hybrid	Inter
Ease of Setup	Very easy to set up, the	Very hard to set up as your team	Easy to set up, the provider does most	Easy to set up because of	Very hard to set up due to	Very easy to set up, the

	provider does most of the work	creates the system	of the work (unless the client asks otherwise)	community practices	interconnected systems	provider does most of the work
Ease of use	Very easy to use	Complex and requires an in-house team	Easy to use	Relatively easy to use as members help solve problems and establish protocols	Difficult to use if the system was not set up properly	Easy to use
Data control	Low, the provider has all control	Very high as yo-u own the system	Low, the provider has all control	High (if members collaborate)	Very high (with the right setup)	Very high (with the right setup)
Reliability	Prone to failures and outages	High (with right team)	Prone to failures and outages	Depends on the community	High (with the right setup)	High(for clients)
Scalability	Low, most providers	Very high as there are no	Very high as there	Fixed capacity	High (with the right setup)	High (with the right

	offer limited resources	othe r system tenants	no are other tenants in your segment of the cloud	limits scalability		setup)
Security and privacy	Very low, not a good fit for sensitive data	Very high, ideal for corporate data	Very low, not a good fit for sensitive data	(i f High members collaborate securi on ty policies)	Very high as you keep the data on a private cloud	Very High
Setup flexibilit y	Little to no flexibility, service providers usually offer only predefined setups	Very flexible	than Less a private cloud, more than a public one	Little flexibility, a r setups e usually t predefined o an extent	Very flexible	Very flexible
Cost	Very Inexpensive	Very expensive	Affordable	Members share the costs	Cheaper than a private model, pricier than a	Very Inexpensive

					public one	
Demand for in-house hardware	No	In-house hardware is not a must but is preferable	No	No	In-house hardware is not a must but is preferable	No
Ownership	CSP	Single organization	CSP	Several organization	Organization and CSP	CSP
Performance	Low to medium	Excellent	Low	Very good	good	Excellent
Location	Off premise	Off or on premise	On premise	Off or on premise	Off or on premise	On premise
Managed by	CSP	Single organization	CSP	Several organization or CSP	Organization and CSP	CSP
User's control	Limited control	Full control	Full control	High control but limited by community policies	Full control over private part and limited at public part	Full control
Workload	Normal	Not	Suitable fo	Suitable for	Highly dynamic	Highly

d	workload with short-spikes in demand	suitable for handling large workload	handling workload	r hi g h changeable handling large workload	or dynamic or changeable
Size of Data Center	Around 50,000s	Around 50,000s	50000>TO <80000	Public cloud > 15000> Private cloud	Less than private cloud Morethan hybrid cloud
Used By	Anyone can access	Limited people access	Depend on Authorization of the user	Depend upon number of cooperatives	Medium accessibility Any client

V. CONCLUSION

Cloud computing has transformed the way businesses around the world do business in a way that many people are unaware of. Understanding the difference among various types of cloud computing and identifying which one is best suited for a growing business is tremendously important. This paper provides the knowledge of the introduction to cloud computing, its concepts, models and services. The paper also discusses the comparison of all cloud computing deployment models in table form. These clouds are compared against supported platforms, supported languages, storage capacity, services, and products. Fig. 3 shows Public cloud is the most popular general deployment option, with a usage share of over 61%. Traditional on-premises deployment, with just under half (49%) of shared use, ranks second. Hybrid cloud, which combines public cloud services with on-premises private cloud infrastructure, ranks third, with approximately 39% usage. The study encouraged respondents to choose from several of the five cloud deployment options. It shows a tenth (9%) selected all five, and almost a fifth (19%) selected four out of five. Among them two-thirds (64%) selected at least two cloud deployment options. The upshot is that while the public cloud is by far the most popular choice, most of the organizations surveyed employ a mix of cloud types. Interestingly, multi-cloud or the use of multiple cloud computing and storage services in a single

homogeneous network architecture had the fewest users (24% of respondents).
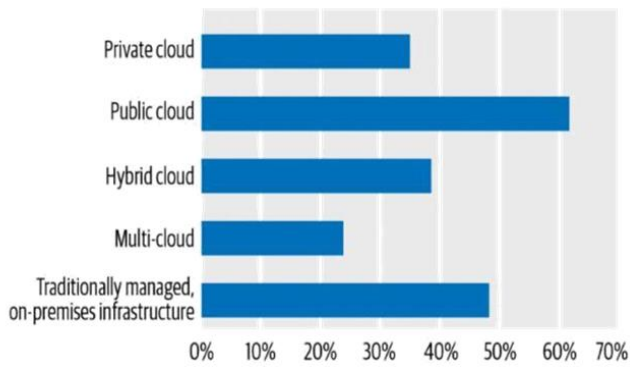

Fig 3: Cloud Computing Technology Market Analysis by Type [13]

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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Ten Research Challenge Areas in Data Science

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ABSTRACT

To drive progress in the field of data science, we propose 10 challenge areas for the research community to pursue. Since data science is broad, with methods drawing from computer science, statistics, and other disciplines, and with applications appearing in all sectors, these challenge areas speak to the breadth of issues spanning science, technology, and society. We preface our enumeration with meta-questions about whether data science is a discipline. We then describe each of the 10 challenge areas. The goal of this article is to start a discussion on what could constitute a basis for a research agenda in data science, while recognizing that the field of data science is still evolving.

Keywords: artificial intelligence, causal reasoning, computing systems, data life cycle, deep learning, ethics, machine learning, privacy, trustworthiness

Although data science builds on knowledge from computer science, engineering, mathematics, statistics, and other disciplines, data science is a unique field with many mysteries to unlock: fundamental scientific questions and pressing problems of societal importance.

In this article we enumerate 10 areas of research in which to make progress to advance the field of data science. Our goal is to start a discussion on what could constitute a basis for a research agenda in data science, while recognizing that the field of data science is still evolving.

Before we plunge into this enumeration, we preface our discussion by raising, but not answering, a meta-question: Is data science a discipline? Answering this meta-question is still under lively debate, including within the pages of this journal. Herein, we suggest additional meta-questions to help frame the debate.

I. INTRODUCTION

Data science is a field of study: one can get a degree in data science, get a job as a data scientist, and get funded to do data science research. But is data science a discipline, that is, a branch of knowledge? If not yet, will it evolve to be one, distinct from other disciplines? Here are a few meta-questions on whether data science is a discipline.

- Are there driving deep question(s) in data science? If so, what are they? Each scientific discipline (usually) has one or more 'deep'

questions that drive its research agenda: What is the origin of the universe (astrophysics)? What is the origin of life (biology)? What is computable (computer science)? Does data science inherit its deep questions from all its constituent disciplines or does it have its own unique ones?

- What is the role of the domain in the field of data science? Many academics have argued (Wing et al., 2018) that data science is unique in that it is not just about methods, but also about the use of those methods in the context of a domain—the domain of the data being collected and analyzed; the domain in which, from this data, a question is to be answered. Is the inclusion of a domain inherent in defining the field of data science? Other methods-based disciplines, such as computer science, mathematics, and statistics, are used in the context of other domains, and are correspondingly inspired by problems from these domains. Can one study data science, as we do in computer science, mathematics, and statistics, without studying it in the context of a domain? Is the (more integral?) way a domain is included in the study of data science unique to data science?

- What makes data science data science? Is there a problem unique to data science that one can convincingly argue would not be addressed or asked by any of its constituent disciplines, for example, computer science or statistics? When should a set of methods, analyses, or results be considered data science, and not just methods, analyses, or results in computer science or statistics (or mathematics, etc.)? Or should all methods, analyses, and results in all these disciplines be considered part of data science?

Data science as a field of study is still too new to have definitive answers to all these meta-questions. Their answers will likely evolve over time, as the field matures and as members of the contributing established disciplines share scholarship and perspectives from their respective disciplines. We encourage the data science community to ponder and debate these meta-questions, as we make progress on more concrete scientific and societal challenges raised by the preponderance of data, data science methods, and applications of data science.

II. TEN RESEARCH AREAS

So, let's ask an easier question, one that also underlies any field of study: What are the research challenge areas that drive the study of data science? Here is a list of 10. They are not in any priority order, and some of them are related to each other. They are phrased as challenge areas, not challenge questions; each area suggests many questions. They are not necessarily the 'top 10' but they are a good 10 to start the community discussing what a broad research agenda for data science might look like. Given our discussion above, they unsurprisingly overlap with challenges found in computer science, statistics (Berger et al., 2019), social sciences, and so on. Given the author's background, they are posed from the perspective of a computer scientist. The list begins, roughly speaking, with challenges relevant to science, then to technology, and then to society.

1. Scientific Understanding of Learning, Especially Deep Learning Algorithms.

As much as we admire the astonishing successes of deep learning, we still lack a scientific understanding of why deep learning works so well, though we are making headway (Arora et al., 2018; Balestriero & Baraniuk, 2018). We do not understand the mathematical properties of deep learning algorithms or of the models they produce. We do not know how to explain why a deep learning model produces one result and not another. We do not understand how robust or fragile models are to perturbations to input data distributions. We do not understand how to verify that deep learning will perform the intended

task well on new input data. We do not know how to characterize or measure the uncertainty of a model's results. We do not know deep learning's fundamental computational limits (Thompson et al., 2020); at what point does more data and more compute not help? Deep learning is an example of where experimentation in a field is far ahead of any kind of complete theoretical understanding. And, it is not the only example in learning: random forests (Biau & Scornet, 2015) and high-dimensional sparse statistics (Johnstone & Titterington, 2009) enjoy widespread applicability on large-scale data, where gaps remain between their performance in practice and what theory can explain.

2. Causal Reasoning

Machine learning is a powerful tool to find patterns and to examine associations and correlations, particularly in large data sets. While the adoption of machine learning has opened many fruitful areas of research in economics, social science, public health, and medicine, these fields require methods that move beyond correlational analyses and can tackle causal questions. A rich and growing area of current study is revisiting causal inference in the presence of large amounts of data. Economists are devising new methods that incorporate the wealth of data now available into their mainstay causal reasoning techniques, for example, the use of instrumental variables; these new methods make causal inference estimation more efficient and flexible (Athey, 2016; Taddy, 2019). Data scientists are beginning to explore multiple causal inference, not just to overcome some of the strong assumptions of univariate causal inference, but because most real-world observations are due to multiple factors that interact with each other (Wang & Blei, 2019). Inspired by natural experiments used in economics and the social sciences, as more government agency and commercial data becomes publicly available, data scientists are using synthetic control for novel applications in

public health, retail, and sports (Abadie et al., 2010; Amjad et al. 2019).

3. Precious Data

Data can be precious for one of three reasons: the data set is expensive to collect; the data set contains a rare event (low signal-to-noise ratio); or the data set is artisanal—small, task-specific, and/or targets a limited audience. A good example of expensive data comes from large, one-off, expensive scientific instruments, for example, the Large Synoptic Survey Telescope, the Large Hadron Collider, and the IceCube Neutrino Detector at the South Pole. A good example of rare event data is data from sensors on physical infrastructure, such as bridges and tunnels; sensors produce a lot of raw data, but the disastrous event they are used to predict is (thankfully) rare. Rare data can also be expensive to collect. A good example of artisanal data is the tens of millions of court judgments that China has released online to the public since 2014 (Liebman et al., 2017) or the two-plus-million U.S. government declassified documents collected by Columbia's History Lab (Connelly et al., 2019). For each of these different kinds of precious data, we need new data science methods and algorithms, taking into consideration the domain and the intended uses and users of the data.

4. Multiple, Heterogeneous Data Sources

For some problems, we can collect lots of data from different data sources to improve our models and to increase knowledge. For example, to predict the effectiveness of a specific cancer treatment for a human, we might build a model based on 2-D cell lines from mice, more expensive 3-D cell lines from mice, and the costly DNA sequence of the cancer cells extracted from the human. As another example, multiscale, spatiotemporal climate models simulate the interactions among multiple physical systems, each represented by disparate data sources drawn from sensing: the ocean, the atmosphere, the land, the biosphere, and humans. Many of these data sources

might be precious data (see Challenge no. 3). State-of-the-art data science methods cannot as yet handle combining multiple, heterogeneous sources of data to build a single, accurate model. Bounding the uncertainty of a data model is exacerbated when built from multiple, possibly unrelated data sources. More pragmatically, standardization of data types and data formats could reduce undesired or unnecessary heterogeneity. Focused research in combining multiple sources of data will provide extraordinary impact.

5. Inferring From Noisy and/or Incomplete Data.

The real world is messy and we often do not have complete information about every data point. Yet, data scientists want to build models from such data to do prediction and inference. This long-standing problem in statistics comes to the fore as: (1) the volume of data, especially about people, that we can generate and collect grows unboundedly; (2) the means of generating and collecting data is not under our control, for example, data from mobile phone and web apps vary—by design—across different users and across different populations; and 3) many sectors, from finance to retail to transportation, embrace the desire to do real-time personalization. A great example of a novel formulation of this problem is the planned use of differential privacy for Census 2020 data (Abowd, 2018; Hawes, 2020), where noise is deliberately added to a query result, to maintain the privacy of individuals participating in the census. Handling 'deliberate' noise is particularly important for researchers working with small geographic areas such as census blocks, since the added noise can make the data uninformative at those levels of aggregation. How then can social scientists, who for decades have been drawing inferences from census data, make inferences on this 'noisy' data and how do they combine their past inferences with these new ones? Machine learning's ability to better separate noise from signal can improve the efficiency and accuracy of those inferences.

6. Trustworthy AI

We have seen rapid deployment of systems using artificial intelligence and machine learning in critical domains such as autonomous vehicles, criminal justice, health care, hiring, housing, human resource management, law enforcement, and public safety, where decisions taken by AI agents directly impact human lives. Consequently, there is an increasing concern if these decisions can be trusted to be correct, fair, ethical (see Challenge no. 10), interpretable, private (see Challenge no. 9), reliable, robust, safe, and secure, especially under adversarial attacks. Many of these properties borrow from a long history of research on Trustworthy Computing (National Research Council, 1999), but AI raises the ante (Wing, 2020): reasoning about a machine learning model seems to be inseparable from reasoning about the available data used to build it and the unseen data on which it is to be used; and these models are inherently probabilistic. One approach to building trust is through providing explanations of the outcomes of a machine learned model (Adadi & Berrada, 2018; Chen et al., 2018; Murdoch et al., 2019; Turek, 2016). If we can interpret the outcome in a meaningful way, then the end user can better trust the model. Another approach is through formal methods, where one strives to prove once and for all a model satisfies a certain property. New trust properties yield new tradeoffs for machine learned models, for example, privacy versus accuracy; robustness versus efficiency; fairness versus robustness. There are multiple technical audiences for trustworthy models: model developers, model users (human and machine), and model customers; as well as more general audiences: consumers, policymakers, regulators, the media, and the public.

7. Computing Systems for Data-Intensive Applications

Traditional designs of computing systems have focused on computational speed and power: the more cycles, the faster the application can run. Today, the

primary focus of applications, especially in the sciences (e.g., astronomy, biology, climate science, materials science), is data. Novel special-purpose processors, for example, GPUs, FPGAs, TPUs, are now commonly found in large data centers. Domain-specific accelerators, including those designed for deep learning, show orders of magnitude performance gains over general-purpose computers (Dally et al., 2020). Even with all these data and all this fast and flexible computational power, it can still take weeks to build accurate predictive models; however, applications, whether from science or industry, want real-time predictions. Distributing data, computing, and models helps with scale and reliability (and privacy), but then runs up against the fundamental limit of the speed of light and practical limits of network bandwidth and latency. Also, data-hungry and compute-hungry algorithms, for example, deep learning, are energy hogs (Strubell et al., 2019). Not only should we consider space and time, but energy consumption, in our performance metrics. In short, we need to rethink computer systems design from first principles, with data (not compute) the focus. New computing systems designs need to consider: heterogeneous processing, efficient layout of massive amounts of data for fast access, communication and network capability, energy efficiency, and the target domain, application, or even task.

8. Automating Front-End Stages of the Data Life Cycle

While the excitement in data science is due largely to the successes of machine learning, and more specifically deep learning, before we get to use machine learning algorithms, we need to prepare the data for analysis. The early stages in the data life cycle (Wing, 2019) are still labor intensive and tedious. Data scientists, drawing on both computational and statistical tools, need to devise automated methods that address data collection, data cleaning, and data wrangling, without losing other desired properties, for example, accuracy, precision, and robustness, of the end model. One example of emerging work in this area is the Data Analysis Baseline Library (Mueller, 2019), which provides a framework to simplify and automate data cleaning, visualization, model building, and model interpretation. The Snorkel project addresses the tedious task of data labeling (Ratner et al., 2018). Trifacta, a university spin-out company, addresses data wrangling (Trifacta, 2020). Complementing these needs, commercial services already support later stages in the data life cycle, in particular, automating construction of machine learning models, for example, Cloud AutoML (Google, 2020) and Azure Machine Learning (Microsoft, 2020).

9. Privacy

For many applications, the more data we have, the better the model we can build. One way to get more data is to share data, for example, multiple parties pool their individual data sets to build collectively a better model than any one party can build. However, in many cases, due to regulation or privacy concerns, we need to preserve the confidentiality of each party's data set. An example of this scenario is in building a model to predict whether someone has a disease or not. If multiple hospitals could share their patient records, we could build a better predictive model; but due to Health Insurance Portability and Accountability Act (HIPAA, 1996) privacy regulations, hospitals cannot share these records. We are only now exploring practical and scalable ways, using cryptographic and statistical methods, for multiple parties to share data, models, and/or model outcomes while preserving the privacy of each party's data set. Industry and government are already exploiting techniques and concepts, for example, secure multiparty computation, homomorphic encryption, zero-knowledge proofs, differential privacy, and secure enclaves, as elements of point solutions to point problems (Abowd, 2018; Ion et al., 2017; Kamara, 2014). We can also apply these

methods to the simpler scenario where a single entity's data must be kept private prior to analysis.

10. Ethics

Data science raises new ethical issues. They can be framed along three axes: (1) the ethics of data: how data are generated, recorded, and shared; (2) the ethics of algorithms: how artificial intelligence, machine learning, and robots interpret data; and (3) the ethics of practices: devising responsible innovation and professional codes to guide this emerging science (Floridi & Taddeo, 2016) and to define institutional review board (IRB) criteria and processes specific for data (Wing et al., 2018). The ethical principles expressed in the Belmont Report (Belmont Report, 1979) and the Menlo Report (Dittrich & Kenneally, 2011) give us a starting point for identifying new ethical issues data science technology raises. The ethical principle of Respect for Persons suggests that people should always be informed when they are talking with a chatbot. The ethical principle of Beneficence requires a risk/benefit analysis on the decision a self-driving car makes on whom not to harm. The ethical principle of Justice requires us to ensure the fairness of risk assessment tools in the court system and automated decision systems used in hiring. These new ethical issues correspondingly raise new scientific challenges for the data science community, for example, how to detect and eliminate racial, gender, socioeconomic, or other biases in machine learning models.

III. CLOSING REMARKS

As many universities and colleges are creating new data science schools, institutes, centers, and so on (Wing et al., 2018), it is worth reflecting on data science as a field. Will data science as an area of research and education evolve into being its own discipline or be a field that cuts across all other disciplines? One could argue that computer science, mathematics, and statistics share this commonality:

they are each their own discipline, but they each can be applied to (almost) every other discipline.

What will data science be in 10 or 50 years? The answer to this question is in the hands of the next-generation researchers and educators. To advance and study data science will take a commitment to learn the vocabulary, methods, and tools from multiple, traditionally siloed disciplines. Integrating and applying this knowledge takes patience, but can be exhilarating. To today's undergraduates, graduate students, postdoctoral fellows, and early-career faculty and researchers: Through the data science research problems you choose to tackle, you will shape this field!

IV. ACKNOWLEDGMENTS

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Big Data with Cloud Computing: Discussions and Challenges

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ABSTRACT

With the recent advancements in computer technologies, the amount of data available is increasing day by day. However, excessive amounts of data create great challenges for users. Meanwhile, cloud computing services provide a powerful environment to store large volumes of data. They eliminate various requirements, such as dedicated space and maintenance of expensive computer hardware and software. Handling big data is a time-consuming task that requires large computational clusters to ensure successful data storage and processing. [1] Security and Privacy of information is the biggest challenge to cloud computing. Security and privacy issues can be overcome by employing encryption, security hardware and security applications.[2]

In this work, the definition, classification, and characteristics of big data are discussed, along with various cloud services, such as Microsoft Azure, Google Cloud, Amazon Web Services, International Business Machine cloud, Hortonworks, and MapR. A comparative analysis of various cloud-based big data frameworks is also performed.

Various research challenges are defined in terms of distributed database storage, data security, heterogeneity, and data visualization.[1]

Key words: big data; data analysis; cloud computing; Hadoop

I. INTRODUCTION

With recent technological advancements, the amount of data available is increasing day by day. For example, sensor networks and social networking sites generate overwhelming flows of data. In other words, big data are produced from multiple sources in different formats at very high speeds [1] At present, big data represent an important research area. Big data are rapidly produced and are thus difficult to store, process, or manage using traditional software. Big data technologies are tools that are capable of storing meaningful information in different types of formats. For the purpose of meeting users' requirements and analyzing and storing complex data, a number of analytical frameworks have been made available to aid users in analyzing complex structured and unstructured data [3]. Several programs, models, technologies, hardware, and software have been proposed and designed to access the information from big data. The main objective of these technologies is to store reliable and accurate results for big data [4] In

addition, big data require state-of-the-art technology to efficiently store and process large amounts of data within a limited run time.

Three different types of big data platforms are interactive analysis tools, stream processing tools, and batch processing tools[4]. Interactive analysis tools are used to process data in interactive environments and interact with real-time data. Apache Drill and Google's Dremel are the frameworks for storing real-time data.

Stream processing tools are used to store information in continuous flow. The main platforms for storing streaming information are S4 and Strom. Hadoop infrastructure is utilized to store information in batches.

Big data techniques are involved in various disciplines, such as signal processing, statistics, visualization, social network analysis, neural networks, and data mining. Mohajer et al. designed an interactive gradient algorithm that receives controlled messages from neighboring nodes. The proposed method uses a self-optimization framework for big data.

II. DEFINITIONS OF BIG DATA

Big data refers to data sets that are too large or complex to be dealt with by traditional data processing application software. Data with many fields (rows) offer greater statistical power, while data with higher complexity (more attributes or columns) may lead to a higher false discovery rate. Big data analysis challenges include capturing data, data storage, data analysis, search, sharing, transfer, visualization, querying, updating, information privacy, and data source. Big data was originally associated with three key concepts: volume, variety, and velocity.[The analysis of big data presents challenges in sampling, and thus previously allowing for only observations and sampling. Therefore, big data often includes data with sizes that exceed the capacity of traditional software to process within an acceptable time and value [5].

2.1 Characteristics of big data

Big data are characterized by three Vs: volume, velocity, and variety. These characteristics were introduced by Gartner to define the various challenges in big data [1]

With new-generation architecture, data are now stored in different types of formats; hence, the three Vs may be extended to five Vs, namely, volume, velocity, variety, value, and veracity[1]

(1) Volume: Data are generated by multiple sources (sensors, social networks, smartphones, etc.) and are continuously expanding. The Internet produces global data in large increments. In 2012, approximately 2.5 exabytes (EB) of data were produced every day. According to the report of International Data Cooperation, the volume of data in 2013 doubled, reaching 4.4 zettabytes (ZB). In 2020, the volume of data reached 40 ZB. Table 2 shows the names of the units of data that can be measured in bytes[14].

(2) Velocity: Data are exponentially growing at high speeds. Millions of connected devices are added on a daily basis, thereby leading to increases in not only volume but also velocity[15, 16]. One relevant example is YouTube, which generates big data at high speeds[17, 18].

Table 3 presents the number of users in India who had used social media networks by February 2021. Figure 1

Table 1 Units of data.

Name of unit	Equals	Size in bytes
Bit	1 or 0	1/8
Nibble	4 bits	1/2
Byte	8 bits	1
Kilobyte (KB)	1024 bytes	210
Megabyte (MB)	1024 KB	220
Gigabyte (GB)	1024 MB	230
Terabyte (TB)	1024 GB	240
Petabyte (PB)	1024 TB	250
Exabyte (EB)	1024 PB	260

Zettabyte (ZB) 1024 EB		270
Yottabyte (YB) 1024 ZB		280

Table 2 Users in India as of February 2021.

Application name	Count	Application name	Count
WhatsApp	53 Crore	Instagram	21 Crore
YouTube	44.8 Crore	Twitter	1.75 Crore
Facebook	41 Crore		

Big Data contains a large amount of data that is not being processed by traditional data storage or the processing unit. It is used by many multinational companies to process the data and business of many organizations. The data flow would exceed 150 exabytes per day before replication.

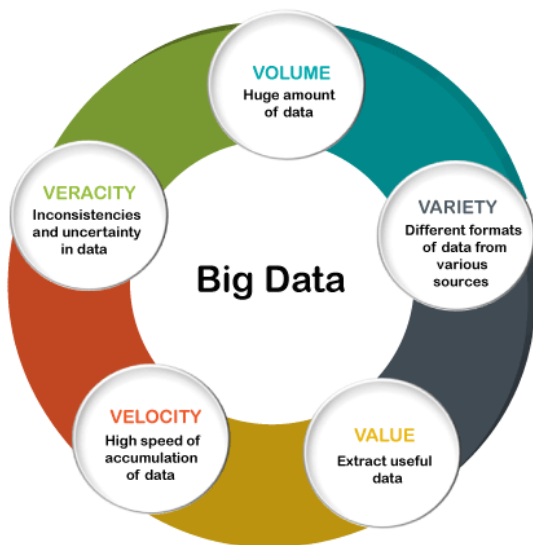There are five v's of Big Data that explains [7] shows the five Vs of big data.

Fig 1: Five Vs of big data.

(3) Variety: Data are generated in multiple formats via social networks, smartphones, or sensors. These tools produce data in the form of data logs, images, videos, audio, documents, and text. Data may also be structured, semistructured, and unstructured[1]. Collected data can be unstructured, semi-structured or structured in nature. Unstructured data is data that is unorganized and comes in different files or formats. Typically, unstructured data is not a good fit for a mainstream relational database because it doesn't fit

into conventional data models. Semi-structured data is data that has not been organized into a specialized repository but has associated information, such as metadata. This makes it easier to process than unstructured data. Structured data, meanwhile, is data that has been organized into a formatted repository. This means the data is made more addressable for effective data processing and analysis.[8]

(4) Value: Value is an important characteristic of big data. It relates to how data can be dealt with and converted into meaningful information[1]. The last V in the 5 V's of big data is value. This refers to the value that big data can provide, and it relates directly to what organizations can do with that collected data. Being able to pull value from big data is a requirement, as the value of big data increases significantly depending on the insights that can be gained from them.[8]

(5) Veracity: Veracity refers to the quality, correctness, and trustworthiness of data. Therefore, maintaining veracity in data is mandatory[1,2]. For example, data in huge amounts create confusion, whereas small amounts of data can convey incomplete or half information.[1]. Data can sometimes become messy and difficult to use. A large amount of data can cause more confusion than insights if it's incomplete. For example, concerning the medical field, if data about what drugs a patient is taking is incomplete, then the patient's life may be endangered.[8]

2.2 Types of big data

Data are produced at unprecedented rates from various sources, such as financial, government, health, and social networks. Such rapid growth of data can be attributed to smart devices, the Internet of Things, etc. In the last decades, companies have failed to store data efficiently and for long periods[1,2]. This drawback relates to traditional technologies that lack adequate storage capacity and are costly. Meanwhile, big data require new storage methods backed by

powerful technologies[7]. Big data can be classified into several

III. CLOUD COMPUTING

Cloud computing offers a cost-efficient and scalable solution to store big data. According to the National Institute for Standards and Technology, "Cloud Computing is based on pay-per-use services for enabling convenient, on-demand network access to a shared pool of configurable computing resources such as servers, networks, and services that can be rapidly provisioned and released with minimal management effort or service provider interaction". Cloud computing services can be[3] categories. Figure 2 depicts the classification of big data.
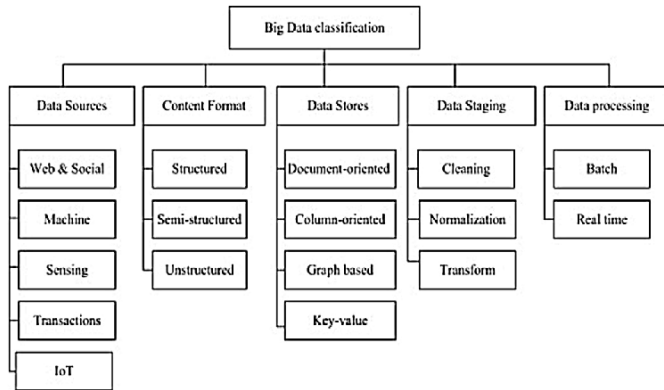

Fig 2: Types of big data.

Table 4 Types of big data.

Type	Category	explanation
	Social Media	Social media represents an important aspect of big data. Facebook, Twitter, emails, and microblogs are social media sources that generate massive amounts of data daily[27].
Data Source	Machine Genarated data	Software and hardware, such as medical devices, computers, and other types of machines that generate data without human interferences.
	Sensing	Various types of sensing devices that generate data and convert them into signals
	Transaction	Financial, business, and work data generate time-based dimensions that define data.
	IOT	Tablets, smartphones, and digital camera devices are connected over the Internet and thus generate huge amounts of data and information.
Content format source	Structured-data	Structured-data are in a consistent order with a well-defined format. The advantage of structured-data is that they are easy to maintain, access, and store on computers. Structured-data are stored in the form of rows and columns; an example is a DataBase Management System (DBMS)
	Semi-structured data	Semi-structured data can be considered as another form of structured-data. It inherits a few properties of structured-data that do not represent the data in database models. An example is Common Separated Value (CSV) files

	Unstructured data	Unstructured data do not follow the formal structure rules of data models. Images, videos, text messages, and social media posts are examples of unstructured data.
Data store sources	Key value stores	Key value stores are used to store and access data in key/value pairs. They are basically designed to store massive data and manage heavy loads. Apache HBase, Apache Cassandra, Redis, and Riak are examples of key value store databases
	Graph stores	Graph stores are used to analyze data on the basis of the relationships between nodes, edges, and properties. Neo4j is an example of a graph store.
	Column family stores	Column family stores keep data and information within a column of a table at the same location on a disk in the same way a row store keeps row data together. Google Bigtable is an example of column family stores.
	Document-oriented stores	Document-oriented stores offer complex data forms in multiple formats, such as XML, JSON, text, string, array, or binary forms. CouchDB and MongoDB are examples of document-oriented stores

|		
Data Staging	Cleaning	Cleaning is a process in which noisy data, outliers, and missing values are removed.
	transformation	In data transformation, data are transformed in an appropriate format for analysis.
	Normalization	Normalization is a process used to reduce redundancies from data
Data processing	Batch data processing	MapReduce-based systems are used to process data in the form of batches. Apache Hadoop, Apache Mahout, Skytree Server, and Dryad are examples of batch processing.
	Real-time data processing	Streaming systems, such as S4, are based on distributed frameworks that allow users to design applications for processing continuous unbounded streams of data

IV. CLOUD COMPUTING SERVICES
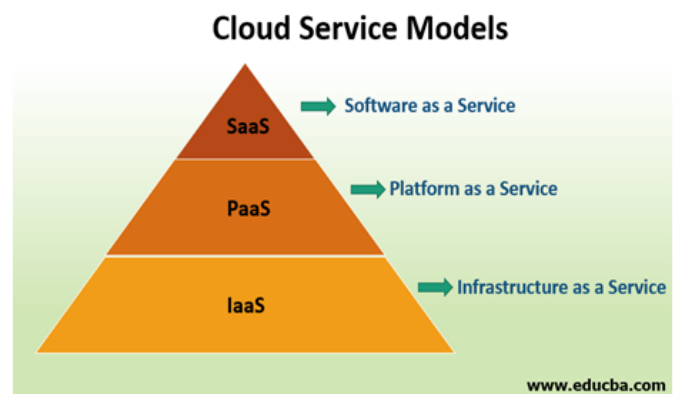
Fig 3: CLOUD COMPUTING SERVICES

classified into the following three categories[1]:

(1) Infrastructure as a Service (IaaS): These services are basically based on the principle of "pay for what you need". It provides high-performance computing to customers. Amazon Web Services (AWS),Elastic Compute Cloud, and Simple Storage Services (S3) are examples of IaaS. AWS and S3 provide online storage services. At nominal charges, customers can easily access the world's largest data centers. At present, three companies provide IaaS landscape services: Google, Microsoft, and HP. Google provides Google Compute Engine to access IaaS services. Microsoft also provides a cloud platform through its Window Azure Platform. HP offers HP Cloud, which is designed by NASA and Rack Space.

(2) Software as a Service (SaaS): With the help of the Internet, all applications are run on remote cloud infrastructure in SaaS. To access SaaS services, users need an Internet connection and a web browser, such as Google Chrome or Internet Explorer[40]. Users connect to a desktop environment via a virtual machine, in which all software programs are installed. SaaS provides more facilities to users than IaaS.

(3) Platform as a Service (PaaS): It provides a runtime environment to users. It allows users to create, test, and run web applications. Users can easily access PaaS on the basis of the pay-per-use mode using an Internet connection. PaaS provides the infrastructure (networking, storage, and services) and platform (DBMS, business intelligence, middleware) for running a web application life cycle. Examples of PaaS include Microsoft Azure and Google Cloud[41].
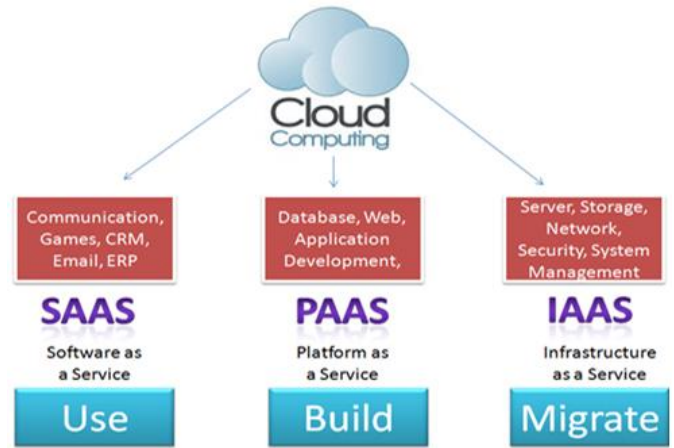

Fig 4 :   Cloud computing services.

The cloud computing environment has two important aspects: the frontend and the backend. From the frontend side, users access cloud services through an Internet connection; at the backend, all cloud services are runFigure 3 shows the various types of cloud computing services[42].

Big data and cloud computing are closely associated.

With technological changes, big data models Provide distributed processing, parallel technologies, large storage capacity, and real-time analysis of heterogeneous databases.

Data security and privacy are also considered in big data models. Big data require large amounts of storage space and thus entail the use of cloud computing. Cloud computing offers scalability and cost savings[43]. Moreover, it provides massive amounts of storage capacity and processing power. Cloud computing works on different types of technologies, such as distributed storage and virtualization, and processes data for different types of tasks. It accesses distributed queries over multiple datasets and gives responses in a timely types of tasks. It accesses distributed queries over multiple datasets and gives responses in a timely example of big data processing in a cloud environment that allows the storage of massive amounts of data in a cluster[9].

In other words, MapR is an efficient and cost effective model for processing big data. The MapR framework comprises the map and reduce functions for handling big data.

Cloud computing also plays an important role in distributed system environments by facilitating storage, boosting computing power, and aiding network communication. Big data technologies store data in cloud clusters rather than in local storage file systems. Several companies provide big data cloud platforms.

Moreover, various cloud computing platforms are available to store big data. Table 5 shows a comparative analysis of big data cloud frameworks for storing massive amounts of data[10]. Cloud services such as Microsoft Azure, Google Cloud, AWS, IBM, Hortonworks, and MapR are compared on the basis of various parameters.
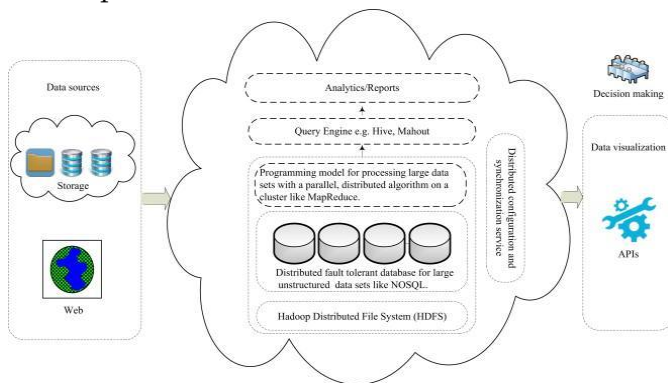

Fig 5:   Big data and cloud computing.

V.   Research Issues in Big Data

As data are growing at exponential rates, a number of issues and problems emerge during the processing and storage of big data. Few tools are available to resolve these issues and problems in a cloud environment.

Technologies, such as PigLatin, Dryad, MongoDB, Cassandra, and MapR, are not able to resolve these issues in big data processing. Even with the help of Hadoop and MapR, users cannot execute queries on databases, and they have low-level infrastructures for data processing and management. Some issues and problems in big data are summarized as follows[11]:

(1) Distributed database storage system:

Numerous technologies are used to store and retrieve huge amounts of data. Cloud computing is an important aspect of big data. Big data are generated by multiple devices on a daily basis. At present, the main issue in distributed frameworks is the storage of data in a straightforward manner and the processing and migration of data between distributed servers.

(2) Data security: Security threats are an important issue in a cloud computing environment. Cloud computing has been transformed with modern information and communication technologies, and several types of unresolved security threats exist in big data. Data security threats are magnified by the variety, velocity, and volume of big data. Meanwhile, various issues and threats, such as the availability of data, confidentiality, real-time monitoring, identity and access authorization control, integrity, and privacy, exist in big data when used with cloud computing frameworks.

Therefore, data security must be measured once data are outsourced to cloud service providers[11].

(3) Heterogeneity: Big data are heterogeneous in nature because data are gathered from multiple devices in different formats, such as images, videos, audio, and text. Before loading data into a warehouse, they need to be transformed and cleaned, and the processes present challenges in big data[12]. Combining all unstructured data and reconciling them for use in report creation are incredibly difficult to achieve in real-time.

(4) Data processing and cleaning: Data storage and acquisition require preprocessing and cleaning, which involves data merging, data filtering, data consistency, and data optimization. Thus, processing and cleaning data are difficult because of the wide variety of data sources[13]. Moreover, data sources may contain noise and errors, or they may be incomplete. The challenge is how to clean large amounts of data and how to determine whether such data are reliable.

(5) Data visualization: Data visualization is a technique to represent complex data in a graphical form for clear understanding. If the data are structured, then they can be easily represented in the traditional graphical way. If the data are unstructured or semistructured, then they are difficult to visualize with high diversity in realtime. heterogeneity/data formats.

VI. CONCLUSION

Cloud computing has transformed the way businesses around the world do business in a way that many people are unaware of. Understanding the difference among various types of cloud computing and identifying which one is best suited for a growing business is tremendously important. This paper provides the knowledge of the introduction to cloud computing, its concepts, models and services. The paper also discusses the comparison of all cloud computing deployment models in table form. These clouds are compared against supported platforms, supported languages, storage capacity, services, and products. Fig. 3 shows Public cloud is the most popular general deployment option, with a usage share of over 61%. Traditional on-premises deployment, with just under half (49%) of shared use, ranks second. Hybrid cloud, which combines public cloud services with on-premises private cloud infrastructure, ranks third, with approximately 39% usage. The study encouraged respondents to choose from several of the five cloud deployment options. It shows a tenth (9%) selected all five, and almost a fifth (19%) selected four out of five. Among them two-thirds (64%) selected at least two cloud deployment options. The upshot is that while the public cloud is by far the most popular choice, most of the organizations surveyed employ a mix of cloud types. Interestingly, multi-cloud or the use of multiple cloud computing and storage services in a single homogeneous network architecture had the fewest users (24% of respondents). [1]

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Internet of Things (IOT)

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ABSTRACT

Internet of Things (IoT) is fast becoming a disruptive technology business opportunity, with standards emerging primarily for wireless communication between sensors, actuators and gadgets in day-to-day human life, all in general being referred to as "Things". This offers the capability to measure for understanding environment indicators.

This paper addresses the internet of things (IoT) as the main enabling factor of promising paradigm for integration and comprehensive of several technologies for communication solution, Identification and integrating for tracking of technologies as wireless sensor and actuators. IoT as envisioned is billion sensors connected to the internet through the sensors that would be generate large amount of data which need to analyzed, interpreted and utilized. Context aware capturing enables modeling, interpreting and storing of sensor data which is linked to appropriate context variable dynamically.

Building or home automation, social smart communication for enhancement of quality of life, that could be considered as one of the application of IoT where the sensors, actuators and controllers can be connected to internet and controlled. This paper introduces the concept of application for internet of things and with the discussion of social and governance issues that arise as the future vision of internet of things.

I. INTRODUCTION

"IOT"- Anyone who says that the Internet has fundamentally changed society may be right, but at the same time, the greatest transformation actually still lies ahead of us. Several new technologies are now converging in a way that means the Internet is on the brink of a substantial expansion as objects large and small get connected and assume their own web identity. Following on from the Internet of computers, whenour servers and personal computers were connected to a global network, and the Internet of mobile telephones, when it was the turn of telephones and other mobile units, the next phase of development is the Internet of things, when more or less anything will be connected and managed in the virtual world. This revolution will be the Net's largest enlargement ever and will have sweeping effects on every industry and all of our everyday lives.

Smart connectivity with existing networks and context-aware computation using network resources is an indispensable part of IoT. With the growing presence of WiFi and 4G-LTE wireless Internet access, the evolution towards ubiquitous information and communication networks is already evident. However, for the Internet of Things vision to successfully emerge, the computing paradigm will need to go beyond traditional mobile computing scenarios that use smart phones and portables, and evolve into connecting everyday existing objects and embedding intelligence into our environment. For technology to disappear from the consciousness of the user, the Internet of Things demands: a shared understanding of the situation of its users and their appliances, software architectures and pervasive communication networks to process and convey the contextual information to where it is relevant, and the analytics tools in the Internet of Things that aim for autonomous and smart behavior. With these three fundamental grounds in place, smart connectivity and context-aware computation can be accomplished

Evolution of IOT:

1. Internet of Boffins
To establish a connection in between human brain and artificial brain so that machine can work like a human brain.The main aim is to upload human brain into machine. So that man can think, take decision without any effort. After the death of the body, the virtual brain will act as the man. So, even after the death of a person we will not loose the knowledge, intelligence, personalities, feelings and memories can be preserved for years in the form of a virtual brain.

2. Internet of greeks
'Internet of Geeks' era started with the proposal of IPv6. It was the latest revision of the internet protocol. The communication protocol provides identification and location system for computers on networks and routes traffic across internet. The

popular internet services started taking roots in this era. Amazon.com started its first online retail service in 1995, followed by eBay providing customers with online auction and shopping services. Hotmail started its free web based emailbservice in 1996, followed by Google search in 1998. PayPal started its first internet payment service in 1998. Internet penetration was low in the market until 2000.

3. Internet of Masses
'Internet of masses' era started with the Dot-com bubble burst in 2000. In the starting of this era Dotcom bubble burst led to high growth in stock markets due to increasing use of internet in the industrial sector. In this era many people across the globe started using internet. Social networking sites came into existence. In 2001 Wikipedia came into existence followed by Facebook in 2004, further followed by YouTube, Twitter and WikiLeaks in the consecutive years.

4. Mobile internet
'Mobile Internet' era refers to access to the Internet via cellular phone service provider. The era got a boost with introduction of smartphones which gave a fast working internet on phones. This was the era from 2007-2011. There was steep rise in the use of internet by the people round the globe due to the mobile internet.

5. Internet of things
'Internet of Things' refers to an era where things can be connected to each other using internet.

II. DEFINATION OF IOT

"Today computers—and, therefore, the Internet—are almost wholly dependent on human beings for information. Nearly all of the roughly 50 petabytes(a petabyte is 1,024 terabytes) of data available on the Internet were first captured and created by human beings—by typing, pressing a record button, taking a

digital picture, or scanning a bar code. Conventional diagrams of the Internet . . . leave out the most numerous and important routers of all - people. The problem is, people have limited time, attention and accuracy—all of which means they are not very good at capturing data about things in the real world. And that's a big deal. We're physical, and so is our environment . . . You can't eat bits, burn them to stay warm or put them in your gas tank. Ideas and information are important, but things matter much more. Yet today's information technology is so dependent on data originated by people that our computers know more about ideas than things. If we had computers that knew everything there was to know about things using data they gathered without any help from us—we would be able to track and count everything, and greatly reduce waste, loss and cost. We would know when things needed replacing, repairing or recalling, and whether they were fresh or past their best. The Internet of Things has the potential to change the world, just as the Internet did. Maybe even more so

III. EXAMPLES OF IOT

- A lightbulb that can be switched on using a smartphone app is an IoT device, as is a motion sensor or a smart thermostat in your office or a connected streetlight.
- The Internet of Things refers to the rapidly growing network of connected objects that are able to collect and exchange data in real time using embedded sensors. Cars, lights, refrigerators, and more appliances can all be connected to the IOT.
- IoT helps in the prediction and management of natural disasters. For instance, take the example of forest fires. To avoid the chaos and destruction caused by a forest fire, various sensors can be installed around the boundaries of the forests. These sensors continuously monitor the temperature and carbon content in the region.

- A lot of security agencies make use of biometric systems to mark daily attendance, allow access to the authorized personnel only, and other related services. Advanced security, data communication, and minimized human intervention are some of the features of IoT being utilized in this sector. Biometric technology makes use of fingerprint, voice, eye, and face recognition.
- IoT can be used to connect cars with each other in order to exchange information like location, speed, and dynamics. An estimate shows that by 2020, there will be 24 billion connected cars in the world. We use IoT in our daily life without even realizing its presence. For example,while finding the shortest route, while driving semi-automatic smart cars, etc.

IV. LITERATURE SURVEY

"Internet of Things (IoT) is a new paradigm that has changed the traditional way of living into a high tech life style. Smart city, smart homes, pollution control, energy saving, smart transportation, smart industries are such transformations due to IoT. This article would help the readers and researcher to understand the IoT and its applicability to the real world.

With the Internet of Things (IoT) gradually evolving as the subsequent phase of the evolution of the Internet, it becomes crucial to recognize the various potential domains for application of IoT.This paper presents the recent development of IoT technologies and discusses future applications and research challenges.

This paper gives a detail analysis of various applications based on Internet of Thing (IoT)s. This explains about how internet of things evolved from mobile computing and ubiquitous computing. It emphasises the fact that objects are connected over the internet rather than people [1].

V. ADVANTAGES OF IOT

1. Ability to access information from anywhere at any time on any device;
2. Improved communication between connected electronic devices;
3. Transferring data packets over a connected network saving time and money;
4. Automating tasks helping to improve the quality of a business's services and reducing the need for human intervention.
5. Cost-effective operation.
6. Better Time Management.

VI. DISADVANTAGES OF IOT

1. As the number of connected devices increases and more information is shared between devices, the potential that a hacker could steal confidential information also increases.
2. Enterprises may eventually have to deal with massive numbers – maybe even millions – of IoT devices, and collecting and managing the data from all those devices will be challenging.
3. If there's a bug in the system, it's likely that every connected device will become corrupted.
4. Since there's no international standard of compatibility for IoT, it's difficult for devices from different manufacturers to communicate with each other.

VII. CHALLENGES OF IOT

- Insufficient testing and updating.
- Concern regarding data security and privacy.
- Software complexity.
- Data volumes and interpretation.
- Integration with AI and automation.
- Devices require a constant power supply which is difficult.
- Interaction and short-range communication.

VIII. CONCLUSION

The design phase of loT is a very fast field with umpteen number of challenges Many of the common design challenges faced in Embedded field apply to loT as well, with some specifics This sharing is based on our hands-on product building experience Might vastly vary between different types of loT devices By having an engineering approach, many of the issues can be resolved.

IX. FUTURE SCOPE

- The future of IOT has the potential to be limitless.
- Advances to the industrial internet will be accelerated through increased network agility, integrated artificial intelligence(AI) and the capacity to deploy, automate, and secure diverse use cases at hyperscale.
- IOT adoption is paving the way for smart cities..

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IOT Based Smart Bins for Smart Cities

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ABSTRACT

The burgeoning of IoT has paved the way for enhancements in many aspects of life. One issue that needs to be improved is the handling of garbage collection. This system proposes an IoT based system that can support the existing workforce to manage waste generated in the sectors of a city. The bins to be collected are selected on the basis of three criteria: a. fill percentage based on either level or weight (high, low, medium) b. day of the week (weekday or weekend) c. the period of time (morning, afternoon, evening). The system calculates the shortest possible path including the selected bins and also provides the real-time status of the bin. The aggregated outcome of the above mentioned system helps in magnifying the efficiency of work and in the reduction of time and cost to complete it. Index Terms—smart bin, IoT, path optimization, frequency optimization, smart city, waste management

Keywords— Embedded System, Smart City, Smart Bin, Wireless sensor networks, Wireless Communication

I. INTRODUCTION

The increase in the population of India brings some concerning issues need to be addressed and proper conduct should be applied to make the changes noticeable. One such issue which comes with the increase in population is the waste generation In India, 62 million tons of waste is generated every year, out of which 43 million is collected and only 11.9 million processed. This number is likely to increase from 62 million to 165 million tons by 203. If we look at the numbers, only 69 percent of the total waste generated is collected and about 19 percent is processed . This is an alarming number considering the fact that waste directly impacts in degradation of the environment and thus has a negative impact on climate change. By improving the collection numbers we can reduce the waste burning at the street corners and on empty/unoccupied lands. The collection of waste will also help in keeping the environment clean and disease free, surroundings fresh. The current waste collection methods use static scheduling. The static scheduling system of waste collection has various demerits Smart bins are not entirely new as an idea but continuous effort of design and implementation can make it possible to spread this idea into actual use.

II. LITERATURE SURVEY

Idea of smart garbage bins and systems have been in discussion for quite a long time. The technologies used at disposal to develop this smart system have also evolved, Internet of Things (IoT). Each idea seems to be similar but is slightly different at its core and our proposed work is no exception from the same. After the IoT field, finding its hold in our lives, this is our original plan for designing a smart garbage collection system which has provision for citizen participation and analysis of data for better decision making. At hardware level, the smart system is a garbage bin with ultrasonic sensor, a micro-controller and Wi-Fi module for transmission of data. The worldwide implementation of Internet of Things is possible with a Cloud centric vision. This work exploits the future possibilities, key technologies and application that are likely to drive IoT research. But a strong foundation to our work is provided, where the basics and applications of Arduino board is explained . It is quite interesting as it implements a GAYT (Get As You Throw) system concept as a way to encourage recycling among citizens. As we would discuss further, the citizen participation part of our system is quite influenced by their work

III. DESIGN

The conventional bin is transformed into a smart-bin by installing a module that consists of a microcontroller, set of sensors and a Wifi shield. Below are the details of components used :
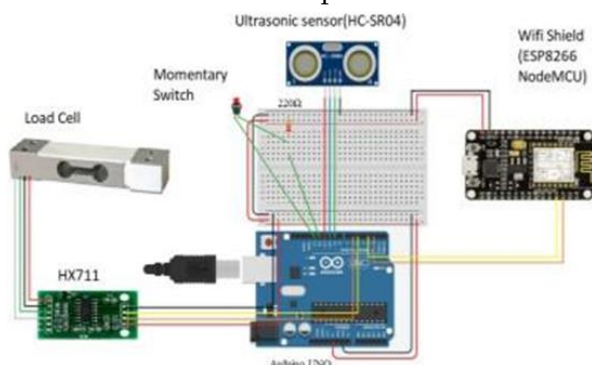

Figure 3.1: Circuit Diagram

1) **Arduino Uno:** It is a micro-controller board used to read values from the sensors.
2) **Ultrasonic Sensor HC-SR04:** It calculates the level of waste present in the bin.
3) **Load Cell HX711:** It determines the weight of the waste in the bin.
4) **Momentary switch:** The switch is placed below the lid to determine if the bin is closed or not. Once it is closed, the data is sent through ESP8266 NodeMCU.
5) **WiFi Shield ESP8266 NodeMCU:** It connects the Arduino to a network thereby allowing data transmission to the server

Figure 3.2: Sensor placement in the bin

Figure 3.3: Prototype bin

IV. ANALYTICAL / EXPERIMENTAL WORK

1) The real-time level and weight data are determined by the smart-bin which is then updated into the database containing a table for each bin and a master table storing the current status of the bin. 2) A selection algorithm identifies the bins that are to be collected based on the status of the bin 3) Application is used to display the information which is collected from the bin. The garbage collectors can access current status of the bin and what bins are to be collected based on selection and shortest path algorithm. The application provides an ordered list of bins to be collected which redirects to Google maps for navigation.
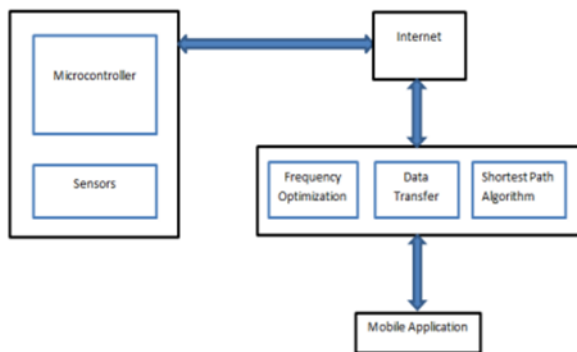
Figure 4.1: Figure 2. System Architecture

V. ALGORITHM

- Input: Current status of the bins
- $i \leftarrow 0$
- while i ¡ no of bins do
- if level THRESHOLD MAX OR weight THRESHOLD MAX then
- bin status ← high
- else if (level ¡ THRESHOLD MAX AND level ¿ 50) OR (weight ¡ THRESHOLD MAX AND weight ¿ 50) then
- bin status ← med
- else
- bin status ← low
- end if
- end while

VI. PROS AND CONS

- **Pros :-**
— Proposed system provides greater accessibility to the dustbin.
— If position of dustbin is changed from one place to another place its position will auto- matically get changed in server with the help of GPS module.
— It will save our fuel and time using appropriate route planning algorithm. Here we are using traveling salesman problem.

- **Cons:-**
— In fixed scheduling if one dustbin is filled early so it will -be left unnoticed until the next interval of collection.
— In average threshold scheduling Average is calculated so if one dustbin which is filled, will be emptied after the value exceeds the threshold value which will be late in some cases.
— In Full capacity scheduling, unless and until all dustbin are filled no garbage collection will be done

VII. APPLICATIONS

— To collect dustbins placed at public places in city.
— Automatic open-close lid for ease of use
— There is no contact touch between dustbin and Person so, prevention from germs and diseases.
— Warning message indication when a Smart Trash Bin is nearly full. Also send SMS to garbage collector in particular area.

VIII. CONCLUSION

This project work is the implementation of Automatic Garbage Fill Alerting system using Ultrasonic sensor, Arduino Uno, Buzzer and Wi-Fi module. Cleaning of dustbin is done as the garbage level of dustbin reaches to the maximum level. Alarms when wet garbage is

poured in dry dustbin. If dustbin is not cleaned in fixed time then the message will be send to higher authority and they will take appropriate action on sweeper or concerned contractor. Fake reports cannot be generated as previous data is always available when dustbin is cleaned in this way corruption is reduced in management. By using appropriate algorithm we can reduce the no of trips of collection van and hence we can save expenditure and resources. It ultimately helps to keep city and country clean. Therefore, the Smart dustbin makes garbage collection mechanism more efficient, which will ultimately make our dustbins and also cities smart at the same time.

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Phishing Detector Extension Using Machine Learning

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ABSTRACT

The goal of our project is to implement a machine learning solution to the matter of detecting phishing and malicious web links. The tip results of our project are going to be a software package which uses machine learning algorithm to detect malicious URLs. Phishing is that the technique of extracting user credentials and sensitive data from users by masquerading as a real website. In phishing, the user is supplied with a mirror website which is clone of the legitimate one but with malicious code to extract and send user credentials to phishers. Phishing attacks can cause huge financial losses for patrons of banking and financial services. the normal approach to phishing detection has been to either to use a blacklist of known phishing links or heuristically evaluate the attributes in a suspected phishing page to detect the presence of malicious codes. The heuristic function relies unproved and error to define the edge which is employed to classify malicious links from benign ones. the disadvantage to the current approach is poor accuracy and low adaptability to new phishing links. We attempt to use machine learning to beat these drawbacks by implementing some classification algorithms and comparing the performance of those algorithms on our dataset. we are going to test algorithms like Logistic Regression, SVM, Decision Trees and Neural Networks on a dataset of phishing links from UCI Machine Learning repository and pick the simplest model to develop a browser plugin, which might be published as a chrome extension.

I. INTRODUCTION

Financial services such as banking are now readily available on the web which makes people's lives easier. It is therefore essential that the protection and security of such services be maintained. one of the biggest threats to web security is cybercrime. Phishing scams are a way to extract user information by pretending to be a real website or service over the net. There are a variety of cybercrime attacks such as Spear sensitive identity theft, targeted at specific individuals or companies, Clone sensitive identity theft is a form of sensitive identity theft when a compiled email or link is copied to a new mail with special attachments (possible) link, Whaling, etc.

Theft of sensitive information can result in significant financial losses.

Similarly, the IRS has warned of an increase in attacks on sensitive identity theft with an increase of more than 400% on reported cases.

In our project, we will test three machine learning algorithms in the database of features that represent the features that are often associated with the pages of identity theft, select the most effective model supported by its functionality and build an online browser plugin that can ultimately be used by users. The project report is designed as follows; The Pre-Work section describes the common methods of crime detection and a few mechanical learning methods tried in recent years, the Proposed Approach section very well describes our approach and what will be the top product of our project, the Database section describes the data we use for our project and a list of for use in our project, the Machine Learning Algorithms section describes the various algorithms we have tested with our database in terms of their meanings, The Chrome Plugin implementation section explains the structure of our sensitive identity theft system and provides descriptions of various software modules within the system, the Outcomes section provides test results of us with graphical algorithms that arrange comparisons between three algorithms for features such as accuracy, sensitivity and falsehood. a good rating, and the concluding section summarizes the pr objective with a view to future developers.

II. METHODS AND MATERIAL

We suggest using machine learning to overcome obstacles associated with common methods of detection of identity theft. The problem of detection of sensitive identity theft is a very relevant candidate for the use of machine learning solutions due to the easy availability of sufficient amounts of information on sensitive crime attack patterns. the basic idea is to use machine learning algorithms in the available databases of sensitive data theft pages to come up with a model that may tend to perform categories in real time if the provided web content may be a criminal webpage or official web page. We will produce a learned model into a software tool that can be easily used to complete users in order to combat criminal attempts to steal sensitive information. For this purpose we have chosen to use a machine learning algorithm from the beginning using JavaScript and building Chrome.
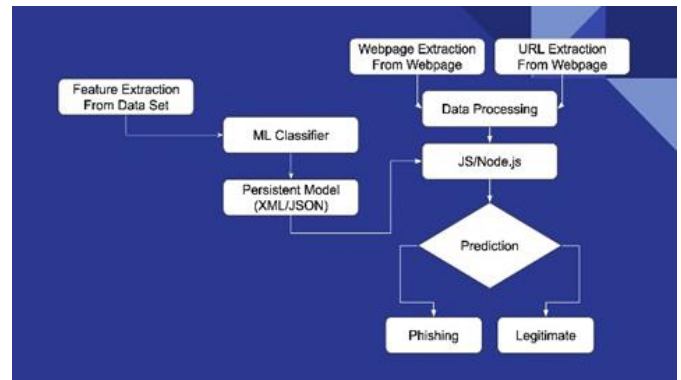
III. RESULT AND DISCUSSION

We have trained and tested supervised machine learning algorithms in training Database. The following algorithms are selected based on their performance in categories problems. The database was divided into training and the test was set at 7:3.

A. Random Forest

Random forests are subdivisions that include multiple tree predictions, where each tree is based on random vector values independently sampled. Moreover, all the trees in the forest are propagated in the same way. To construct a tree, we assume that n is the number of training observations and p is the number of variables (features) during the training set. identifying the selection node in the tree determines k «p as the number of variables to be selected. We selected a bootstrap sample from the n test within the training set and used the rest of the recognition to estimate the tree error within the test phase. Thus, we randomly select the k variable as a fence somewhere in the tree

and calculate the most effective division supporting the k variable within the training set. Trees grow regularly and have never been pruned compared to other tree-straightening methods. Random forests can handle a large number of variables in a data set. Also, during the forest-building process they produce an unbiased internal measure of common error. in addition, they will properly balance missing data.
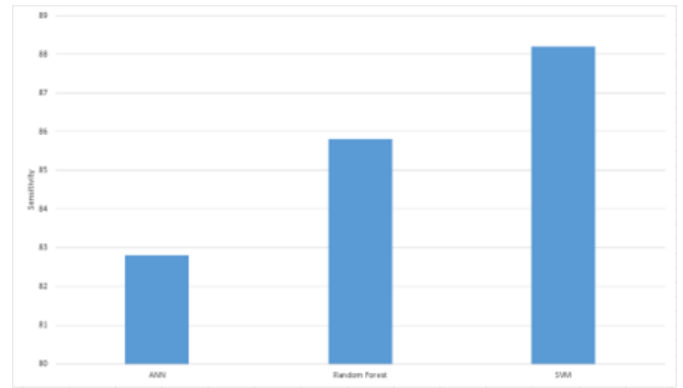
B. SVM:

Support Vector Machine (SVM) is a discriminatory machine-controlled machine, which conforms to the design principle of separating a large aircraft with a high safety zone, called a margin, to reduce the risk of error predictors.
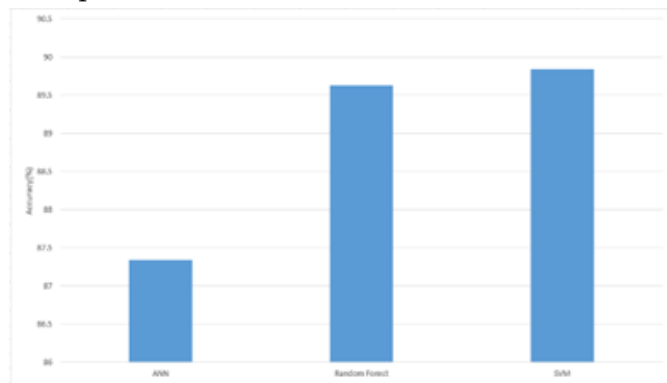
Accuracy of Classifiers
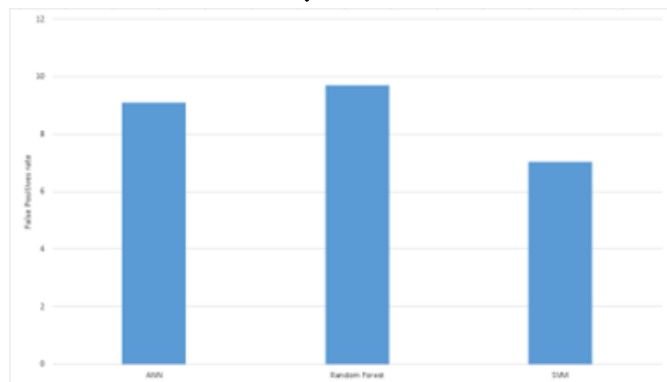
False Positive Rate of Classifiers

Sensitivity of Classifiers

IV. CONCLUSION

So in summary, we have seen how serious cybercrime threatens web security and security and how dangerous identity theft is.

Figure 4: False level of class dividers

adoption is a very important problem area. review a few common methods of detection of identity theft; namely methods to evaluate the list of blocked and heuristic, and their problems. we tested three machine learning algorithms in the 'Phishing Websites Dataset' from the UCI Machine Learning Repository and reviewed their results. We then selected a simple algorithm that supports its functionality and built the Chrome extension to detect web content of sensitive identity theft. The extension allows easy use of our crime detection model to steal sensitive information for users. For future enhancements, we will build a system to detect sensitive identity theft as a fast web service that is able to integrate online learning so that new patterns of sensitive identity theft can be easily read and improve the accuracy of our models by extracting better features than the core problem. We have reviewed some of the most common ways to detect identity theft; namely methods to evaluate the list of blocked and heuristic, and their problems. We tested three machine learning algorithms in the 'Phishing Websites Dataset' from the UCI Machine Learning Repository and reviewed their results. We then selected the best algorithm based on its functionality

and built the Chrome extension for accessing web pages to steal sensitive information.

The extension allows easy use of our crime detection model to steal sensitive information from end users. For future improvements, we aim to build a system to detect sensitive identity theft as a fast web service that will integrate online learning so that new patterns of sensitive identity theft can be easily learned and improve the accuracy of our models by delivering better features.

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Volume Controlling with Hand Gesture

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ABSTRACT

The project introduces an application using computer vision for Hand gesture recognition. A camera records a live video stream, from which a snapshot is taken with the help of interface. The system is trained for each type of count hand gestures (one, two, three, four, and five) at least once. After that a test gesture is given to it and the system tries to recognize it.

A research was carried out on a number of algorithms that could best differentiate a hand gesture. It was found that the diagonal sum algorithm gave the highest accuracy rate. In the preprocessing phase, a self-developed algorithm removes the background of each training gesture. After that the image is converted into a binary image and the sums of all diagonal elements of the picture are taken. This sum helps us in differentiating and classifying different hand gestures.

Previous systems have used data gloves or markers for input in the system. I have no such constraints for using the system. The user can give hand gestures in view of the camera naturally. A completely robust hand gesture recognition system is still under heavy research and development; the implemented system serves as an extendible foundation for future work.

KEYWORDS: Hand gesture, Recognition, Detection, Diagonal Sum, Pre-processing, Feature extraction, Skin Modeling, Labeling

I. INTRODUCTION

Recent developments in computer software and related hardware technology have provided a value added service to the users. In everyday life, physical gestures are a powerful means of communication. They can economically convey a rich set of facts and feelings. For example, waving one's hand from side to side can mean anything from a "happy goodbye" to "caution". Use of the full potential of physical gesture is also something that most human computer dialogues lack.

The task of hand gesture recognition is one the important and elemental problem in computer vision. With recent advances in information technology and media, automated human interactions systems are build which involve hand processing task like hand detection, hand recognition and hand tracking. This prompted my interest so I planned to make a software system that could recognize human gestures

through computer vision, which is a sub field of artificial intelligence. The purpose of my software through computer vision was to program a computer to "understand" a scene or features in an image.

A first step in any hand processing system is to detect and localize hand in an image. The hand detection task was however challenging because of variability in the pose, orientation, location and scale. Also different lighting conditions add further variability.

II. DIGITAL IMAGE PROCESSING

Image processing is reckoned as one of the most rapidly involving fields of the software industry with growing applications in all areas of work. It holds the possibility of developing the ultimate machines in future, which would be able to perform the visual function of living beings. As such, it forms the basis of all kinds of visual automation.

III. BIOMETRICS

Biometric systems are systems that recognize or verify human beings. Some of the most important biometric features are based physical features like hand, finger, face and eye. For instance finger print recognition utilizes of ridges and furrows on skin surface of the palm and fingertips. Hand gesture detection is related to the location of the presence of a hand in still image or in sequence of images i.e. moving images. Other biometric features are determined by human behavior like voice, signature and walk. The way humans generate sound for mouth, nasal cavities and lips is used for voice recognition. Signature recognition looks at the pattern, speed of the pen when writing ones signature.

IV. HAND GESTURE DETECTION AND RECOGNITION

DETECTION

Hand detection is related to the location of the presence of a hand in a still image or sequence of images i.e. moving images. In case of moving sequences it can be followed by tracking of the hand in the scene but this is more relevant to the applications such as sign language. The underlying concept of hand detection is that human eyes can detect objects which machines cannot with that much accuracy as that of a human. From a machine point of view it is just like a man fumble around with his senses to find an object.

The factors, which make the hand detection task difficult to solve, are:

Variations in image plane and pose
The hands in the image vary due to rotation, translation and scaling of the camera pose or the hand itself. The rotation can be both in and out of the plane.

Skin Color and Other Structure Components
The appearance of a hand is largely affected by skin color, size and also the presence or absence of additional features like hairs on the hand further adds to this variability.

Lighting Condition and Background
As shown in Figure 1.1 light source properties affect the appearance of the hand. Also the background, which defines the profile of the hand, is important and cannot be ignored.

Figure: 1.1: Lighting Condition and Background

RECOGNITION

Hand detection and recognition have been significant subjects in the field of computer vision and image processing during the past 30 years. There have been considerable achievements in these fields and numerous approaches have been proposed. However, the typical procedure of a fully automated hand gesture recognition system can be illustrated in the Figure 1.2 below:

Figure 1.2: Hand Gesture Recognition Flow Chart
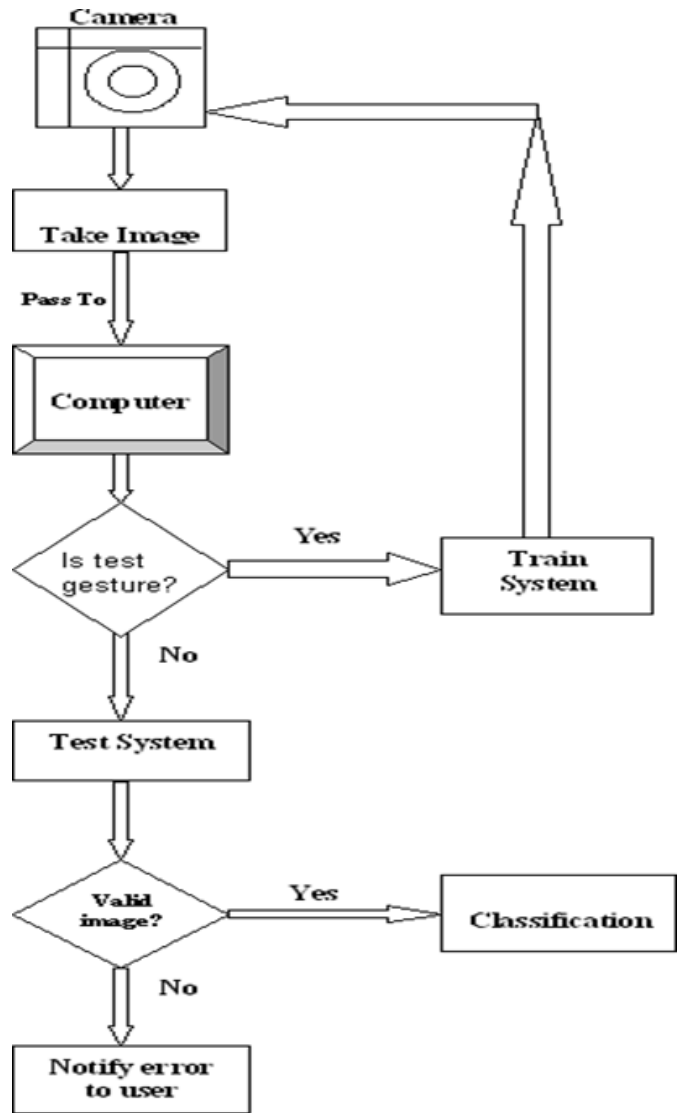
V. LITERATURE REVIEW

Hand gesture recognition research is classified in three categories. First **"Glove based Analysis"** attaching sensor with gloves mechanical or optical to transduces flexion of fingers into electrical signals for hand posture determination and additional sensor for position of the hand. This sensor is usually an acoustic or a magnetic that attached to the glove. Look-up table software toolkit provided for some applications to recognize hand posture.

The second approach is **"Vision based Analysis"** that human beings get information from their surroundings, and this is probably most difficult approach to employ in satisfactory way. Many different implementations have been tested so far.

One is to deploy 3-D model for the human hand. Several cameras attached to this model to determine parameters corresponding for matching images of the hand, palm orientation and joint angles to perform hand gesture classification. Lee and Kunii developed a hand gesture analysis system based on a three-dimensional hand skeleton model with 27 degrees of freedom. They incorporated five major constraints based on the human hand kinematics to reduce the model parameter space search. To simplify the model matching, specially marked gloves were used [3].

The Third implementation is **"Analysis of drawing gesture"** use stylus as an input device. These drawing analysis lead to recognition of written text. Mechanical sensing work has used for hand gesture recognition at vast level for direct and virtual environment manipulation. Mechanically sensing hand posture has many problems like electromagnetic noise, reliability and accuracy. By visual sensing gesture interaction can be made potentially practical but it is most difficult problem for machines.

LIGHTING

The task of differentiating the skin pixels from those of the background is made considerably easier by a careful choice of lighting. According to Ray Lockton, if the lighting is constant across the view of the camera then the effects of self-shadowing can be reduced to a minimum [25].

The top three images were lit by a single light source situated off to the left. A self-shadowing effect can be seen on all three, especially marked on the right image where the hand is angled away from the source. The bottom three images are more uniformly lit, with little self-shadowing. Cast shadows do not affect the skin for any of the images and therefore should not degrade detection. Note how an increase of illumination in the bottom three images results in a greater contrast between skin and background [25].

The intensity should also be set to provide sufficient light for the CCD in the camera. However, since this system is intended to be used by the consumer it

would be a disadvantage if special lighting equipment were required. It was decided to attempt to extract the hand information using standard room lighting. This would permit the system to be used in a non-specialist environment [25].

BODY GESTURES

This section includes tracking full body motion, recognizing body gestures, and recognizing human activity. Activity may be defined over a much longer period of time than what is normally considered a gesture; for example, two people meeting in an open area, stopping to talk and then continuing on their way may be considered a recognizable activity. Bobick proposed taxonomy of motion understanding in terms of: Movement – the atomic elements of motion, Activity – a sequence of movements or static configurations and Action – high-level description of what is happening in context.

Most research to date has focused on the first two levels [3].

- The Pfinder system developed at the MIT Media Lab has been used by a number of groups to do body tracking and gesture recognition. It forms a two-dimensional representation of the body, using statistical models of color and shape. The body model provides an effective interface for applications such as video games, interpretive dance, navigation, and interaction with virtual characters [3].
- Lucente combined Pfinder with speech recognition in an interactive environment called Visualization Space, allowing a user to manipulate virtual objects and navigate through virtual worlds [3].

VISION-BASED GESTURE RECOGNITION

The most significant disadvantage of the tracker-based systems is that they are cumbersome. This detracts from the immerse nature of a virtual environment by requiring the user to put on an

unnatural device that cannot easily be ignored, and which often requires significant effort to put on and calibrate. Even optical systems with markers applied to the body suffer from these shortcomings, albeit not as severely. What many have wished for is a technology that provides real-time data useful for analyzing and recognizing human motion that is passive and non-obtrusive. Computer vision techniques have the potential to meet these requirements.

Vision-based interfaces use one or more cameras to capture images, at a frame rate of 30 Hz or more, and interpret those images to produce visual features that can be used to interpret human activity and recognize gestures [3].

Typically the camera locations are fixed in the environment, although they may also be mounted on moving platforms or on other people. For the past decade, there has been a significant amount of research in the computer vision community on detecting and recognizing faces, analyzing facial expression, extracting lip and facial motion to aid speech recognition, interpreting human activity, and recognizing particular gestures [3].

Currently, most computer vision systems use cameras for recognition. Analog cameras feed their signal into a digitizer board, or frame grabber, which may do a DMA transfer directly to host memory. Digital cameras bypass the analog-to-digital conversion and go straight to memory. There may be a preprocessing step, where images are normalized, enhanced, or transformed in some manner, and then a feature extraction step. The features

which may be any of a variety of two- or three-dimensional features, statistical properties, or estimated body parameters – are analyzed and classified as a particular gesture if appropriate [3].

This technique was also used by us for recognizing hand gestures in real time. With the help of a web camera, I took pictures of hand on a prescribed background and then applied the classification algorithm for recognition.

PROJECT CONSTRAINTS

I propose a vision-based approach to accomplish the task of hand gesture detection. As discussed above, the task of hand gesture recognition with any machine learning technique suffers from the variability problem. To reduce the variability in hand recognition task we assume the following assumptions:

- Single colored camera mounted above a neutral colored desk.
- User will interact by gesturing in the view of the camera.
- Training is must.
- Hand will not be rotated while image is capturing.

The real time gesture classification system depends on the hardware and software.

Hardware

- Minimum 2.8 GHz processor Computer System or latest
- 52X CD-ROM drive
- Web cam (For real-time hand Detection)

Software

- Windows 2000(Service Pack 4),XP, Vista or Windows 7
- Matlab 8.0 or latest (installed with image processing toolbox)
- Vcapg2.dll (Video Capture Program Generation 2)
- DirectX 9.0 (for supporting Vcapg2)

VI. BRIEF OUTLINE OF THE IMPLEMENTED SYSTEM

Hand gesture recognition system can be divided into following modules:

- Preprocessing
- Feature extraction of the processed image
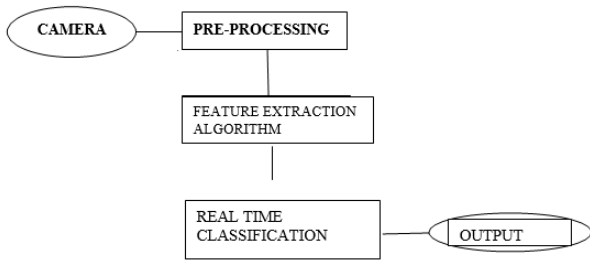- Real time classification

FIG. System Implementation:

FEATURE EXTRACTION ALGORITHMS

There are four types of algorithms that I studied and implemented namely as followings:

- Row vector algorithm
- Edging and row vector passing
- Mean and standard deviation of edged image
- Diagonal sum algorithm

ROW VECTOR ALGORITHM

We know that behind every image is a matrix of numbers with which we do manipulations to derive some conclusion in computer vision. For example we can calculate a row vector of the matrix. A row vector is basically a single row of numbers with resolution 1*Y, where Y is the total no of columns in the image matrix. Each element in the row vector represents the sum of its respective column entries as illustrated in Figure 4.4:
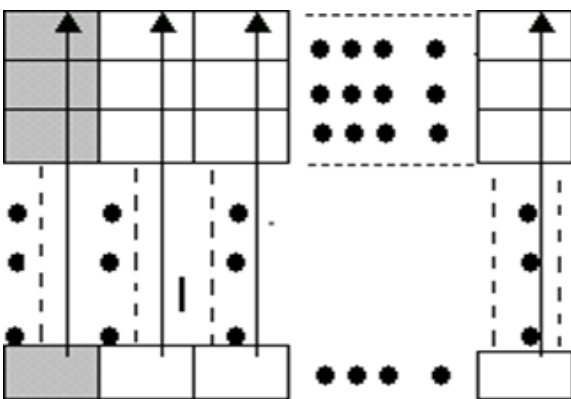
Figure 4.4 Row vector of an image

EDGING AND ROW VECTOR PASSING ALGORITHM

In the pre-processing phase of this algorithm, I do preprocessing, skin modeling and removed the background etc. of the gesture image taken. This image was converted from RGB into grayscale type. Gray scale images represent an image as a matrix where every element has a value corresponding to how bright/dark the pixel at the corresponding position should be colored.

MEAN AND STANDARD DEVIATION OF EDGED IMAGE

In the pre-processing phase, doing several step like removing the background and RGB image is converted into grayscale type as done in the previous algorithm. The edge of the grayscale image is taken with a fixed threshold i.e. 0.5 then calculate the mean and standard deviation the processed image.

Mean is calculated by taking a sum of all the pixel values and dividing it by the total no of values in the matrix. Mathematically, it is defined as:

$$\overline{X} = \sum_{i=1}^{n} X_i / n$$

Stand Deviation can calculate from mean which is mathematically defined as:

$$s = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \overline{x})^2}{n}}$$

DIAGONAL SUM ALGORITHM

In the pre-processing phase, doing mentioned steps in methodology, skin modeling removal of the background, conversion of RGB to binary and labeling. The binary image format also stores an image as a matrix but can only color a pixel black or white (and nothing in between). It assigns a 0 for black and a 1 for white. In the next step, the sum of all the elements in every diagonal is calculated. The main diagonal is represented as k=0 in Figure 4.7 given below; the diagonals below the main diagonal are represented by k<0 and those above it are represented as k>0
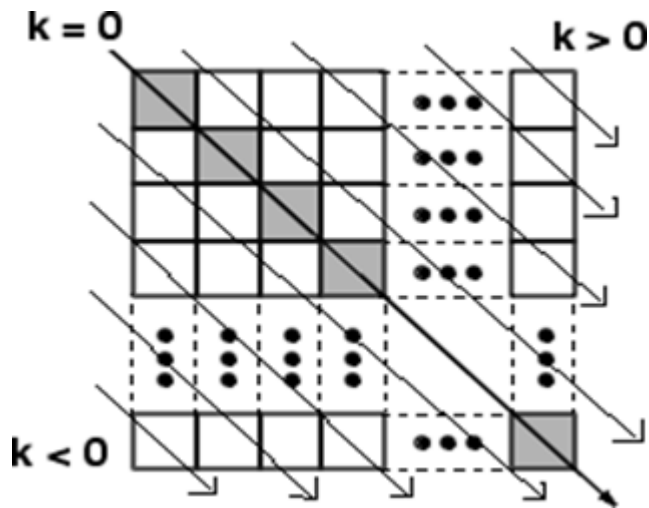
Figure: 4.8: Diagonal Sum

VII. CONCLUSION AND FUTURE WORK

This chapter summarizes my work at every stage of the project. At the time I started my thesis, I had a brief idea of how I will bring it from a topic on the paper to a real product. Due to knowledge of Computer Vision and Biometric subjects I had background in the image-processing field but not at expert level but my constant effort helped me to go through and succeed eventually.

As required in every project, research is of utmost importance. So, I spent the pretty much time in going through the background literature. I looked at various approaches of doing my thesis and developed four different methods: Row vector algorithm, Edging and row vector passing algorithm, Mean and standard deviation of edged image and Diagonal sum algorithm. Each of these algorithms was tried with neural networks and have higher performance rate in the ascending order respectively.

The first limitation that was discovered in all the algorithms used with neural networks was that their performance depended on the amount of training dataset provided. The system worked efficiently after being trained by a larger dataset as compared to a smaller dataset.

Due to the unusual behavior of neural network with all the mentioned parameters, the diagonal sum algorithm was finally implemented in real time. The system was tested with 60 pictures and the detection rate was found to be 86%. The strengths and weaknesses of gesture recognition using diagonal sum have been presented and discussed. With the implemented system serving as an extendible foundation for future research, extensions to the current system have been proposed.

VIII. FUTURE WORK

The system could also be made smart to be trained for only one or two gestures rather than all and then made ready for testing. This will require only a few changes in the current interface code, which were not performed due to the shortage of time.

One time training constraint for real time system can be removed if the algorithm is made efficient to work with all skin types and light conditions which seems impossible by now altogether. Framing with COG (Centre of gravity) to control orientation factor could make this system more perfect for real application.

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Virtual Police Station

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ABSTRACT

In Today's era, it is difficult to imagine life without the internet, as most of the systems are now working over the internet but now also the police are using 'Pen and Paper' for filing a case and for various other work.

But with the time population is increasing the workforce is not sufficient for this large population. And with the time type is as new technology is coming this old method of police is not compatible to use.

In this paper, we have discussed an internet-based Web Application (Prototype Level) that will help in filling an online complaint using this web portal and get various permission from the police department. This will help to reduce crime and to establish a good relationship between citizens and police authority.

Index Terms—Online FIR, Virtual Police station, Crime, Investigation.

I. INTRODUCTION

According to legal analyses, many public does not visit police station due to their difficulty in registration or filing complaints. One of the biggest reasons is that all the process is manual and time-consuming as they have to visit the police station many times. And in some cases, people don't know the process which is also not money friendly or fear of people that they might be harmed by police or the person on whom the FIR is filed. By making a system in which people can directly complain. As an old or manual process is paper-based which is easily manipulated or tempered.

The Ministry of Home Affairs takes different steps to make a good relationship between police and citizens. As the world is moving toward the internet, the ministry is also trying to bring various police facilities to use the internet under the national E-governance Plan (NeGP) of the Government of India.

This project is a Web Application that helps in reporting and managing an online system to lodge a complaint or to get different police-related services (like complaint approvals, FIR filing, License approvals, and various other forms), which will help in easy and simple structure for citizens to get different police services easily and in a short time.

II. MODULES

The System consists of three interfaces Citizen, Police Officer, and Administrator(senior officers). The first one is a public interface in which a new user has to create an account and file a complaint which will be verified by the police. The second interface is police in which a police officer can log in using his credentials and after login, he can check the cases to

which he is assigned and update the daily case dairy. And the last interface is the Administrator a higher ranked officer who can add an officer as an in-charge to investigate the case or look into the case updates which has been done.

- If any citizen or user wants to file a complaint this is a good system where he/she can file a complaint through this portal where he/she has to register themselves first.
- Once the account of the user has been created he/she can log in and view the case updates
- Police officers who are in charge of the case can add all their investigation updates to the case diary.
- The updated case dairy is visible to both the victim and senior officer in which if the case in charge is inactive then the senior can assign the case to a new officer.

III. SYSTEM ARCHITECTURE
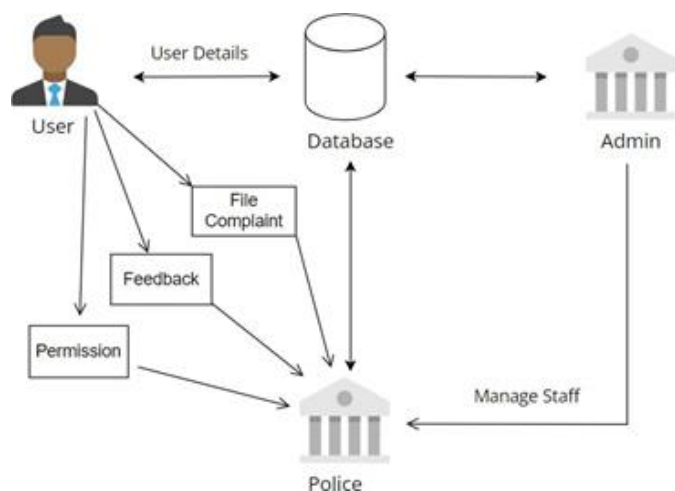
Fig. 1. System Architecture

This is an online web application for the public where users can register FIR without visiting the police station in online mode using this web application. First, a new user has to sign up using his credentials (name, DoB, email, mobile number, UID), it will create the account of that user and store its information in the database. Then the user has to login in using his ID and password provided. After login user can choose the option accordingly.
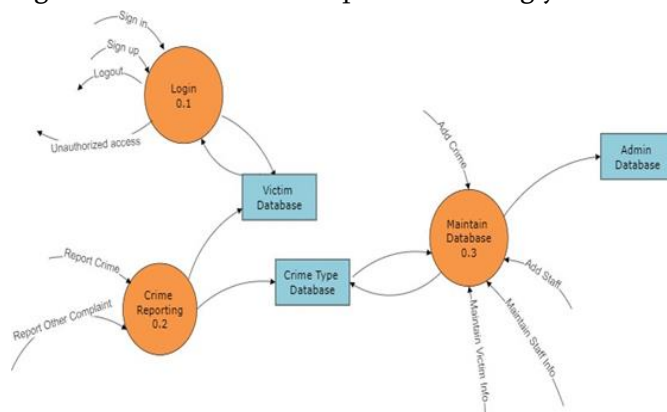

Fig. 2. Data flow for user

IV. TECHNOLOGY USED

A. Python

Python is a general-purpose high-level programming language created by Guido van Rossum in the late 1980s. The language places strong emphasis on code readability and simplicity, making it possible for programmers to develop applications rapidly. Like all high-level programming languages, Python code resembles the English language which computers are unable to understand. Codes that we write in Python have to be interpreted by a special program known as the Python interpreter, which we'll have to install before we can code, test and execute our Python programs. Python uses dynamic typing and a combination of reference counting and a cycle-detecting garbage collector for memory management. It uses dynamic name resolution (late binding), which binds method and variable names during program execution.

B. Django

Django is used to develop web applications in python which is lightweight and straightforward and helps in creating a quick web application. An important reason to select the Django framework are:

- The Django admin interface saves time: In Django everyone using web pages creates database tables to hold information, and then they must create an

administrative interface to manage those records. With only a few small classes, Django creates these administrative forms in a slick and easy-to-use interface. It even handles the authentication, so only administrators have access to them. This saves a lot of work.

- URL management is easy: Django allows you to handle how your URLs are formed at the application level and not the server level. This saves you from the headache of putting application logic into your apache conf file where is really doesn't belong. Nice URLs are also very SEO friendly.

C. MySQL

MySQL server is a open-source relational database manage- ment system which is a major support for web based appli- cations. Databases and related tables are the main component of many websites and applications as the data is stored and exchanged over the web. Even all social networking websites mainly Facebook, Twitter, and Google depends on MySQL data which are designed and optimized for such purpose. For all these reasons, MySQL server becomes the default choice for web applications. MySQL server is used for data operations like querying, sorting, filtering, grouping, modifying and joining the tables. Before learning the commonly used queries, let us look into some of the advantages of MySQL

V. FUTURE WORK

1) AI assistant in filing a complaint or to access any feature of Virtual Police station
2) UID based login.
3) SMS facility.
4) Fingerprint and face recognition.

VI. CONCLUSION

The online Complaint system is a Web Application that can be used for filling a complaint online without visiting the police station. It is helpful to government for keeping track of all the cases from that area. Here people/citizen can lodge FIR in simple and organized manner and get update on timely basis.

It can be used by the citizen for getting various permission from the police authority by simply log in and submitting an application for required permission. It will improve the transparency of the process and case which will lead to a good relationship between citizens and police authority.

Getting a justice for violating of the law and order is just a one touch away.

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Algorithm Visualizer A Web Based Tool

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ABSTRACT

Algorithm visualizer is a web-based tool that was created with the concerns in mind when learning about data structures and algorithms in mind. Students can learn sophisticated algorithms like merge sort that are tough to visualize in their heads thanks to the platform's vivid visuals. We also intend to provide information regarding the algorithm's time and space complexities, making our platform a one- stop shop for algorithm research. Selection Sort, Bubble Sort, Insertion Sort, and Merge Sort are four basic sorting algorithms that were visualized using a web-based animation application. After selecting a data-ordering and method, the user may either run an automatic animation or step through it at their own pace using the animation tool.

Keywords: Algorithms, Data Structures, Visualization, searching, sorting, pathfinder.

I. INTRODUCTION

As computer engineering students, we are familiar with the difficulties one might face while learning the subject of data structures and algorithms. For us it was very tough to visualize algorithms like merge sort. Keeping that in mind we decided to solve this problem through our final year project and thus we came up with the topic 'Algorithm visualizer'.

Algorithms are difficult to understand even with the traditional methods such as paper pencil. Visualization technique has been proven more effective in understanding complex things, also due to the pandemic situation, education is shifted to online learning which makes the difficult subject of algorithms more difficult for students. To solve this problem to some extent we propose the platform 'algorithm visualizer' to help students learn algorithms. This might help student even after the pandemic is over as it uses colorful and eye-catching animations.

II. METHODS AND MATERIAL

As of now we have implemented four algorithms (Prime numbers, Sorting Algorithms, Pathfinding Agorithms and Binary search). We have studied about each and every algorithm in detail. There is always more than one way to solve a problem, we have explained below which method we have implemented for algorithms.

A] Prime Number:

Sieve of Eratosthenes is efficient algorithm to find prime number from 1 to N where n is a given number.

B] Sorting Algorithms:

We have implemented bubble sort, insertion sort, selection sort and quick sort algorithm. Out of these algorithms first three are simple algorithm but not as efficient as quick sort. Bubble sort compare adjacent element and arrange its position and continue this at most n times where n is a size of the array. Insertion sort keep moving elements

From left to right until left element is bigger. Selection sort select smallest number from the elements and append it to the sorted part of the array. Quick sort uses recursion to sort array.

C] Pathfinder Algorithms:

Pathfinder Algorithms are the backbone of application like google maps .We,In this project have included popular pathfinder algorithms named DjKstra's algorithm, Depth first search and breadth first search.

D] Binary Search:

It's one of the most used and efficient algorithm. It is used in many ways. It follows Divide and Conquer approach.
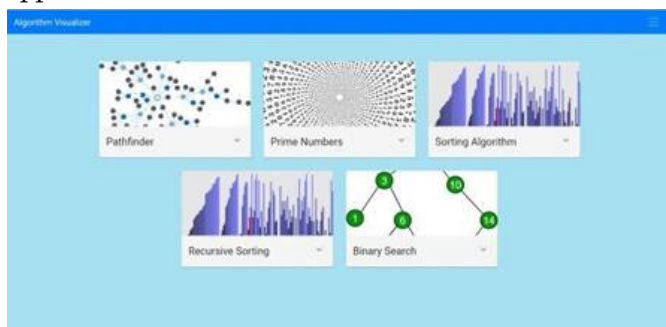

Fig. Home screen of the tool.

Now, let's take an overview on how the tool actually works. Basically, the working has four steps. Namely, Environment setup, taking inputs, perform necessary calculations in the background and reflecting the changes on the screen.

Let's understand it better using the example of sorting algorithms.

Firstly, the environment is setup, i.e. The original array to be sorted is represented in the form of vertical bars.

Now the user has an option to choose the range of values, numbers ,speed of animations and the algorithms they want to visualize. They may choose the duo option to compare two different algorithms.

After taking the inputs the necessary calculations depending on the user inputs are done and the animations are displayed.

III. RESULTS AND DISCUSSION

In studies it is found that visualization makes Complex things easy to study and understand they also took reviews from beginners as they can tell how equalization effect understanding of complex topics and how we can improve project. After enough

reviews we found that visualization is a way interesting than the traditional methods to understand topics easily.

IV. CONCLUSION AND FUTURE SCOPE

According to our findings, algorithm visualization might be viewed as a beneficial complement to traditional computer science teaching. We feel (and the findings of the survey back up this belief) that it aids in improving the quality of education in the field and contributes to the resolution of some of the issues in higher education.

We came to the conclusion from our research and experience that learning from a book or reading is not always the   most effective way to absorb things. You may grasp anything better when you study it from films or animations, therefore We believe this is one of the attempts to improve the learning process that requires more time and thinking

As of now, we plan to include complex algorithms like convex hull, n-queens and A* algorithm as a future scope to help learners who are at intermediate or advanced levels.

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Consumer Intention Prediction Using Twitter Data

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ABSTRACT

The ecommerce business, and specifically customers buying things online, has seen a considerable increase recently. There has been a lot of research into determining a user's purchase patterns and, more significantly, the factors that influence such patterns. may impact whether or not the consumer will purchase the product In this research, we'll look at be investigating whether it is possible to predict and buying intent of a user for a product and target that user with a message. A commercial or a bargain Furthermore, we want to create tools that will assist the Businesses estimate the number of prospective clients for their products. From their tweets and user profile data, they may determine their purchasing intent.

KEYWORDS: Consumer reviews, sentiment analysis, social perception score, linear regression analysis.

I. INTRODUCTION

We want to create a machine learning strategy that will identify potential clients for a product by evaluating purchase intent in terms of Twitter tweets. Because text analytics can be performed manually, it is in efficient, we must employ a text analytical machine learning model technique. Finding patterns and trends will be more faster and more efficient text mining and natural language processing technologies. In some ways, the process of detecting purchasing intentions is similar to that of finding wishes in product reviews.

After the introduction of brick-and-mortar businesses, the trend of online shopping has deservedly increased. E-retailers produ ced projected revenue of 1.9 trillion US dollars (7.4 percent of total retail sales) from 1.61 billion clients worldwide in 2016. Amazon, the world's largest online retailer, has over 310 million active user accounts, with about 136 billion dollars in sales in 2016. (Statista, 2017). In the first month after demonetization, digital payments grew by 271 percent in the world's third-largest purchasing power parity country (India), whereas cash on delivery fell by 30-40 percent (Chronicle, 2017). Marketing managers regularly and use purchase intentions as a factor in making decisions regarding new and existing products and services. Until now, many businesses have relied on client feedback. Our technique is complicated by the fact that we must cal culate how to measure the purchase.From a tweet's intentions Investigating and selecting several types of text analysis met ho ds. Choosing the ideal option will be a difficult process. Taking measurements of our machine's output. Learning models and then selecting

on the optimal one involves a number of elements that we shall discuss.

II. LITERATURE SURVEY

Several research studies have been conducted to examine the insights into online customer purchasing behavior. Only a few, however, have addressed client purchasing objectives. Studies on recognising wishes from text, particularly (Ramanand Bhavsar and Pednekar). Consider the challenge of identifying product review buy wishes. Among these desires are product recommendations or a desire to purchase the product to do so, they employed linguistic riles. There aware two types of desires Although rule-based ways to purchasing or recognising desires are available and are effective, coverage is inadequate, and they are difficult to extend. The problem of detecting purchase intentions is similar to that of finding wishes in product reviews. We provide a Machine instead of a rule-based method.

The sentiment 140API, which allows you to detect sentiment of a certain brand, product, or any subject on twitter, is one of the most frequent pre-processing approaches for twitter data. As part of the speech tagger, the Twitter NLP library .

LITERATURE REVIEW PIC BELOW

III. METHODOLOGY

When the corpus was complete, we tested various text analysis models to see which one produced the best results. The models we utilise are as follows:

A. Linear Regression:
When the dependent variable is binary, logistic regression is the proper regression strategy to use. The logistic regression, like other regression studies, is a predictive analysis. It's a term used to describe data.

B. Vectors Machines are supported:
SVM stands for supervised machine learning method that does not do complicated data transformations. Then it tries to split data into the designated classes.

C. Naive Byes:
The Bayes theorem is used with the "naive" assumption of conditional independence between any pair of characteristics given the features of the class variable.

D. Decision Tree:
A non-parametric supervised learning approach for classification and regression, decision trees are utilised. The objective is to learn basic decision rules from data attributes to develop a model that predicts the value of a target variable.

E. Neural Network:
A neural network is a deep learning machine method that is organised in layers of neurons. There are three levels of neurons: an input layer, an output layer, and buried layers. The neurons in these layers learn from the original input and subsequent runs, making the neuron network adaptable.

IV. TECHNOLOGY USED

A. NumPy:
Here, in this our project we use python module called NumPy for manipulating the data of our dataset and do some mathematical operation to calculate desired output from that using python NumPy module. NumPy is a general- purpose array-processing

package. It provides a high-performance multidimensional array object, and tools for working with these arrays. It's the abecedarian package for scientific computing with Python. In NumPy, number of confines of the array is called rank of the array. A tuple of integers giving the size of the array along each dimension is known as shape of the array. An array class in NumPy is called as and array. Rudiments in NumPy arrays are penetrated by using square classes and can be initialized by using nested Python Lists.

B. Panda:

We have used Panda module in this project to manipulate huge dataset with the functionality of pandas module effectively and we get desired dataset in form in which we want by manipulating raw dataset with the help of pandas. Pandas is an open-source library that's erected on top of NumPy library. Pandas is fast and it has high-performance productivity for druggies. Advantage Of Panda are as follow:

1. Fast and effective for manipulating and assaying data.
2. Data from different train objects can be loaded.
3. Easy running of missing data (represented as NaN) in floating point.

C. Matplotlib:

It is a python data visualization library or module. We have used this module in our project to visualize table format data into graph format, so that if there is any kind of error or inaccuracy so that we can easily get it out by data visualization as compared to data in table format and we able correct it immediately, so in directly it will increase our speed. Matplotlib is easy to use and an amazing imaging library in Python. It's erected on NumPy arrays and designed. to work with the broader SciPy mound and consists of several plots like line, bar, smatter, histogram, etc. Matplotlib is an amazing visualization library in Python for 2D plots of arrays. Matplotlib is a multiplatform data

visualization library erected on NumPy arrays and designed to work with the broader SciPy mound. It was introduced by John Hunter in the time 2002. One of the topmost benefits of visualization is that it allows us visual access to huge quantities of data in fluently digestible illustrations. Matplotlib consists of several plots like line, bar, smatter, histogram etc.

D. Flask:

we have used flask python module in our project, the purpose of this module is to connect backend machine learning module to CSS and Bootstrap and flask module will help to connect ML backend module to frontend to calculate estimated price. So here used need to give some basic information related to car purchasing and this information or input will pre-process in our machine and output or estimated car price will shown on website with the help of flask. Flask is an API of Python that allows us to build up web-applications. It was developed by Armin Ronacher. Flask's framework is more explicit than Django's framework and is also easier to learn because it has less base code to implement a simple web-Application. A Web-Application Framework or Web Framework is the collection of modules and libraries that helps the developer to write applications without writing the low-level codes such as protocols, thread management, etc. Flask is based on WSGI (Web Server Gateway Interface) toolkit and Jinja2 tem MODELLING.

V. MODELLING

A. Analyzing:

In our project, we utilised the agile approach, which includes analysing as the first stage. We evaluated our dataset and the models we intended to use for our project throughout this part of the model to ensure that our results were as accurate as possible.

B. Planning:

In the second step of our model, the planning phase, we planned the tasks that our group members would carry out in order to finish the project within the time frame we set.

C. Design:

During the design process, we create the project's primary core components, such as the frontend and backend.

In order to use Machine Learning algorithms and produce projected outcomes, the two must be combined.

D. Testing:

We eliminated all bugs during this round. Check to determine if our project met all of the user's needs. Validation comes last after the prerequisite check.

E. Deployment:

For the time being, we've deployed our project on localhost 8000, but we can also deploy it on other platforms in the future, in order for all users to have access. The fundamental goal of implementing the Agile style of software elopement is to complete all tasks and processes at the same time. For our project, it also provides an incremental and iterative approach.

VI. SOFTWARE TESTING

Software testing can be stated as the process of verifying and validating that software or application is bug-free, meets the technical requirements as guided by its design and devel- opment, and meets the user require ments effectively and effi- ciently with handling all the exceptional and boundary cases. The process of software testing aims not only at finding faults in the existing software but also at finding measures to improve the software in terms of efficiency, accuracy, and usability. It mainly aims at measuring the specification, functionality, and performance of a software program or application.Software testing can be divided into two steps:

A. **Verification:** it refers to the set of tasks that ensure that software correctly implements a specific function. Verification: "Are we building the product, right?"

B. **Validation:** it refers to a different set of tasks that ensure that the software that has been built.

VII. ACKNOWLEDGEMENT

VIII. FUTURE WORK

This research's research study and literature evaluations revealed significant gaps, indicating that there are opportunities to expand this work. Incorporating geo-spatial data into sentiment analysis

may aid marketers in gaining insights into the reasons for a product's success or failure, as well as designing or altering the product to fit the preferences of the local population.

Apart from the potential for expansion, the work in this project provides abundant opportunity for study in adjacent areas that were not explored in this project or elsewhere and so provide rich ground for research.

There are few research on the impact of attitudes on product sales in the existing literature. Future research might focus on identifying other elements that function as predictors and obstacles.

IX. CONCLUSION

When compared to previous studies in the sector, our study stands out since we created five distinct models and then evaluated them before selecting the best one based on the product data because of the two issues listed below, we were unable to achieve greater than 80% accuracy. It's a success to reach even 80% accuracy with unbalanced class data and such a little dataset. We have two significant issues to deal with:

A. The issue of class imbalance: We have roughly 2000 positive tweets and 1200 negative tweets in our dataset since we manually tagged it. As a result, our True Negative Rate was extremely low, and our model was unable to effectively forecast the negative.

B. Limited annotated data: We were only able to annotate roughly 3200 tweets since we had to manually annotate each tweet in the dataset, which takes a long time.

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IOT Platform for Structural Health Monitoring

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ABSTRACT

Structural Health Monitoring (SHM) is becoming a crucial research topic to improve the human safety and to reduce maintenance costs. However, most of the existing SHM systems face challenges performing at real-time due to environmental effects and different operational hazards. Furthermore, the remote and constant monitoring amenities are not established yet, properly.

To overcome this, Internet of Things (IoT) can be used, which would provide flexibility to monitor structures (building, bridge) from anywhere. In this paper, a complete IoT SHM platform is proposed. The platform consists of a Raspberry Pi, an analog to digital converter (ADC) MCP3008, and a Wi-Fi module for wireless communication.

Piezoelectric (PZT) sensors were used to collect the data from the structure. The MCP3008 is used as an interface between the PZT sensors and the Raspberry Pi.

The raspberry pi performs the necessary calculations to determine the SHM status using a proposed mathematical model to determine the damage's location and size if any. The All the data is pushed to the Internet filter using Thing Worx platform. The proposed platform is evaluated and tested successfully.

I. INTRODUCTION

SHM is a non-destructive evaluation technique to monitor the integrity of civil structures such as bridges, aircraft, etc. Since the gradual deterioration of structures can happen for different reasons, such as continuous exposure to the inclement weather, overloading, etc., SHM is a vital tool to be implemented in old buildings, bridges, etc., to ensure the safety of human beings.

Although researchers from different discipline took different approaches for SHM, most of the works in this field were done using civil and mechanical engineers' approach. Their works involved mostly to analyse natural frequencies of structures to make decisions.

However, in this paper, the chosen approach was to develop a technique to analyse signals (electrical) and implement the proposed technique on an embedded platform.

Generally, to perform SHM, firstly, data needs to be collected using sensors. Different types of sensors such as ultrasonic, piezoelectric etc. can be used for SHM to generate signals traveling through solid

configurations. Later, data collected from the sensors needs to be analysed by applying different signal processing techniques, because a minor variation within the system triggered by different factors such as noises, temperature changes, environmental effects, might cause significant changes in the response from the sensors, concealing the potential signal changes due to structural defects.

Various signal processing techniques have been used to improve the SHM performance such as Wavelet noising, Fast Fourier Transform (FFT), Wavelet transform, Cross-Correlation (CC), Principal Component Analysis (PCA), etc.

Wavelet analysis can be used to remove noise from the signal and detect damage in the structure. Fast Fourier transform and wavelet transform are usually used to get the frequency spectrum of sensors' output signal, and these spectrums also can help to design appropriate filters to remove noises. On the other hand, CC is the degree of similarity between two signals.

For SHM applications, the signals to be compared are the base signal and the real-time signal. Another useful signal processing technique used in SHM is PCA, which uses orthogonal transformation to establish the linear relationship between input and output. The linear input/output relationship developed for a targeted structure can be exploited for an SHM process.

II. PROPOSED METHODOLOGY

The proposed IoT platform consists of Wi-Fi module, Raspberry Pi, ADC, DAC, buffer, and PZT as shown in Figure 1.

The two piezoelectric sensors are mounted on the structural and connected to a high speed ADC. In the real case implementation, we will deploy the sensors in a way to catch all the possible damage. A buffer is used as a level conversion and to protect the Raspberry Pi. The Raspberry Pi generated the

excitation signal and the DAC converted it to analog. In addition, the Raspberry Pi, using the proposed SHM technique, is used to detect if the structure has damage or not and the location of the damage if it is existing.

Moreover, the Raspberry sends the structure health status to the Internet server. The data is stored on the Internet and can be monitored remotely from any mobile device. Moreover, the Internet server sends an alert if there is a damage in the structure.

WIFI MODULE

Wi-Fi Module. Miniature Wi-Fi (802.11b/g/n) Module is a USB module that has 2.4 GHz ISM band. It has a data rate up to 150 Mbps (downlink) and up to 150 Mbps (uplink). It uses IEEE 802.11n (draft), IEEE 802.11g, and IEEE 802.11b standards. The Wi-Fi module is used to send the data to the cloud.

RASPBERRY PIE

The Raspberry Pi 2 is a single-board computer. It features a full Linux operating system with diverse programming and connectivity options. The on board 900 MHz quad-core ARM Cortex-A7 CPU allows for swift computation and analysis of data obtained from several nodes and transducers.

The operating system of Raspberry Pi is Linux 3.18.5-v7+ and has 4 processors in one chip which is CPU ARMv7 Processor rev 5 (v7l). It has a RAM of 1 GB and maximum clock speed 900 MHz Normally, current drawn by Raspberry Pi 2 is 200 mA. The Raspberry Pi will be used to collect the structure health and push it to the cloud using Wi-Fi module.

ADC

The CA3306 is a CMOS parallel ADC designed for applications demanding both low-power consumption and high speed digitization. It is a 6-bit 15 MSPS ADC with a parallel read out with single 5 V supply. The power consumption is as low as 15 mW, depending upon the operating clock frequency.

It may be directly retrofitted into CA3300 sockets, offering improved linearity at a lower reference voltage and high operating speed with a 5 V supply. The high conversion rate of this ADC is ideally suited for digitizing high speed signals in SHM application. If a higher resolution is needed, the overflow bit makes the connection of two or more CA3306s in series possible to increase the resolution. Also, two CA3306s may be used to produce a 7-bit high speed converter that doubles the conversion speed; this will increase the sampling rate from 15 MHz to 30 MHz.

DAC

The MCP4725 is a low-power, high accuracy, single channel, 12-bit buffered voltage output DAC with non- volatile memory (EEPROM). It's on board precision output amplifier allows it to achieve rail-to-rail analogy output swing. The MCP4725 is an ideal DAC device where design simplicity and small footprint are desired and for applications requiring the DAC device settings to be saved during power-off time.

BUFFER

The 74HC4050 is a hex buffer with overvoltage tolerant inputs. Inputs are overvoltage tolerant up to 15 V which enables the device to be used in high-to-low level shifting applications.

PIEZOELECTRIC SENSOR

PZT transducer converts mechanical energy to electric signals or vice versa. They can work as an actuator to excite an elastic lamb wave based on the electrical signal applied to the PZT crystal. It can also be used as a transducer to transform the responding elastic lamb waves into an electrical signal. Two PTZs sensors are mounted on structure: PZT1 (excitation) will send the excitation signal and PZT2 (receiver) will receive the signal. The CA3306 is operating at 5 V, which means that we cannot connect it directly to the Raspberry Pi which operates at 3.3 V. Accordingly, a level converter in between is needed.

The simplest way to do level conversion is to use a buffer such as CMOS 74HC4050. As the buffer runs at 3.3 V, so it is necessary to place a pull-up resistor to 5 V behind the clock buffer.
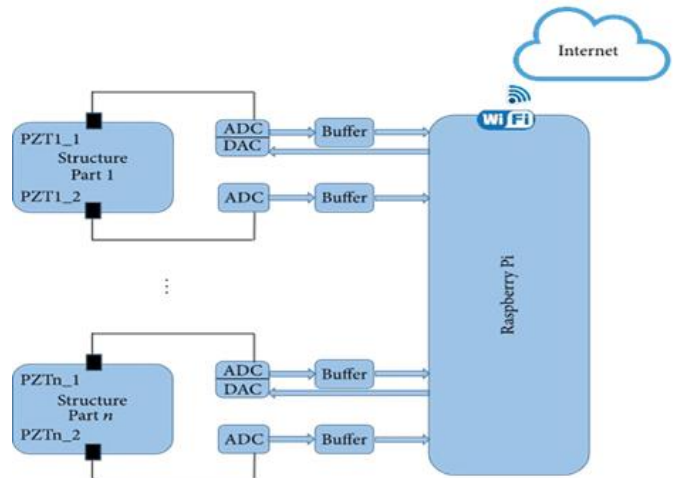

Fig. 1

PROPOSED MATHEMATICAL MODEL

In this model, two sensors (PZT) were used, which were able to generate, as well as receive signals. The generated signal by the PZT1 travelled through the structure, and PZT2 receives the signal (pitch-catch) as shown in Fig.1. When the signal gets reflected at the edges, it travels back to PZT1 (pulse-echo). The wave velocity of the signal, generated by PZT1, and the signal travel back to the PZT1, Ws needs to be determined, needs to be determined

$$Ws=(L/T_h/2) \quad \text{eq -1}$$

L is the distance between two PZT sensors, and is the peak Ws damage location, L to peak time difference. By utilizing found using the eq. (2).

$$L=(T_h/2)\,Ws \quad \text{eq-2}$$

After calculating the position, the next step would be determining the damage width. First, the proportion of the damage position to the total length, could be determined by:

$$\frac{Lc}{Lh} = S_1 \qquad (3)$$
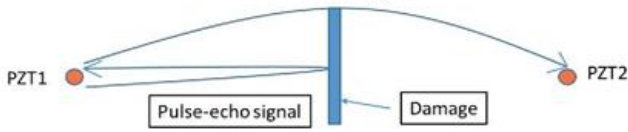
Pitch-Catch signal
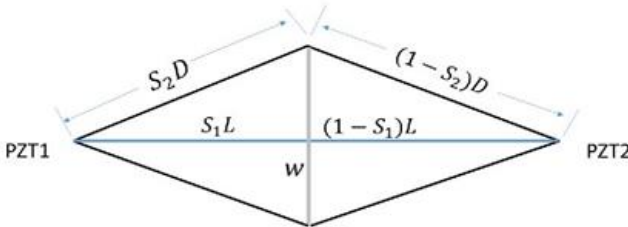

Fig. 1. Proposed Concept

Fig. 2. Mathematical model diagram

Due to a damage being present, the wave takes longer to travel from exciter to sensor, which implies the wave travels a further distance. This distance, H, can be determined by:

Tt*Ws=D

Where, is the total time the wave takes to travel from exciter to the sensor with the presence of the damage. From these equations, a triangle can be made as seen in Fig. 3. is the hypotenuse of this triangle and are the base and very close in value and only equal if is ½. Whereas can be determined using the following equation:

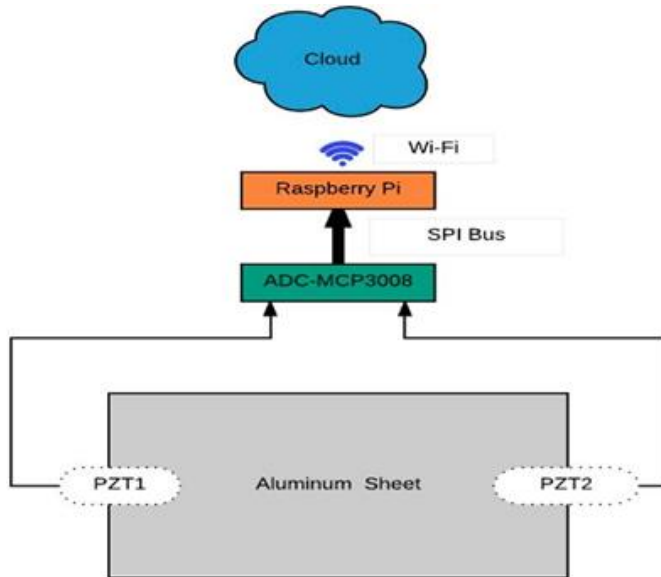**W= 2*Sqrt of (S₂D) ^2-(Lc)^2**

Fig. 3

III. RESULTS AND DISCUSSION

To verify the proposed architecture, as well as the algorithm, experimental set-ups were done for the pitch-catch technique by generating signals using function generators. Noises to these signals were added using other function generators. For the pulse-echo technique, the same setup would be needed.

In order to evaluate the proposed platform, a healthy aluminium sheet and another sheet with damage were used. The unhealthy sheet has damage that is 30 cm far from the exciter piezoelectric sensor and 7 cm width as shown in Figure 11.

The proposed platform is used to check both sheets and send the data to the Internet server. These two sheets are tested separately by the proposed platform.] Figure 12 shows the test bed as located in the lab.

The health status was sent to the Internet server that hosted on ThingWorx. ThingWorx is a technology platform designed for the the excitation signal and the DAC converts it to analog. In addition, the Raspberry Pi was used to detect if the structure has damage or not. Moreover, the Raspberry was used to send the structure health status to the Internet server. The data was stored on the Internet server and can be monitored remotely from any mobile device. The system has been validated using a real test bed in the lab. Results show that the proposed IoT SHM platform successfully checked if the sheet is healthy or not with 0% error. In addition, the proposed platform has a maximum of 1.03% error for the damage location and maximum of 8.43% error for the damage width.

IV. CONCLUSION

Since IoT is gradually changing the way we used to interact with different devices, as well as applications, the blessings of IoT are appreciated by researchers from different disciplines. In this work, an SHM hardware platform with IoT was proposed.

The hardware architecture consisted of a raspberry pi, an ADC, and a Wi-Fi module. A simple signal processing technique with less mathematical calculation was implemented in this architecture, which used a Butterworth filter (to remove noises) and a mathematical model (to get damage location/size). Later, the SHM information was pushed to the Internet for remote access.

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AI Swarm Drones

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ABSTRACT

This paper proposes Idea and importance of a swarm of drones. In the study, inspired by the swarms in nature, drones look for the target by sensing the surrounding and communicating with each other for collision avoidance and effective co-ordination. The position for each drone is implemented using the particle swarm optimization algorithm as the swarm intelligence (A swarm-based optimization algorithm), as well as a model for the drones to take the real-world environment into consideration. In addition, the system is processed in real time along with the movements of the drones. The effectiveness of the proposed system was verified through repeated test simulations studied from various studies, including a benchmark function optimization and air pollutant search problems. The results show that the proposed system is highly practical, accurate, and robust.

Keywords: Swarm, Technology, PSO.

I. INTRODUCTION

The demand for autonomous aerial vehicles (AAV), commonly called drones, has largely increased in recent years due to their compactness and mobility, which enable them to carry out various tasks that are economically inefficient or potentially dangerous to humans effectively. For example, it is hard for humans to explore rugged mountain terrains, flooded areas, war zones or air pollution regions without drones. they have been used in various search applications, such as industrial building inspections, search and rescue operations and post-disaster area exploration autonomously. The search applications have one important factor in common search efficiency in quick time.

Previous research has focused on improving the stand-alone performance and automation of each drone, such as localization accuracy, communication robustness, and various sensors but not on co-ordination with multiple drones. However, it is relatively expensive to handle a group of such high-end drones. Additionally, it takes a long time for a single drone to cover a broad search space. Thus, previous studies shows the decomposition of the search space or control a number of low-cost drones into several formation patterns. The previous research successfully demonstrating the feasibility of search-by-drones, there is still room for improvement. The Important things, time and cost, it is not the best strategy to thoroughly scan every available location in the search space. so, it is more effective for drones to

conduct a brief survey first and successively progress to better locations by investigating the evidence of the surroundings and communicating with each other. We can find examples of this behaviour from nature, such as ants, bees, fish, birds, and so on. They show cooperative and intelligent behaviors to achieve complex goals, which is called swarm intelligence (SI). In the area of multi-robot path planning in 2-D space, there have been several studies of approaches based on swarm intelligence. However, there is difference between mobile robots in 2-D space and drones in 3-D space. Whereas mobile robots can stand stably without any posture control and only need to be controlled by position feedback, the postures and positions of drones can be controlled based on a certain dynamic model in order to hover stably. Therefore, in this paper, swarm system for quadcopter drones is proposed by integrating the position update rule of the swarm intelligence algorithm (PSO). In the proposed system, The Study of a swarm of more than 10 drones was employed for a search mission. The swarm was controlled by a position update mechanism which included the swarm intelligence inspired from a well-known swarm-based optimization algorithm (PSO).

II. LITERATURE SURVEY

The Defense Advanced Research Projects Agency (DARPA) is experimenting with using a swarm of autonomous drones and ground robots to assist with military missions. In a video of a linear algorithm provides an effective method for maneuvering individuals in a swarm. By keeping velocity constant, the swarm of UAVs are realistically simulated. Recent test, DARPA showed how its robots analyzed two city blocks to find, surround, and secure a mock city building.

DARPA conducted its test back in June 2019, in Georgia, featuring both drones and groundbased robots. The demonstration was part of DARPA's offensive Swarm-Enabled Tactics (OFFSET) program,

which is designed to eventually accompany small infantry units as they work in dense urban environments, and could eventually scale up to 250 drones and ground robots.

The Swarming Algorithms are used in the drones for the automated operations. The Particle Swarm Optimization Algorithm (PSO) and the Linear Optimization Algorithm are highly used algorithms today. PSO is focused on minimizing error between the drones and the target but changes the speed of UAVs. In addition to changing the drone's direction to head toward the target. A linear algorithm provides an effective method for maneuvering individuals in a swarm. When applying PSO to real flying objects, the constant speed changes are the main drawback. Actual UAVs should maintain a constant velocity to operate in a stable and controlled manner to prevent chaos and collisions.

Compared to the PSO, the PSO linear algorithm produces the most realistic results. The swarm does not have to move synchronously, and the UAVs move toward the target by minimizing the error in their position from the target. The error is minimized in a linear fashion since the velocity of the UAV remains constant. Linearity produces great results, and the simulated UAVs are able to find the target quickly and efficiently. The program also handles the UAVs as objects that occupy space. Each UAV has a threshold boundary distance, so they will avoid each other if they get too close. These movements allow the swarm to move toward a destination in space without collisions.

III. DESCRIPTION

There are three phases of operation. After take-off, they start a spread out phase for a fixed period of time. This first stage is used to place the drones in a good positions to start exploring the environment. This spread out of the drones in the environment is achieved by maximizing the minimum distance between them while at the same time flying within a

fixed radius of the take-off area, it can obviously be implemented in a distributed and local way. Once the spread out stage finishes, the drones start the monitoring phase. The behavior of the drones continues to be the same as in the spread-out phase, they try to maximize the minimum distance between them while moving, but in this state they are also sensing the environment seeking desired object's values above a fixed alarm threshold. Also during this stage, the drones start broadcasting their sensed data through the communications channel so other agents of the system can receive it (at least those that are close enough to it). As soon as one of the drones detects an object above the threshold it enters the search stage. In this stage the plane starts collaborating with surrounding drones in order to find the object. As each plane is receiving the data sensed and broadcast by others surrounding it, it uses the data coming from the N nearest neighbors and its own sensing data to select a promising direction for continuing its search.

IV. ALGORITHM

Particle Optimization Algorithm :

Step 1: start.

Step 2: Initialize the drone population by random positioning and velocity vectors.

Step 3: evaluate the best position of each drone.

Step 4: evaluate whether each drone's position is better than previous position.

Step 5: if current position is true keep the position.

Step 6: if false assign new best position to the drone.

Step 7: compute the velocity of each drone.

Step 8: update the position each drones for searching desired object.

Step 9: check whether the target found if not restart from.

Step 10: end.

V. CONCLUSION AND RECOMMENDATIONS

In the near future, our airspace will be populated by swarms of aerial robots, performing complex tasks that would be impossible for a single vehicle. This papers reviews work that could provide the fundamental algorithmic, analytic, perceptive, and technological building blocks necessary to realize this future. The research issues discussed in this survey paper span hierarchical integration of swarm synchronization control with safe trajectory optimization and assignment, and cooperative estimation and control with perception in the loop, offering the readers a broad perspective on aerial swarm robotics. In addition, we emphasize the importance of the three way tradeoff between computational efficiency, stability and robustness, and optimal system performance. To truly address this tradeoff, we argue that it is imperative to advance beyond methods that are currently being used in autonomous drones and general swarm robotics in order to realize long-term autonomy of aerial swarm systems. One important area of further study is to develop learning and decision-making architectures that will endow swarms of aerial robots with high levels of autonomy and flexibility. We argue that such architectures will ultimately lead to reduced risk and cost as well as long-term autonomous operations. To be successful, any such architecture must provide the framework for reasoning about the wide-ranging nature of uncertainties and modeling errors, ranging from known unknowns (e.g., sensor and actuator noise) to unknown unknowns (e.g., wind disturbance, hardware failures). All of these impact the safety and robustness of algorithms and system-level functions of swarm behaviors. Furthermore, computation and communication within a swarm must be fast enough to ensure stability under model changes and mission specifications at the various timescales and bandwidths within the system. For aerial swarms systems with highly uncertain environmental models, the role of highlevel planning, decision making, and

classification in flight in conjunction with low-level swarm control and estimation systems can be characterized mathematically through the properties of stability, convergence, and robustness. Various aspects of the swarm decision-making, control, and estimation should come in different timescales and hierarchical levels to exploit scalability and computational efficiency. An example of such characterization on stability would be a mathematical theorem correlating desired models and parameters to be updated on-line as well as their update or learning rates, to functions of various system features, such as sampling rate, swarm control law update rate, bandwidth of dynamics and communication, dimensions of dynamic systems, and properties of environmental uncertainties. This should also provide a guideline as to gauge how efficient and robust a particular swarm algorithm or system-level architecture is at achieving autonomy in aerial swarms. For example, distributed optimal planning requires robots to share their optimal solutions with their neighbors, up to a certain time horizon. Adding simultaneous target or task allocation to this problem further increases the required size of communicated information. It would be beneficial to combine such methods with on-line adaptation methods that can forecast the neighbors' future behavior and would, in turn, effectively reduce communication requirements. The key idea is again combining formal mathematical analysis with the hierarchical and multi-modal decomposition discussed earlier. Another important area is to establish rigorous methodologies for fault detection, isolation, and recovery to handle various potential faults occurring at sub-system levels, individual system levels, and swarm levels. As swarms are deployed to a greater extent for aggressive or agile autonomous missions, it will become necessary to create the means to exert some form of adversarial control on swarms. Such counter-swarm techniques can also be used for civilian purposes, such as maintaining law and order and herding birds and

animals away from environmental hazards such as floods or wildfires.

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Fingerprint Based ATM System

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ABSTRACT

In this modern world, almost everyone uses ATM machines which allow people to transfer and withdraw cash. This study is based on executing a fingerprint method in the ATM System. We chose this field to improve safety and security for people to make the transaction easier. The fingerprints are unique for each person. There is no insecurity of losing an ATM card and no requirement to carry an ATM card with you every time. On comparison of different technologies for ATM security, the fingerprint technology operates better and safer than others. These reasons make this mechanism an effortless and secure way of transaction and also maintains a coherent ambience with users and ATM machines. This is the latest technology in electronic cash transactions.

Keywords: Enhancing ATM, biometric based ATM, security system for ATM, and fingerprint-based ATM.

I. INTRODUCTION

Biometrics is a technology that helps to make your data extremely secure, unique all the users by way of their personal physical characteristics. Biometric information can be used to perfectly identify people by using their fingerprint, face, speech, handwriting, or hand geometry and so on. Using biometric identifiers offers several advantages over traditional and current methods. Tokens such as magnetic stripe cards, smart cards and physical keys, can be stolen, lost, replicated, or left behind; passwords can be shared, forgotten, hacked or accidentally observed by a third party . There are two key functions offered by a biometric system. One technique is identification and the other is verification. In this paper, we are concentrating on identifying and verifying a user by fingerprint recognition. A modern ATM is typically made up of the devices like CPU to control the user interface and devices related to transaction, Magnetic or Chip card reader to identify the customer, PIN Pad, Secure crypto-processor generally within a secure cover, Display to be used by the customer for performing the transaction, Function key buttons, Record Printer to provide the customer with a record of their transaction, to store the parts of the machinery requiring restricted access -Vault , Housing for aesthetics, Sensors and Indicators. Fingerprint technology is the most widely accepted and mature biometric method.

II. LITERATURE SURVEY

To implement this concept, we have studied different research works and found following information. For fingerprint recognition, a system needs to capture fingerprint and then follow certain algorithm for fingerprint matching. The research paper. Discusses a minutiae detection algorithm and showed key parameters of fingerprint image for identification. For solving the bugs of traditional identification methods, the author of designs a new ATM terminal customer recognition system. The chip of S3C2440 is used for the core of microprocessor in ARM9 and an improved enhancement algorithm of fingerprint image increase the security of bank account and the ATM machine. For image enhancement, the Gabor filter algorithms and direction filter algorithms are used. In research paper, authors showed that Gabor filters (GFs) play an important role in the extraction of Gabor features and the enhancement of various types of images. For the purpose of enhancing curved structures in noisy images, curved GFs that locally adaptheir shape to the direction of flow can also be used.

Sr.no	Title	Authr	Publication
1.	ATM Terminal Security using Fingerprint Recognition	Vibhav R.Pandit Kirti R. Joshi NarendraG. Bawane	IEEE SYMPOSIUM ON SECURITY AND PRIVACY WORKSHOP (SPW)
2.	Biomatric recognition : Sequrity and privacy concerns	S. Prabhakar, S. Pankanti, and A. K. Jain,	IEEE Security Privacy Mag., vol.
3.	ATM Security Using Fingerprint Biometric Identifer: An	Moses Okechukwu Onyesolu, Ignatius Majesty Ezeani	An Investigative Study", (IJACSA) International Journal of Advanced
	Investigative Study		Computer Science and Applications
4.	Fingerprint Matching	Anil K. Jain, Jianjiang Feng, Karthik Nandakumar	IEEE Computer Society 2010,
5.	Fingerprint Based Security System for ATM	Steffy Mathew, Mohammed Arshak C, Muhammed Ajmal KP, Mohammed Fazil KK, Honey Susan	IRJET Volume: 06 Issue: 06	June 2019

If images of fingerprint are poor-quality images, they result in missing features, leading to the degrading performance of the fingerprint system. Thus, it is very important for a fingerprint recognition system to estimate the quality and validity of the captured fingerprint images. Existing approaches for this estimation are either to use of local features of the image or to use of global features of the image . Traditional fingerprint recognition approaches have demerits of easy losing rich information and poor performances due to the complex type of inputs, such as image rotation, poor quality image enrollment, incomplete input image, and so on. Thus in order to overcome these shortcomings, in research paper , a new fingerprint recognition scheme based on a set of assembled invariant moment (geometric moment and Zernike moment) features to ensure the secure communications is proposed. In paper , fuzzy features match (FFM) based novel method on a local triangle feature is set to match the deformed fingerprints. Fingerprint here is represented by the fuzzy feature set: the local triangle feature set.

III. HARDWARE DESIGN

To implement the proposed security for ATM terminals with the use of fingerprint recognition, we use the different hardware and software platforms. Fig 1 shows the major system modules and their interconnections
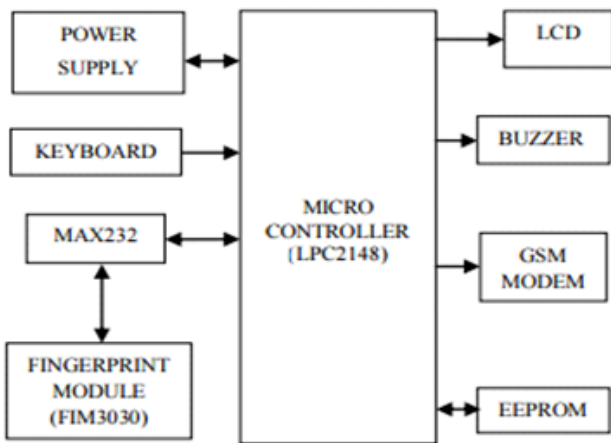

Fig 1: Overview of the system.

IV. PROPOSED SYSTEM

Our system integrates biometric identification into normal, traditional authentication technique use by electronic ATM machines now a days to ensure a strong unbreakable security and non-repudiate transactions. In order to increase the security, we are using the combination of three authentication methods of card, fingerprint, and PIN with voice. Our proposed System makes use of the Finger Print Scanning Technology and voice Recognition Technology to authenticate the user.

Advantages of Proposed System
- Strong Authentication
- Hidden cost of ATM Card Management can be avoided.
- Useful for senior system because no need to carry cards and memorize passwords
- Due to bio metric system no one is able to access the other systems.

- User can change the authentication any time in home branch with few simple procedures.
- It is easy to use.
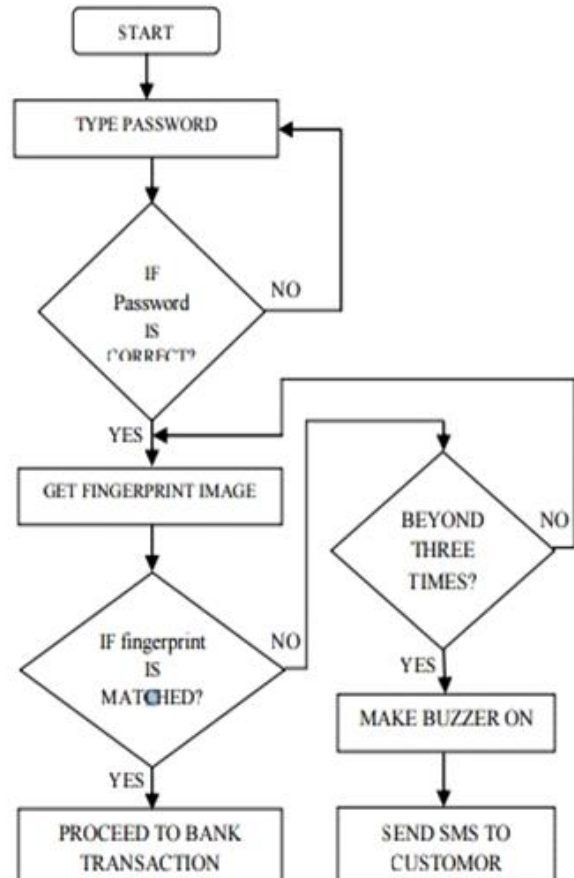- It is used instead of PIN number

V. SOFTWARE DESIGN

Fig 4 : Realization of flow of tasks for the proposed system.

VI. CONCLUSION

After testing the system developed, we came to know that ATM prototype can be efficiently used with fingerprint recognition. Since, password protection is not bypassed in our system, the fingerprint recognition done after it yielded fast response and is found to be of ease for use. Fingerprint images cannot be recreated from templates; hence no one can misuse the system. LPC2148 and FIM3030 provide low power consumption platform. Speed of execution can be enhanced with the use of more sophisticated microcontroller. The same hardware platform can be

used with IRIS scanner to put forward another potential biometric security to the ATMs.

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Movie Recommendation Using Vectorisation

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ABSTRACT

In todays busy world, entertainment has become a necessity for everyone to refresh our energy and mood. Entertainment refreshes our mind and makes us confident for work so that we can perform more enthusiastically. For revitalising ourselves, we can either listen to music or can watch movies of our choice. For this, one can make use of Recommendation Systems which are more reliable, since in searching we require more and more time which one cannot afford to waste. Here I have designed a system for Movie Recommendation. Now, to improve the accuracy of a movie recommender, a Hybrid approach by combining collaborative filtering and content based filtering using Support Vector Machine as a classifier is presented in the proposed methodology and comparative results have been shown which depicts that the proposed approach shows an improvement in the accuracy, quality and scalability of the movie recommendation system than the pure approaches in three different datasets. Hybrid approach helps to get the advantages from both the approaches as well as tries to eliminate the drawbacks of both methods.

Keywords: Recommendation System, Movie Recommendation, SVM, Entertainment.

I. INTRODUCTION

A recommendation system is a model that is commonly used for filtering information. Here it tries to predict the users preferences and provide the optimal suggestions based on their preferences. Now a days, these systems have become popular and are widely used today in areas such as movies, books, videos, clothing, music, restaurants, food, places and many other utilities. These systems collects information according to user's choice or preferences, and then use this information to improve the their suggestions in the future.Movies are now became an important part and parcel in everyones life. There are different types of movies or one can say different genres where most of them are for entertainment, some for educational purposes, animated movies for children while some are horror movies or action films. Movies can be easily differentiated through their genres like drama, comedy, action, thriller, animation etc. Other way to distinguish among movies, they can be either by star-cast, releasing year, director, language etc. While searching movies online, there are millions of movies to search for and finding a movie according to our mood and liking is very difficult task unless we know the name of

movie. But again we avoid watching same movie again and again. Movie Recommendation Systems helps user to search his preferred movies among all of these different types of movies and hence reduce the time for searching.

So it is expected that the movie recommendation system should be very accurate in prediction and should provide us with the recommendation of movies which are almost same or should match closely with our preferences. Now a days, N number of companies are making use of recommendation systems to increase the user interaction and enhance ones experience towards that company or product. Movie Recommendation System is very powerful and important system and has various benefits.

II. METHODS AND MATERIAL

The hybrid approach that is proposed in an integrative method by merging SVM as classifier method and genetic algorithm based weighted similarity measure to construct a movie recommendation system. The proposed movie recommendation system gives finer similarity metrics and quality than the existing Movie recommendation system but the computation time which is taken by the proposed recommendation system is more than the existing recommendation system. This problem can be fixed by taking the clustered data points as an input dataset

The proposed approach is for improving the scalability and quality of the movie recommendation system. We use a Hybrid approach, by unifying Content-Based Filtering and Collaborative Filtering, so that the approaches can be profited from each other. For computing similarity between the different movies in the given dataset efficiently and in least time and to reduce computation time of the movie recommender engine we used cosine similarity measure.

Agile Methodology:

1. **Collecting the data sets:** I have collected all the required data set from Kaggle web site. In this project we require tmdb_5000_movie.csv, tmdb_5000_credits.csv files.
2. **Data Analysis:** This is to make sure that the collected data sets are correct and analysing the data in the csv files that is after checking whether all the column fields are present or not in the data sets.
3. **Algorithms:** In my project, I have only two algorithms one is cosine similarity and other is single valued decomposition are used to build the machine learning recommendation model.
4. **Training and testing the model:** After implementing algorithm, we will have to train the model to get the desired result of the user. I have tested it several times if the model recommends different set of movies to different users.
5. **Improvements in the project:** In the later stage we can implement different algorithms and methods for better recommendation also we can improve the interface.

III. RESULTS AND DISCUSSION

Since this project is movie recommendation system, one can develop a movie recommendation system by using either content based or collaborative filtering or combining both. In our project we have developed a hybrid approach i.e combination of both content and collaborative filtering .Both the approaches have advantages and dis-advantages.in content based filtering the it based on the user ratings or user likes only such kind of movie will recommended to the user. Advantages: it is easy to design and it takes less time to compute Dis-advantages: the model can only make recommendations based on existing interests of the user. other words, the model has limited ability to

expand on the users' existing interests. In Collaborative

filtering the recommendation is comparison of similar users.

Advantages:

No need domain knowledge because the embeddings are automatically learned. The model can help users discover new interests. In isolation, the ML systemmay not know the user is interested in a given item, but the model might still recommend it because similar users are interested in that item.

Dis-advantages:

The prediction of the model for a given (user, item) pair is the dot product of the corresponding embeddings. So, if an item is not seen during training, the system can't create an embedding for it and can't query the model with this item. This issue is often called the cold-start problem. The hybrid approach will resolves all these limitations by combining both contentand collaborative filtering

IV. LITERATURE SURVEY

Over the years, many recommendation systems have been developed using either collaborative, content based or hybrid filtering methods. These systems have been implemented using various big data and machine learning algorithms.

1. Movie Recommendation System by K-Means Clustering AND K-Nearest Neighbour A recommendation system collect data about the user's preferences either implicitly or explicitly on different items like movies. An implicit acquisition in the development of movie recommendation system uses the user's behaviour while watching the movies. On the other hand, a explicit acquisition in the development of movie recommendation system uses the user's previous ratings or history. The other supporting technique that are used in the development of

recommendation system is clustering. Clustering is a process to group a set of objects in such a way that objects in the same clusters are more similar to each other than to those in other clusters. K-Means Clustering along with K-Nearest Neighbour is implemented on the movie lens dataset in order to obtain the best-optimized result. In existing technique, the data is scattered which results in a high number of clusters while in the proposed technique data is gathered and results in a low number of clusters. The process of recommendation of a movie is optimized in the proposed scheme. The proposed recommender system predicts the user's preference of a movie on the basis of different parameters. The recommender system works on the concept that people are having common preference or choice. These users will influence on each other's opinions. This process optimizes the process and having lower RMSE.

2. Movie Recommendation System using Collaborating Filtering: By theory proposed by ChingS eh(Mike)Wu, Deepti Garg, Unnathi Bhandary, Collaborative filtering system will analyse the user's behaviour and preferences and will predict what their liking based on similarity with other users. There are two types of collaborative filtering systems; they are
   a) user-based recommender.
   b) item-based recommender.

3. Use-based filtering: User-based preferences are very common in the field of designing personalized systems. This approach is usually based on liking of the user. The process starts with users giving ratings on scale of to movies. These ratings can be implicit or explicit. Explicit ratings are when these users explicitly rates the item on some scale or indicates a thumbs-up or thumbs-down to the item. More often, explicit ratings are hard to gather as not all user are

interested in providing honest feedbacks. In such scenarios, we usually gather implicit ratings based on ones behaviour. For instance, if a user buys an item or product more than once, then it indicates that it is a positive preference. In context to movie systems, we can imply that if a user watches the entire movie, then he/she has some sort of liking to it. Note there are no clear rules in determining implicit ratings. Next, for each user, we first find predefined number of nearest neighbours. The assumption is that if two users' ratings are highly correlated, then these two users must enjoy similar items and products is used to recommend items to users.

4. Item-based filtering: Unlike the user-based filtering, item-based mainly focuses on the similarity between these item's users like instead of the user themselves. The most similar items are computed ahead of time as then for recommendation, the items which are most similar to the target items are recommended to the user.

V. SYSTEM ANALYSIS AND DESIGN
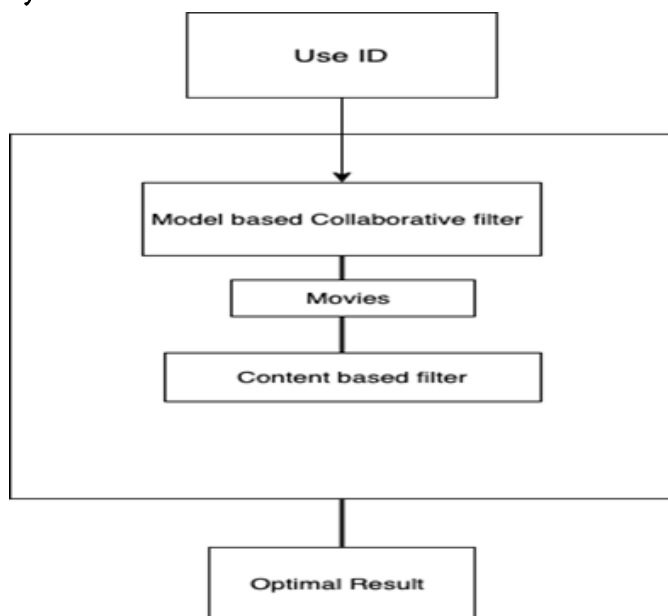
System Architecture:

Fig:-4.1 Architecture for hybrid approach

For each different individual, different set list of movies are recommended. As user login or enters the user id, the system will recommend the set of 10 movies to the particular user by combining the both the set of movie based on the user the hybrid model will recommend the single list of movie to the user.

VI. CONCLUSION

In this project, to improve the scalability, accuracy and quality of movie recommendation system, a Hybrid approach unifying collaborative filtering and content based filtering using Vector classifier and Cosine Similarity is presented in the proposed methodology. Existing pure approaches and proposed hybrid approach is implemented on three different Movie datasets and the results are compared among them. Comparative results depicts that the proposed approach shows an improvement in the accuracy, quality and scalability of the movie recommendation system than the pure approaches. Also, computing timeof the proposed approach is lesser than the other two pure approaches.

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A Survey Paper on Speech Recognition System with Improved CLDNN Structure

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ABSTRACT

In the field of end-to-end speech recognition technology based on deep learning, CLDNN (Convolutional Long Short-Term Memory Fully Connected Deep Neural Network) is a commonly used model structure. The fully connected LSTM (Long Short Term Memory) model is used in the traditional CLDNN structure to process the timing information in the speech signal, which is prone to overfitting during the training process and affects the learning effect. Deeper models tend to perform better, but increasing the model depth by Simply stacking the network layers can cause gradient disappearance, gradient explosion, and "degeneration" problems. Aiming at the above phenomena and problems, this paper proposes an improved CLDNN structure. It combines the residual network and ConvLSTM to establish the residual ConvLSTM model, and replaces the fully connected LSTM model in the traditional CLDNN structure. The model structure solves the problems of the traditional CLDNN model, and can increase the model depth by stacking residual ConvLSTM blocks without gradient disappearance, gradient explosion and degeneration problems, which makes the speech recognition system perform better. The experimental results show that the model structure has a word error rate (WER) decrease of more than 8% in both Chinese and English speech recognition tasks compared to the traditional CLDNN structure.

I. INTRODUCTION

At present, relevant technology companies at home and abroad are constantly developing their own end-to-end speech recognition model.In recent years, thanks to the breakthrough of deep learning, automatic speech recognition technology is also in the stage of rapid development. The end-to-end speech recognition system based on deep learning has surpassed the traditional speech recognition system in popularity in academia, and began to gradually replace the traditional speech recognition system for practical production.Both of them use CLDNN and CTC to build speech recognition models and achieve excellent performance. DFCNN can see very long history and future information by accumulating a lot of these convolution pooling layer pairs, which ensures that DFCNN can express the long term

correlation of voice excellently, and is more robust than RNN network structure. According to an article published by IBM researchers in ICASSP in 2016, using 3x3 convolution cores and multi-layer convolution followed by pooling layers, 14 layers Deep CNN models can be trained. Compared with the traditional CNN usage model, this model can bring about a relative 10.6% decline in WER on the Swatboard data set. The MSRA team proposed the residual network in 2015, which solved the degradation problem as the depth of the model deepened. Residual network has been applied to speech recognition models and proved to be effective. At the icassp conference in 2017, the Google research team presented an acoustic model structure combined with Network-in-Network (NiN), Batch Normalization (BN) and ConvLSTM. In the absence of a language model, the model achieves 10.5% WER in WSJ speech recognition tasks. CLDNN is a popular structure in the end-to-end speech recognition model because of its simple structure and excellent performance. But the common CLDNN model is not deep enough, and the extracted features are not rich enough, so the speech recognition model can not achieve the best effect. The fully connected long-term and short-term memory model (FC-LSTM) can not maintain the structural locality of speech feature space and is easy to over-fit. To solve these problems, Convolutional Long Short-Term Memory (ConvLSTM) is introduced to replace FC-LSTM in the CLDNN model, which improves the problem that the model can not maintain the locality of spatial structure and is easy to over-fit. In order to deepen the depth of the model without degradation, gradient disappearance and gradient explosion, Residual Network (ResNet) is also introduced in some papers. Based on the above improvements, an end-to-end speech recognition model based on CNN-ResConvLSTM-DNN and CTC structure is proposed by researchers. Compared with the CLDNN model, the WER of this model is 8.90% and 8.78% lower in Chinese and English speech recognition tasks.

II. METHODOLOGIES

a. General CLDNN Model

The general structure of the CLDNN network model is shown in Figure 1. The input layer is a frame-level acoustic feature related to the frequency domain. The frame-level feature is input to several layers of CNN for frequency convolution to reduce the frequency domain change.
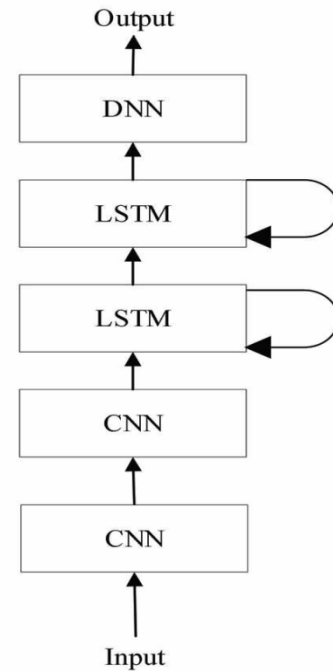

Fig. 1. General Structural Diagram of CLDNN

The output of the last layer of CNN is input to several layers of LSTM to provide context long-term memory. The output of the last layer of LSTM is input to the DNN layer. The purpose is to map the feature space to the output layer which is easier to classify.

b. Improved CLDNN Structure

1. Connectionist Temporal Classification

Traditional acoustic model training is based on frame-level labels with cross entropy criterion, which requires a tedious label alignment process. In order to achieve the goal of end-to-end training, the CTC objective function is used to automatically learn the alignment between network output and label sequence.

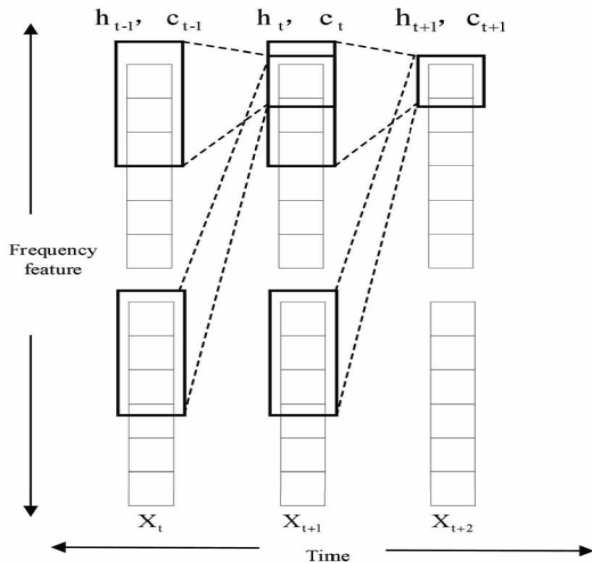## 2. Convolutional LSTMNetwork(ConvLSTM)

fig 2. The Internal Structure of ConvLSTM

The fully connected long-term memory model (FC-LSTM) has proven to be very effective in processing time correlation, but it does not maintain the structural locality of the features and is prone to overfitting. This paper introduces a convolutional long-term memory model, which is an extension of a fully connected long-term and short-term memory model. It has a convolution structure in both input state and state to state transitions. This structure is more capable than ordinary CNN. Time relationship, and it is less likely to overfit than fully connected LSTM

3. Residual Networks

When building a network, the deeper the network depth, the richer the feature hierarchy that can be extracted, so deeper networks can achieve higher levels of features and achieve better results in a given task. However, when constructing deep networks, gradient disappearance, gradient explosion, and degeneration problems are often encountered, resulting in deeper model training difficulties. This paper introduces the residual network structure to construct the deep network, and directly connects the shallow network and the deep network through the skip connection, so that the gradient can be better

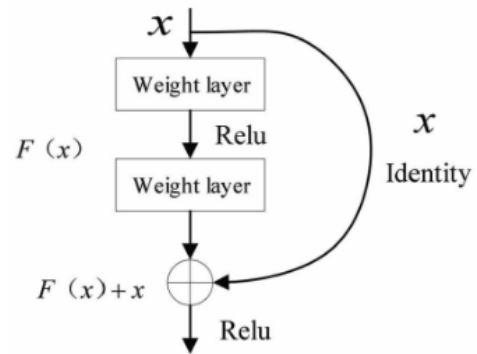transmitted to the shallow layer to solve the above problems.

Fig 3. The Residual Block Structure

4. CNN-ResconvLSTM-DNN structure

In order to stack the multi-layer ConvLSTM to improve the performance of the model without gradient disappearance, gradient explosion and degeneration problems, this paper combines ConvLSTM and residual network structure.
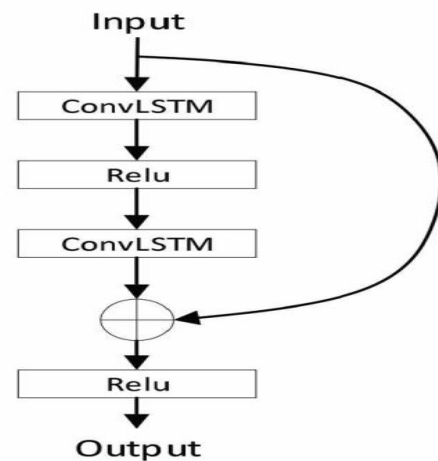

Fig 4. Residual ConvLSTM Block

Based on the above structure, this paper proposes an improvement on the traditional CLDNN structure. Aiming at the problem that the fully connected long-term memory model in the traditional CLDNN model can not maintain the structural locality of the feature space and is easy to over-fitting, the deep residual ConvLSTM network structure composed of multiple residual ConvLSTM blocks is used to replace the traditional CLDNN model. The multi-layer LSTM structure in the model gives the model a better representation of the temporal relationship in the

processing of speech features and is less prone to overfitting. The improved CNN-ResconvLSTM-DNN model can build deeper models by superimposing more residual ConvLSTM without gradient disappearance, gradient explosion and degeneration problems, and can achieve better performance in speech recognition tasks. Its structure is as
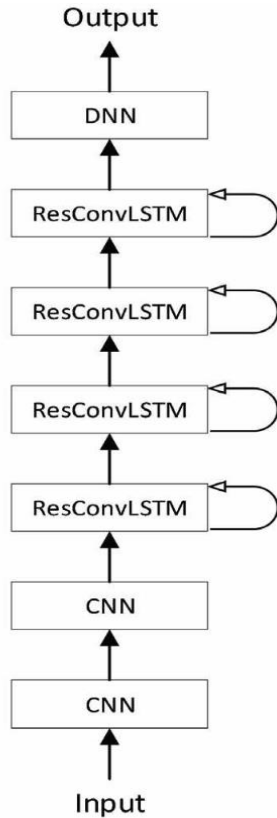

Fig 5. Cnn-Resconvlstm-Dnn Model Structure

III. RESULT AND ANALYSIS

A. Database

They evaluate the model on Chinese and English data sets. The Chinese task selects the THCHS30 corpus and the Aishell-1 corpus for experiments. The corpus collected byTHCHS30 includes a training set with a duration of 25 hours and 10,000 sentences, a development set with 2.14 hours duration, 893 sentences, and a test set with 6.15 hours duration and 2495 sentences. The person involved in the recording is a college student who speaks fluent Mandarin. The sampling frequency is 16 kHz and the sampling size is 16 bits. Aishell-1 collects 178 hours of corpus, covering 11 areas including smart home, driverless,

industrial production, recording in a quiet environment, using three different devices: high-fidelity microphone, Android system phone and IOS The system phone has a sampling frequency of 16 kHz and a sampling size of 16 bits. The English task selects the TIMIT and Switchboard-1 corpus for experiments. The TIMIT corpus contains 6,300 given sentences from 630 people from eight major dialect regions of the United States, with a sampling rate of 16 kHz and a sample size of 16 bits. The official divides 70% of the corpus into training sets and 30% into test sets. The Switchboard-1 corpus collected 260 hours of recordings of 2,400 telephone conversations by 543 callers, with a sampling frequency of 8kHZ and a sampling size of 16 bits.

B. Method

The acoustic features use 40-dimensional MFCC. The number of ConvLSTM nodes in each residual block is 512, the initial learning rate is 0.001, the decay rate of learning rate is 50%, the batch size is 100, and a total o f 1000 training sessions.

C. Result and Analysis

The Chinese test results are shown in Table 1, and the English test results are shown in Table 2

Model structure \ Database	THCHS30	Aishell-1
CNN+LSTM*2+DNN+CTC	28.66	26.27
CNN+ConvLSTM*2+DNN+CTC	37.58	33.55
CNN+ConvLSTM*8+DNN+CTC	25.66	23.36
CNN*2+ConvLSTM*16 （ BN ）+DNN+CTC	27.14	26.84
CNN*2+ResConvLSTM*8+DNN+CTC	**19.76**	**17.59**

1. Performance of model in Chinese Recognition task (WER%)

Model structure \ Database	TIMIT	Switchboard-1
CNN+LSTM*2+DNN+CTC	26.59	25.16
CNN+ConvLSTM*2+DNN+CTC	35.11	32.97
CNN+ConvLSTM*8+DNN+CTC	23.69	23.88
CNN*2+ConvLSTM*16 （BN） +DNN+CTC	23.41	24.79
CNN*2+ResConvLSTM*8+DNN +CTC	**17.81**	**16.92**

2. Performance of model in English Recognition task (WER%)

Chinese Speech Recognition Tasks Use Words To Classify. As Can Be Seen From Table 1, In The Shallow Case, Convlstm Does Not Perform As Well As Fully Connected Lstm. As The Network Model Deepens, Convlstm Performs Better And Better When Convlstm Is Increased To About 16 Layers, The Regularization Layer Is Added To Overcome The Problem Of Gradient Disappearance And Gradient Explosion Generated By The Model. The Network Model Has A "Degraded" Phenomenon, And The Performance Is Not As Shallow As The Model. The Optimal Model Established In This Paper Is A Deep Network Model With Eight Residual Convlstm Blocks, Which Overcomes The Gradient Disappearance, Gradient Explosion And Degeneration Phenomenon Caused By Network Depth. It Has 8.9% And 8.68% of the WER Decline In Two Test Sets Compared With The Traditional Cldnn Model. English Speech Recognition Tasks Use Phonemes For Classification. It Can Be Seen From Table 2 That The Performance Results Of Each Model In The English Recognition Task Are Similar To Those In The Chinese Recognition Task. The Optimal Model Structure Designed In This Paper Has 8.78% And 8.24 % Of Wer Drops On The Two Test Sets Compared With The Traditional Cldnn Model.

IV. CONCLUSION

In view of the problem that the fully connected LSTM in the traditional CLDNN model is easy to over-fitting the model, and the problem of gradient disappearance, gradient explosion and degeneration occurs by simply superimposing the network layer to increase the depth of the model, the following research progresses:

1. The residual ConvLSTM model is used to replace the fully connected LSTM model in the traditional CLDNN model, and an improved CLDNN model structure is proposed.

2. Through the Chinese and English speech recognition experiments, the structure can effectively solve the problems existing in the traditional CLDNN, and can overcome the gradient disappearance, gradient explosion and degeneration problems caused by increasing the depth of the model, and also perform on the speech recognition task. Better than the traditional CLDNN model.

Due to the increase in depth, the training time required for this model is increased compared with the traditional CLDNN. The future research work will focus on further optimizing the model structure, shortening the training time as much as possible without reducing the performance of the model, and striving to achieve or approach the time required for traditional CLDNN training under the same task.

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Extraction of Text from Images of Big Data

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ABSTRACT

Collection of data sets very large and complex that becomes difficult to be processed using on-hand database management tools or traditional data processing applications is called Big Data. Text information in images of big data serves as important clues for many image-based applications. However, locating text from a complex background with multiple colors is a difficult task. The proposed framework in this paper consists of two steps: -1. Colour based partition method. 2. Text line grouping method. Trained classifiers will be used after first step. Canny edge detector is used in first step and text line grouping makes use of Hough transform.

Keywords: Big Data, Color based partition, Canny edge detector, Hough transform, Text line grouping.

I. INTRODUCTION

Big data can be understood as a collection of data sets that are very large and complex which is difficult to be processed using on-hand database management tools or traditional data processing applications.

The data sets that are included here are with sizes beyond the ability of commonly used software tools for capturing, curating, managing, and processing the data within a tolerable elapsed time. The big data target is important due to constant improvement in traditional DBMS technology and new databases like NoSQL and their ability to handle larger amounts of data.

Big data is a huge volume and huge variety of information that require new forms of processing which helps in making decisions and helps in optimization of processes.

Text detection and localization in big data images is necessary for content-based image analysis. This problem is difficult due to the complications in the background, the non-uniform brightness of the image, the varying text font, and their sizes.

As the digital image capturing devices, such as digital cameras, mobile phones are increasing in number text-based image analysis techniques are receiving huge importance in past few years.

Out of all the contents in images text information has drawn lot of attention as it is easily understood by humans and computer. It finds wide scope such as numeric detection in the license plate, sign detection alphanumeric detection on street view images and so on.

The existing methods of text detection and extraction can be roughly categorized into two groups: region-based and connected component (CC)-based.

Region-based methods attempt to detect and extract text regions by texture analysis. Usually, a feature vector extracted from each local region is fed into a classifier for estimating the likelihood of text.

Then merging of neighbouring text regions takes place to generate text blocks. On the other hand, direct segmentation of candidate text components by edge detection or color clustering takes place in CC-based methods. Then pruning of non-text components with heuristic rules or classifiers takes place.

II. METHODS AND MATERIAL

Previous work on text detection and extraction can be classified into two categories. The first category is focused on text region initialization and extension by using distinct features of text characters.

For extraction of candidates of text regions, the text banalization method [2] first assigned a bounding box to the boundary of each candidate character in the edge image and then detected text characters based on the boundary model. Text detection using structural features [3] method calculated ridge points in different scales to describe text skeletons at the level of higher resolution and text orientations at the level of low resolution. Text Segmentation using stroke filter method [4] used a stroke filter to extract the stroke-like structures.

Text extraction from colored book covers [5] method combined a top– bottom analysis based on color variations in each row and column with a bottom– top analysis based on region growing by color similarity. Morphological text extraction method [6] designed robust morphological processing. Text localization enhancement and banalization method [7] improved Otsu' s method for banalization of text regions from background, after which was a set of morphological operations to reduce noise and correct classification errors. For grouping together text characters and removing out false positives, these algorithms employed some conditions involved in

character, such as the character should have a minimum size x and a maximum size y, brightness between character strokes and background. But, these algorithms usually fail to remove the background noise resulting from wire mesh, atmospheric distortion, or other background objects.

For reducing background noise, the algorithms in the connected component method first do splitting of images to blocks and then merge the blocks verified by the features of text characters.

Edge based technique from video frames [8] applied different edge detectors for searching of blocks containing the most apparent edges of text characters. Caption localization method [9] used a fusion strategy which combined color detectors, detectors in texture, contour, and temporal invariance, respectively. Sign detection with conditional random fields [10] method used a group of filters to analyze texture features in each block and joint texture distributions between adjacent blocks by using conditional random field.

One drawback here is that they have been partitioning images without any content in it and dividing the image spatially into blocks of equal size before grouping is performed. Noncontact- based image partition will usually break up text characters or text strings into fragments which fail to satisfy the texture constraints.

Thus, Laplacian method for text detection [11] performed line-by-line scans in edge images to combine rows and columns with high density of edge pixels into text regions. Adaptive algorithm for text detection [12] performed heuristic grouping and did layout analysis to cluster edges of objects in the images having same color, co-ordinates and size into text regions. However, these algorithms are not comfortable with slanted text lines.

A. Big Data Analysis Here the Google' s API (Application Programming Interface) will be included. There are several Google APIs here. The Google Maps API, Google Places API,

Google Street view API, Google Earth API and so on.

The images related to this paper will be taken from Google Street view API. There are millions of photos taken in various directions of various streets of various cities, which acts as a Big Data here, that is provided by the Google API. After the registration process in Google Street view API, the user gets the key. By properly specifying the required parameters and optional parameters in the URL, the user can obtain the different street view images, which are formed at different combinations of latitude and longitude values.

The required parameters are size (size specifies the output size of the image in pixels.), loc (location can be either a text string or a lat/lng value), sensor (sensor indicates whether or not the request came from a device using a location sensor (e.g. a GPS) to determine the location sent in this request). The optional parameters include heading (heading indicates the compass heading of the camera), fov (default is 90) determines the horizontal field of view of the image, pitch (default is 0) specifies the up or down angle of the camera relative to the Street View vehicle, key (optional) identifies the user's application for quota purposes.

Figure 1. Street view Images containing text

Now the various street view images obtained are a part of big data of the streets of any city. From these street view images, the text will be highlighted and shown. The text could be from shops or from banners or the street names located from the street view images. That text will be highlighted and shown. This would be helpful for night driving purposes. This could be a real time application of this project. B. Applying Filters There are three types of filters: -

I. Averaging filters (low pass filter) This filter consists of a 3*3 or 5*5 mask and it is placed on the image starting from top left corner. Then it is moved rightwards. Here average of pixels of the original image matrix is taken and the centre value of original image is changed. This process is repeated for all pixels. The corner pixels of original image remain the same

II. Median filter (low pass filter) The averaging filter removes the noise by blurring it, till it is no longer seen. But it also blurred the edges. Bigger the averaging mask more is the blurring. When the image contains salt and pepper noise and if we use the averaging filter, to remove the same, it will blur the noise, but it would also damage the edges. Hence we need to eliminate the salt and pepper noise, we work with a nonlinear filter, known as median filter, or it is called an order statistic filter. Because their response is based on the ordering of pixels, contained within the mask. iii. Adaptive filter (Weiner filter) It eliminates the low frequency regions while enhancing the high frequency components.

Figure 2a. Image without applying filter

Figure 2b. Image after applying filter

B. Now the image processing consists of the following stages: -

1. Color based Partition Method in this method, partitioning of the image has been done on the basis of color. That is all pixels having same color or pixels having small variations in their color component will be placed in one cluster. For this canny edge detector has been used, which detects all the edges of the image. For this first the RGB image consisting of three dimensions is converted to grayscale image which consists of two dimensions.

The three dimensions of the RGB image consist of the row, column and the color dimension for red, green and blue color pixels. The binary image is of two dimensions. Here there are only two color pixels that are black and white. A one value represents a black color pixel and a zero value represents a white color pixel. Now the canny edge detector is applied to this RGB image and a binary image consisting of edges in white color and non-edge pixels in black color is obtained.

Figure 3a. RGB Image

Figure 3b. Output Image of Canny edge detector

Now the scatter plot of non-edge pixels is shown below. In the scatter plot there are three axes. One for red, another for green and another for blue. Now the non-edge pixels of the original image are distributed in the scatter plot according to their red, green and blue composition.
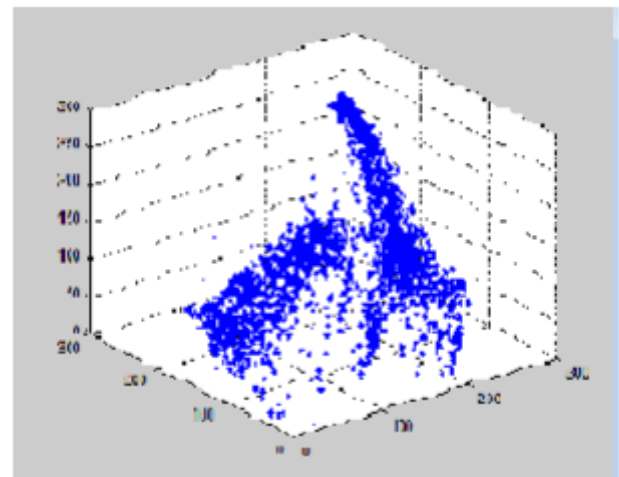

Figure 4. Scatter plot of non-edge pixels

After this the k-means clustering is performed on the non-edge pixels and they are placed into clusters. Now the k-means clustering method calculates the distance among the pixels. Here for color based partition, the distances between the color values are calculated to decide which pixels are in one cluster. Distance calculating methods used are Euclidean distance method and city block distance method. After the clusters are formed, they are plotted using the silhouette plot method, which is shown below.
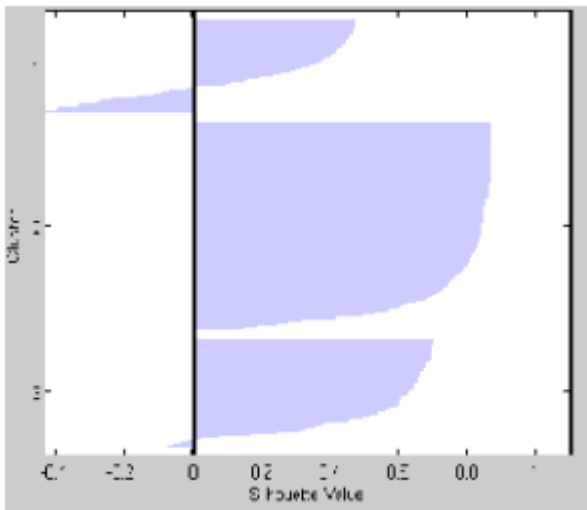
Figure 5. Silhouette plot of clusters of non-edge pixels

Now this plot shows three clusters. The values above one on the positive side shows those pixels which are well separated from other clusters. And the pixels which are having zero value represent those pixels on the boundary of two clusters. And the negative value pixels represent those pixels which are wrongly represented in other clusters.

Purpose of color based partition: -

a. K-means clustering represents all the pixels of the image, in terms of red, green and blue colors. Means by doing this, the total number of colors in the original image is reduced or similar color pixels are brought together into one cluster.

b. The pixels having slight variations in their color are brought into one cluster. So original image is simplified by repainting it with colors formed by the clusters. After color based partition classifiers will be applied. The classifiers are used to detect whether the above partitions contain text in them or not. Because of classifiers it is sure that certain partitions will contain text definitely and by applying classifiers time required may be more. But then grouping method can be applied to those only, which contain text in them. So here efficiency is improved. So at the cost of time, efficiency may be improved. Time and efficiency go hand in hand.

2. Text Line Grouping Method This method uses the fact that all the characters of one text are in one single line and they are placed at equal distances from one another. It calculates the centroids of each character and finds whether the centroids of those characters fall in one single straight line or not. For this it uses the though transform method

III. CONCLUSION

In this paper, first Big Data analysis has been done by using Google Apis. Then filters have been applied to the images for obtaining noiseless images. Then two methods have been applied in the image processing stage. The first method is Color based Partition. Here canny edge detector and k-means clustering have been performed. After this the trained classifiers are applied on the partitions to determine whether each cluster contains text or not. Then the text grouping method uses Hough transform to detect the text. By applying trained classifiers either time or efficiency will be improved. The future scope will be to develop a project which will be a real time application that can be used in vehicles which will highlight the text from streetview images captured online, that will be especially useful during night driving.

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AI Swarm Drones

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ABSTRACT

This paper proposes Idea and importance of a swarm of drones. In the study, inspired by the swarms in nature, drones look for the target by sensing the surrounding and communicating with each other for collision avoidance and effective co-ordination. The position for each drone is implemented using the particle swarm optimization algorithm as the swarm intelligence (A swarm-based optimization algorithm), as well as a model for the drones to take the real-world environment into consideration. In addition, the system is processed in real time along with the movements of the drones. The effectiveness of the proposed system was verified through repeated test simulations studied from various studies, including a benchmark function optimization and air pollutant search problems. The results show that the proposed system is highly practical, accurate, and robust.

Keywords: Swarm, Technology, PSO.

I. INTRODUCTION

The demand for autonomous aerial vehicles (AAV), commonly called drones, has largely increased in recent years due to their compactness and mobility, which enable them to carry out various tasks that are economically inefficient or potentially dangerous to humans effectively. For example, it is hard for humans to explore rugged mountain terrains, flooded areas, war zones or air pollution regions without drones. they have been used in various search applications, such as industrial building inspections, search and rescue operations and post-disaster area exploration autonomously. The search applications have one important factor in common search efficiency in quick time.

Previous research has focused on improving the stand-alone performance andautomation of each drone, such as localization accuracy, communication robustness, and various sensors but not on co-ordination with multiple drones. However, it is relatively expensive to handle a group of such high-end drones. Additionally, it takes a long time for a single drone to cover a broad search space. Thus, previous studies showsthe decomposition of the search space or control a number of low-cost drones into several formation patterns. The previous research successfully demonstrating the feasibility of search-by-drones, there is still room for improvement. The Important things, time and cost, it is not the best strategy to thoroughly scan every available location in the search space. so, it is more effective for drones to

conduct a brief survey first and successively progress to better locations by investigating the evidence of the surroundings and communicating with each other. We can find examples of this behaviour from nature, such as ants, bees, fish, birds, and so on. They show cooperative and intelligent behaviors to achieve complex goals, which is called swarm intelligence (SI). In the area of multi-robot path planning in 2-D space, there have been several studies of approaches based on swarm intelligence. However, there is difference between mobile robots in 2-D space and drones in 3-D space. Whereas mobile robots can stand stably without any posture control and only need to be controlled by position feedback, the postures and positions of drones can be controlled based on a certain dynamic model in order to hover stably. Therefore, in this paper, swarm system for quadcopter drones is proposed by integrating the position update rule of the swarm intelligence algorithm (PSO). In the proposed system, The Study of a swarm of more than 10 drones was employed for a search mission. The swarm was controlled by a position update mechanism which included the swarm intelligence inspired from a well-known swarmbased optimization algorithm (PSO).

II. LITERATURE SURVEY

The Defense Advanced Research Projects Agency (DARPA) is experimenting with using a swarm of autonomous drones and ground robots to assist with military missions. In a video of a linear algorithm provides an effective method for maneuvering individuals in a swarm. By keeping velocity constant, the swarm of UAVs are realistically simulated. Recent test, DARPA showed how its robots analyzed two city blocks to find, surround, and secure a mock city building.

DARPA conducted its test back in June 2019, in Georgia, featuring both drones and groundbased robots. The demonstration was part of DARPA's offensive Swarm-Enabled Tactics (OFFSET) program,

which is designed to eventually accompany small infantry units as they work in dense urban environments, and could eventually scale up to 250 drones and ground robots.

The Swarming Algorithms are used in the drones for the automated operations. The Particle Swarm Optimization Algorithm (PSO) and the Linear Optimization Algorithm are highly used algorithms today. PSO is focused on minimizing error between the drones and the target but changes the speed of UAVs. In addition to changing the drone's direction to head toward the target. A linear algorithm provides an effective method for maneuvering individuals in a swarm. When applying PSO to real flying objects, the constant speed changes are the main drawback. Actual UAVs should maintain a constant velocity to operate in a stable and controlled manner to prevent chaos and collisions.

Compared to the PSO, the PSO linear algorithm produces the most realistic results. The swarm does not have to move synchronously, and the UAVs move toward the target by minimizing the error in their position from the target. The error is minimized in a linear fashion since the velocity of the UAV remains constant. Linearity produces great results, and the simulated UAVs are able to find the target quickly and efficiently. The program also handles the UAVs as objects that occupy space. Each UAV has a threshold boundary distance, so they will avoid each other if they get too close. These movements allow the swarm to move toward a destination in space without collisions.

III. DESCRIPTION

There are three phases of operation. After take-off, they start a spread out phase for a fixed period of time. This first stage is used to place the drones in a good positions to start exploring the environment. This spread out of the drones in the environment is achieved by maximizing the minimum distance between them while at the same time flying within a

fixed radius of the take-off area, it can obviously be implemented in a distributed and local way. Once the spread out stage finishes, the drones start the monitoring phase. The behavior of the drones continues to be the same as in the spread-out phase, they try to maximize the minimum distance between them while moving, but in this state they are also sensing the environment seeking desired object's values above a fixed alarm threshold. Also during this stage, the drones start broadcasting their sensed data through the communications channel so other agents of the system can receive it (at least those that are close enough to it). As soon as one of the drones detects an object above the threshold it enters the search stage. In this stage the plane starts collaborating with surrounding drones in order to find the object. As each plane is receiving the data sensed and broadcast by others surrounding it, it uses the data coming from the N nearest neighbors and its own sensing data to select a promising direction for continuing its search.

IV. ALGORITHM

Particle Optimization Algorithm:

Srep 1:   Start.
Srep 2:   Initialize the drone population by random positioning and velocity vectors.
Srep 3:   Evaluate the best position of each drone.
Srep 4:   Evaluate whether each drone's position is better than previous position.
Srep 5:   If current position is true keep the position.
Srep 6:   If false assign new best position to the drone.
Srep 7:   Compute the velocity of each drone.
Srep 8:   Update the position each drones for searching desired object.
Srep 9:   Check whether the target found if not restart from.
Srep 10: End.

V. CONCLUSION AND RECOMMENDATIONS

In the near future, our airspace will be populated by swarms of aerial robots, performing complex tasks that would be impossible for a single vehicle. This papers reviews work that could provide the fundamental algorithmic, analytic, perceptive, and technological building blocks necessary to realize this future. The research issues discussed in this survey paper span hierarchical integration of swarm synchronization control with safe trajectory optimization and assignment, and cooperative estimation and control with perception in the loop, offering the readers a broad perspective on aerial swarm robotics. In addition, we emphasize the importance of the three way tradeoff between computational efficiency, stability and robustness, and optimal system performance. To truly address this tradeoff, we argue that it is imperative to advance beyond methods that are currently being used in autonomous drones and general swarm robotics in order to realize long-term autonomy of aerial swarm systems. One important area of further study is to develop learning and decision-making architectures that will endow swarms of aerial robots with high levels of autonomy and flexibility. We argue that such architectures will ultimately lead to reduced risk and cost as well as long-term autonomous operations. To be successful, any such architecture must provide the framework for reasoning about the wide-ranging nature of uncertainties and modeling errors, ranging from known unknowns (e.g., sensor and actuator noise) to unknown unknowns (e.g., wind disturbance, hardware failures). All of these impact the safety and robustness of algorithms and system-level functions of swarm behaviors. Furthermore, computation and communication within a swarm must be fast enough to ensure stability under model changes and mission specifications at the various timescales and bandwidths within the system. For aerial swarms systems with highly uncertain environmental models, the role of highlevel planning, decision making, and

classification in flight in conjunction with low-level swarm control and estimation systems can be characterized mathematically through the properties of stability, convergence, and robustness. Various aspects of the swarm decision-making, control, and estimation should come in different timescales and hierarchical levels to exploit scalability and computational efficiency. An example of such characterization on stability would be a mathematical theorem correlating desired models and parameters to be updated on-line as well as their update or learning rates, to functions of various system features, such as sampling rate, swarm control law update rate, bandwidth of dynamics and communication, dimensions of dynamic systems, and properties of environmental uncertainties. This should also provide a guideline as to gauge how efficient and robust a particular swarm algorithm or system-level architecture is at achieving autonomy in aerial swarms. For example, distributed optimal planning requires robots to share their optimal solutions with their neighbors, up to a certain time horizon. Adding simultaneous target or task allocation to this problem further increases the required size of communicated information. It would be beneficial to combine such methods with on-line adaptation methods that can forecast the neighbors' future behavior and would, in turn, effectively reduce communication requirements. The key idea is again combining formal mathematical analysis with the hierarchical and multi-modal decomposition discussed earlier. Another important area is to establish rigorous methodologies for fault detection, isolation, and recovery to handle various potential faults occurring at sub-system levels, individual system levels, and swarm levels. As swarms are deployed to a greater extent for aggressive or agile autonomous missions, it will become necessary to create the means to exert some form of adversarial control on swarms. Such counter-swarm techniques can also be used for civilian purposes, such as maintaining law and order and herding birds and animals away from environmental hazards such as floods or wildfires.

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Car Acceptability Prediction System Using Machine Learning

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ABSTRACT

A car price prediction has been a high-interest research area, as it requires noticeable effort and knowledge of the field expert. Considerable number of distinct attributes are examined for the reliable and accurate prediction. To build a model for predicting the price of used cars in Bosnia and Herzegovina, we applied three machine learning techniques (Artificial Neural Network, Support Vector Machine and Random Forest). However, the mentioned techniques were applied to work as an ensemble. The data used for the prediction was collected from the web portal autopijaca.ba using web scraper that was written in PHP programming language.

Respective performances of different algorithms were then compared to find one that best suits the available data set. The final prediction model was integrated into Java application. Furthermore, the model was evaluated using test data and the accuracy of 87.38% was obtained.

Keywords – car price prediction, support vector machines, classification, machine learning

I. INTRODUCTION

Car price prediction is somehow interesting and popular problem. As per information that was gotten from the Agency for Statistics of BiH, 921.456 vehicles were registered in 2014 from which 84% of them are cars for personal usage [1]. This number is increased by 2.7% since 2013 and it is likely that this trend will continue, and the number of cars will increase in future. This adds additional significance to the problem of the car price prediction.

Accurate car price prediction involves expert knowledge, because price usually depends on many distinctive features and factors. Typically, most significant ones are brand and model, age, horsepower and mileage. The fuel type used in the car as well as fuel consumption per mile highly affect price of a car due to a frequent changes in the price of a fuel. Different features like exterior colour, door number, type of transmission, dimensions, safety, air condition, interior, whether it has navigation or not will also influence the car price. In this paper, we applied different methods and techniques in order to achieve higher precision of the used car price prediction.

This paper is organized in the following manner:

Section II contains related work in the field of price prediction of used cars. In section III, the research methodology of our study is explain. Section IV

elaborates various machine learning algorithms and examine their respective performances to predict the price of the used cars. Finally, in section V, a conclusion of our work are given, together with the future works plan.

II. RELATED WORK

Predicting price of a used cars has been studied extensively in various researches. Listian discussed, in her paper written for Master thesis [2], that regression model that was built using Support Vector Machines (SVM) can predict the price of a car that has been leased with better precision than multivariate regression or some simple multiple regression. This is on the grounds that Support Vector Machine (SVM) is better in dealing with datasets with more dimensions and it is less prone to overfitting and underfitting. The weakness of this research is that a change of simple regression with more advanced SVM regression was not shown in basic indicators like mean, variance or standard deviation.

Another approach was given by Richardson in his thesis work [3]. His theory was that car producers produce more durable cars.

Richardson applied multiple regression analysis and demonstrated that hybrid cars retain their value for longer time than traditional cars. This has roots in environmental concerns about the climate and it gives higher fuel efficiency.

Wu et al. [4] conducted car price prediction study, by using neuro-fuzzy knowledge-based system. They took into consideration the following attributes: brand, year of production and type of engine. Their prediction model produced similar results as the simple regression model. Moreover, they made an expert system named ODAV (Optimal Distribution of Auction Vehicles) as there is a high demand for selling the cars at the end of the leasing year by car dealers. This system gives insights into the best prices for vehicles, as well as the location where the best price can be gained. Regression model based on k-nearest neighbour machine learning algorithm was used to predict the price of a car. This system has a tendency to be exceptionally successful since more than two million vehicles were exchanged through it [5].

Gonggie [6] proposed a model that is built using ANN (Artificial Neural Networks) for the price prediction of a used car. He considered several attributes: miles passed, estimated car life and brand. The proposed model was built so it could deal with nonlinear relations in data which was not the case with previous models that were utilizing the simple linear regression techniques. The non-linear model was able to predict prices of cars with better precision than other linear models.

Furthermore, Pudaruth [7] applied various machine learning algorithms, namely: k-nearest neighbours, multiple linear regression analysis, decision trees and naïve bayes for car price prediction in Mauritius. The dataset used to create a prediction model was collected manually from local newspapers in period less than one month, as time can have a noticeable impact on price of the car. He studied the following attributes: brand, model, cubic capacity, mileage in kilometres, production year, exterior colour, transmission type and price. However, the author found out that Naive Bayes and Decision Tree were unable to predict and classify numeric values. Additionally, limited number of dataset instances could not give high classification performances, i.e. accuracies less than 70%.

Noor and Jan [8] build a model for car price prediction by using multiple linear regression. The dataset was created during the two- months period and included the following features: price, cubic capacity, exterior colour, date when the ad was posted, number of ad views, power steering, mileage in kilometre, rims type, type of transmission, engine type, city, registered city, model, version, make and model year. After applying feature selection, the authors considered only engine type, price, model year and model as input features. With the given

setup authors were able to achieve prediction accuracy of 98%.

In the related work shown above, authors proposed prediction model based on the single machine learning algorithm. However, it is noticeable that single machine learning algorithm approach did not give remarkable prediction results and could be enhanced by assembling various machine learning methods in an ensemble.

III. MATERIALS AND METHODS

Approach for car price prediction proposed in this paper is composed of several steps, shown in Fig. 1.
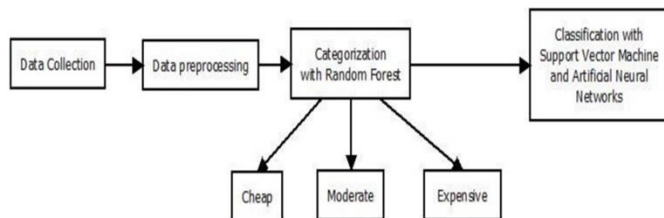
Data is collected from a local web portal for selling and buying cars autopijaca.ba [9], during winter season, as time interval itself has high impact on the price of the cars in Bosnia and Herzegovina. The following attributes were captured for each car: brand, model, car condition, fuel, year of manufacturing, power in kilowatts, transmission type, millage, colour, city, state, number of doors, four wheel drive (yes/no), damaged (yes/no), navigation (yes/no), leather seats (yes/no), alarm (yes/no), aluminium rims (yes/no), digital air condition (yes/no), parking sensors (yes/no), xenon lights (yes/no), remote unlock (yes/no), electric rear mirrors (yes/no), seat heat (yes/no), panorama roof (yes/no), cruise control (yes/no), abs (yes/no), esp (yes/no), asr (yes/no) and price expressed in BAM (BosnianMark).

Since manual data collection is time consuming task, especially when there are numerous records to process, a "web scraper" as a part of this research is created to get this job done automatically and reduce the time for data gathering. Web scraping is well known technique to extract information from websites and save data into local file or database.

Manual data extraction is time consuming and therefore web scrapers are used to do this job in a fraction of time. Web scrapers are programmed for specific websites and can mimic regular users from website's point of view.

After raw data has been collected and stored to local database, data pre-processing step was applied. Many of the attributes were sparse and they do not contain useful information for prediction. Hence, it is decided to remove them from the dataset. The attributes "state", "city", and "damaged" were completely removed.

The collected raw data set contains 1105 samples. Since data is collected using web scraper, there are many samples that have only few attributes. In order to clean these samples, PHP script that is reading scraped data from database, perform cleaning and saves the cleaned samples into CSV file. The CSV file is later used to load data into WEKA, software for building machine learning models [10].

After clean-up process, the data set has been reduced to 797 samples. In particular, all brands that have less than 10 samples and where the price is higher than 60 000 BAM were removed due to the

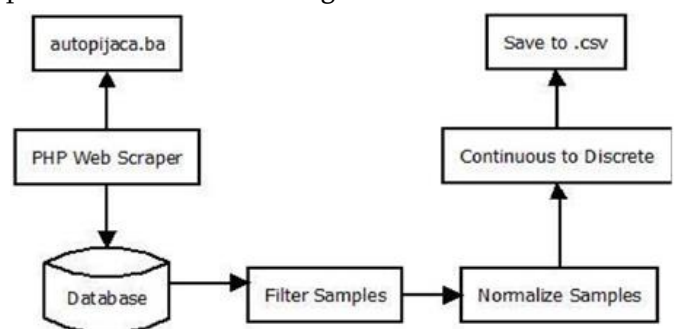skew class problem. The whole dataset creation process is shown in the Fig. 2

Figure 2. Data gathering and transformation workflow diagram

The colour of the cars was normalized into fixed set of 15 different colours. Continuous attributes such as "millage", "year of manufacturing", "power in kilowatts" and "price" are converted into categorical values using predefined cluster intervals. The millage is converted into five distinct categories, the year of

manufacturing has been converted into seven categories and the power in kilowatts is converted into eleven categories. The price attribute has been categorized into 15 distinct categories based on price range. These categories are shown in Table 2 and similar principle was applied to other attributes. This data transformation process converted regression prediction machine learning problem into classification problem.

Table 2. Price classification based on price ranges

From	To	Class
500	2000	500-2000
2000	3500	2000-3500
3500	5000	3500-5000
5000	6500	5000-6500
6500	8000	6500-8000
8000	9500	8000-9500
9500	11000	9500-11000
11000	14000	11000-14000
14000	17000	14000-17000
17000	20000	17000-20000
20000	25000	20000-25000
25000	30000	25000-30000
30000	60000	30000-60000

IV. MODEL IMPLEMENTATION AND EVALUATION

Single machine learning classifier approach that has been used in all previous researches was also tested in this research. The whole data set collected in this research has been split into training (90%) and testing (10%) subsets and Artificial Neural Network, Support Vector Machine and Random Forest classifiers models were built.

Random forest (RF) also known as random decision forest belongs to the category of ensemble methods. RF can be used for classification and regression problems. The algorithm was developed by Ho as an improvement for overfitting of the decision tree algorithms [11]. Artificial Neural Networks is the machine learning model that tries to solve problems in the same way as the human brain does. Instead of neurons, the ANN is using artificial neurons also

known as perceptron. In the human brain, neurons are connected with axons while in ANN the weighted matrices are used for connections between artificial neurons.

Information travels through neurons using connections between them, from one neuron information travels to all the neurons connected to it. Adjusting the weights between neurons system can be trained from input examples [12]. Support Vector Machine can be used for solving classification and regression problems. For input data set, the SVM can make a binary decision and decide in which among the two categories the input sample belongs. The SVM algorithm is trained to label input data into two categories that are divided by the widest area possible between categories [12]. In cases when input data is not labelled, SVM algorithm cannot be applied. For unlabelled data, it is necessary to apply unsupervised learning method and SVM has its implementation called Support Vector Clustering (SVC) [13][14].

Table 3. Single classifier approach accuracy results

Classifier	Accuracy	Error
RF	41.18%	8.04%
ANN	42.35%	7.05%
SVM	48.23%	10.55%

Results shown in Table 3. confirm that single machine learning classifier approach is not reliable for prediction of car prices. Therefore, in this paper ensemble method for car prices prediction was proposed. To apply ensemble of machine learning classifiers a new attribute "price rank" with values: cheap, moderate and expensive has been added to the data set. This attribute divides cars into three price categories: cheap (price < 12 000 BAM), moderate (12 000 BAM <= price < 24 000 BAM) and expensive (24 000 BAM <= price).

Ensemble method combines three machine learning algorithms that were applied in the first experiment as single classifiers: RF, SVM, and ANN.

Random Forest algorithm was applied on the whole dataset, to test how accurately the classifier can categorize samples into cheap, moderate and expensive car classes. RF is a meta estimator that fits a number of decision tree classifiers on various sub-samples of the dataset and use averaging to improve the predictive accuracy and control over- fitting [15]. The following features were used to build model: brand, model, car condition, fuel, age, kilowatts, transmission, miles, color, doors, drive, leather seats, navigation, alarm, aluminium rims, digital AC, manual AC, parking sensors, xenon, remote unlock, seat heat, panorama roof, cruise control, abs, asr, espand price.

Before model training step, numeric attribute price was converted into nominal classes shown in Table 4.

Table 4. Nominal categories of car price attribute

From	To	Class
0	12000	Cheap
12000	24000	Moderate
24000	…..	Expensive

Then, RF classifier is applied, and results are obtained (Table 5.).

Table 5. Classification results with RF classifier

Type of evaluation	% Of correctly classified
Cross validation with 10 folds	85.82
90% percentage split	88.75

Both classifiers, SVM and ANN are further applied to each price category dataset: cheap, moderate and expensive cars datasets.

Applying classification on cheap dataset using SVM and ANN algorithms

Cheap dataset was divided into 2 nominal classes, shown in Table 6.

Table 6. Nominal classes in Cheap dataset

From	To	Class
0	6000	0-6000
6000	12000	6000-12000

In total, 230 samples of Cheap dataset were input to SVM and ANN algorithms.

After running SVM and ANN on given dataset, following results were obtained:

Table 7. Accuracy results for SVM and ANN on Cheap dataset

Type of evaluation	SVM	ANN
Cross Validation with 10 folds	86.96	83.91
90% percentage split	86.96	73.91

Applying Classification on Moderate dataset using SVM and ANN algorithms

The model is further trained on the Moderate dataset. For this purpose, attribute price is ranked into 2 classes, shown in Table 8.

Table 8. Nominal classes in Moderate dataset

From	To	Class
12000	15000	12000-18000
18000	21000	18000-24000

After applying Multilayer Perceptron algorithm on dataset, we got the following results.

Table 9. Accuracy results for SVM and ANN on Moderate dataset

Type of evaluation	SVM	ANN
Cross Validation with 10 folds	78.65	76.41
90% percentage split	83.33	86.11

Applying Classification on Expensive dataset using SVM algorithm

As for the previous datasets, the model is trained on the Expensive dataset. For this purpose, the attribute price is grouped into 2 classes.

Table 10. Nominal classes for Expensive dataset

From	To	Class
24000	28000	24000-32000
32000	36000	32000- .....

SVM and ANN algorithms are further applied to Expensive dataset and results are obtained

Table 11. Accuracy results for SVM and ANN on Expensive dataset

Type of evaluation	SVM	ANN
Cross Validation with 10 folds	79.72	75
90% percentage split	90.48	85.71

After models are built, they have been assembled into the final prediction system, shown in Fig. 3. For the case of 90% dataset split, SVM achieved the highest accuracy in Cheap and Expensive subsets, while ANN performed better in Moderate subset
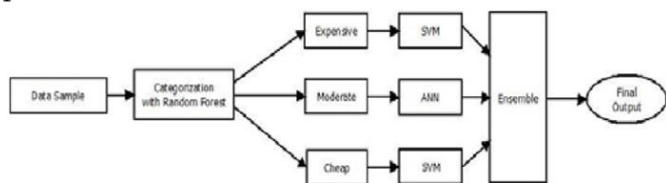
Figure 3. Prediction model for 90% split case

The final prediction system has been incorporated into the Java swing GUI application for the car price prediction. The simple application GUI, shown in Fig. 4. enables potential car buyers to estimate the price of the desired car.

The proposed prediction model has been evaluated on the test subset and model achieved overall accuracy of 87.38%. This proves that combination of multiple machine learning classifiers strengthens the classification performance overall.
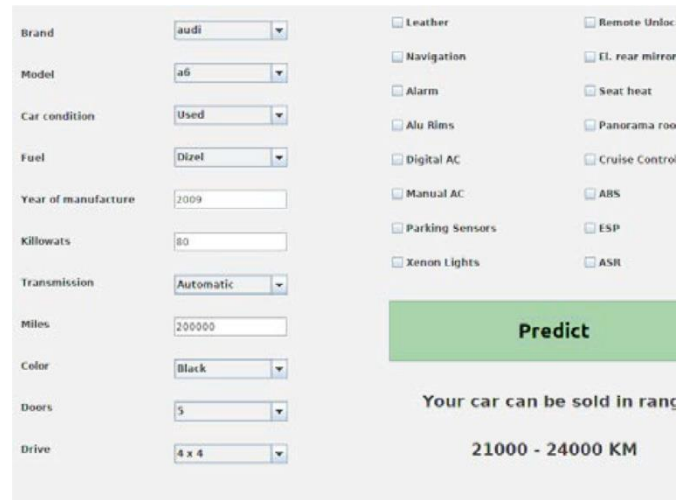
Figure 4. Graphical user interface of the Java applicat for car price prediction

V. CONCLUSION

Car price prediction can be a challenging task due to the high number of attributes that should be considered for the accurate prediction. The major step in the prediction process is collection and pre-processing of the data. In this research, PHP scripts were built to normalize, standardize and clean data to avoid unnecessary noise for machine learning algorithms.

Data cleaning is one of the processes that increases prediction performance, yet insufficient for the cases of complex data sets as the one in this research. Applying single machine algorithm on the data set accuracy was less than 50%. Therefore, the ensemble of multiple machine learning algorithms has been proposed and this combination of ML methods gains accuracy of 92.38%. This is significant improvement compared to single machine learning method approach. However, the drawback of the proposed system is that it consumes much more computational resources than single machine learning algorithm.

Although, this system has achieved astonishing performance in car price prediction problem our aim for the future research is to test this system to work successfully with various data sets. We will extend our test data with eBay [16] and OLX [17] used cars data sets and validate the proposed approach.

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Web Scraping For Book Recommendation System

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ABSTRACT

The purpose of a book recommendation system is to predict buyer's interest and recommend books to them accordingly. Personal recommendation systems have been emerged to conduct effective search which mine related books based on user rating and interest. This paper proposed an effective system for recommending books for online users by providing the data which not only counts the ratings but also the users vote for the best books of 2022 along with their genre by using web scraping. Web scraping, also known as web extraction or harvesting, is a technique to extract data from the World Wide Web (WWW) and save it to a file system or database for later retrieval or analysis. Rather than using big data, smart data would work much better. The proposed system used Beautiful Soup designed and selenium web drivers for scraping HTML documents. Convenient Pythonic functions for navigating, searching, and modifying a parse tree; a toolkit for decomposing an HTML file and extracting desired information via html parser. The required data was successfully scraped or extracted and saved in csv file. Further a book recommendation model needs to be build using this dataset.

Keywords:

Web scraping, Beautiful Soup, Selenium, Web Drivers, HTML Parser, Data Extraction.

I. INTRODUCTION

Web scraping is a method used to get great amounts of data from websites and then data can be used for any kind of data manipulation and operation on it.

For this technique, we use web browsers. You usually do not have the built-in option to get that data you want. That is why we use Web Scraping to automate the process of getting that data and not having to do it manually. Web Scraping is the technique of automating this process so that instead of manually copying the data from websites.

This is accomplished either manually by a user or automatically by a bot or web crawler. Due to the fact that an enormous amount of heterogeneous data is constantly generated on the WWW, web scraping is widely acknowledged as an efficient and powerful technique for collecting bigdata. To adapt to a variety of scenarios, current web scraping techniques have become customized from smaller ad hoc, human-aided procedures to the utilization of fully automated

systems that are able to convert entire websites into well-organized data set.The purpose of this study is to scrape the best books of 2022 data from the Goodreads website for book recommendation system and convert it into a structured data which can be further used for analysis and building recommendation system.

II. METHODS AND MATERIALS

There are two essential modules of a web scraping program – a module for composing an HTTP request, such as Urllib2 or selenium and another one for parsing and extracting information from raw HTML code, such as Beautiful Soup or Pyquery. Here, the Urllib2 module defines a set of functions to dealing with HTTP requests, such as authentication, redirections, cookies, and so on, while Selenium is a web browser wrapper that builds up a web browser, such as Google Chrome or Internet Explorer, and enables users to automate the process of browsing a website by programming. Regarding data extraction, Beautiful Soup is designed for scraping HTML and other XML documents. It provides convenient Pythonic functions for navigating, searching, and modifying a parse tree; a toolkit for decomposing an HTML file and extracting desired information via lxml or html5lib.In the proposed study, I have used both the methods for retrieving data.

Web data was scrapped utilizing Hypertext Transfer Protocol (HTTP) and through a web browser. The process of scraping data from the Internet can be divided into two sequential steps; acquiring web resources and then extracting desired information from the acquired data. Goodreads website was used to scrape best books of 2022 data along with it's Book Title, Author name, Ratings and Genre.

Important libraries like requests, beautifulsoup and selenium were imported. The program was started by composing a HTTP request from goodreads website. This request was formatted in either a URL containing a GET query. Once the request was successfully received and processed by the goodreads website, beautiful soup was used to parse the text retrieved from the website.Book Title ,Author Name and Ratings were retrieved using find_all function.

A. CHALLENGES ENCOUNTERED

In the pursuit of finding the genre of a book, I stumbled upon a hurdle. My program was flaky while locating the genre element. It passed for some books and for some others it failed. We may classify this problem under the category of 'False Negative'.Although the genre of the book was present, the program result displayed it not to be present, thereby failing.My locator strategy being correct, the problem baffled me at the beginning.I decided to dig down to find the Root Cause.Since the strategy of 'requests' was headless, I could not visualize the real problem.At this juncture, Selenium WebDriver came to the rescue.

B. LITTLE ABOUT SELENIUM WEBDRIVER

Selenium WebDriver provides implementations that can help us visualize the proceedings of the program like I would do manually, also it is more powerful when it comes to parsing the DOM and applying waiting mechanisms.Changing the implementation for the extracting the genre part from 'requests and Beautiful soup' to 'Selenium WebDriver'.

C. BUILDING BLOCKS

I used CHROME as a browser and XPATH as our locator strategy. I also exploited the powers of Fluent Wait which would help us wait for the 'Genre' element to be located for a certain time.

D. BOOK GENRE EXTRACTION PROGRAM FLOW / MODULES

i. **Storing Book URLs:** Using Requests, hit the URL of the Good Reads Page. Parse the response HTML using Beautiful Soup 'html parser'. Find the number books present in the list using locators of beautiful soup's findAll method.

Iterate using a For Loop over the number of books to extract the 'anchor tag' thereby pulling the 'href' link of each book. Storing the book URLs in an array. Code Snapshot captured below in Fig. no.1:

Fig no.1

```
import requests
from bs4 import BeautifulSoup
from selenium import webdriver
from selenium.webdriver.common.by import By
from selenium.webdriver.support.ui import WebDriverWait
from selenium.webdriver.support import expected_conditions as EC
from selenium.webdriver.common.desired_capabilities import DesiredCapabilities

bestbooks_url='https://www.goodreads.com/list/show/171064.Best_books_of_2022'
response = requests.get(bestbooks_url)
page_contents = response.text
soup = BeautifulSoup(page_contents, 'html.parser')
allrows = soup.findAll('tr', itemtype='http://schema.org/Book')
listhref=[]

for i in allrows:
    a_tag =i.a
    link=a_tag['href']
    listhref.append(link)
len(listhref)
```

ii. **Setting up Prerequisites for Selenium:** Downloading the required Chrome Driver.Defining the Desired Capabilities and Options for Chrome Driver: Page Strategy as normal. Maximized State of the Chrome Window. Incognito mode. Not loading images. Most important, Headless Mode of Operation. Code Snapshot captured below in Fig. No.2:

Fig no.2

```
caps = DesiredCapabilities().CHROME
caps["pageLoadStrategy"] = "normal"

options = webdriver.ChromeOptions()
prefs = {"profile.managed_default_content_settings.images": 2}
options.add_experimental_option("prefs", prefs)
options.add_argument('--headless')
options.add_argument('--start-maximized')
options.add_argument("--incognito")
```

iii. **Go to Book URLs and extract Genres:** Hitting the Book URLs using looping mechanism.Looking whether the Genre Element is Present.If the Genre Element is not present, then find the 'sign-in' pop up.If the pop up is present, then refresh the page to bypass the pop up.Post refreshing, looking for the Genre Element with the new locator.Conditioning and waiting throughout, either looking out for the presence of pop up, or the two locators of genre elements. Indicating the user if no Genre is present for the book. Capturing the Genre Text corresponding to the Book URL. Repeating the above steps until the Genre of all books are captured. Code Snapshot Depicted Below in Fig.No.3 and Output in Fig.no.4:

Fig no.3

```
for i in listhref:
    driver = webdriver.Chrome(desired_capabilities=caps, options=options,
                              executable_path='C:\\Users\\Rahil\\PycharmProjects\\pythonProject\\chrome
    driver.get("https://www.goodreads.com/"+i)
    print("_____")
    print("https://www.goodreads.com/"+i)
    listgenre = driver.find_elements(By.XPATH,"*//a[@class='actionLinkLite bookPageGenreLink']")
    listpopup = driver.find_elements(By.XPATH,"/html/body/div[3]/div/div[1]/div/div/button")
    listrefreshgenre = driver.find_elements(By.XPATH, "//*[@id=\"__next\"]/div[1]/main/div[1]/div[2]/div
    if(len(listgenre)==0 and len(listpopup) == 1 and len(listrefreshgenre)>0):
        driver.refresh()
        try:
            WebDriverWait(driver, 100, poll_frequency=5).until(
                EC.presence_of_element_located((By.XPATH, "//*[@id=\"__next\"]/div[1]/main/div[1]/div[2]/div
                'Khatan')
            genretext = driver.find_element(By.XPATH, "//*[@id=\"__next\"]/div[1]/main/div[1]/div[2]/div
            print(genretext)
        except:
            print(("Genre is not mentioned for this book"))

    elif(len(listgenre)>0 and len(listrefreshgenre)==0):
        try:
            WebDriverWait(driver, 100, poll_frequency=5).until(EC.presence_of_element_located((By.XPATH,
                'Khatan')
            genretext = driver.find_element(By.XPATH, "*//a[@class='actionLinkLite bookPageGenreLink']")
            print(genretext)
        except:
            print(("Genre is not mentioned for this book"))
```

Fig no.4
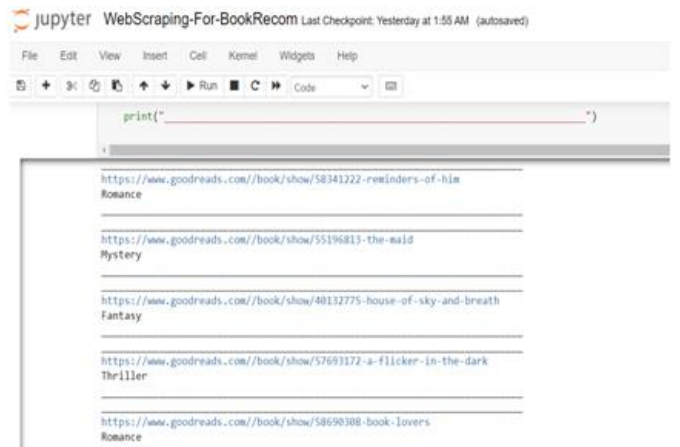
III. RESULTS AND DISCUSSION

A dataframe was created with attributes as Book Title, Author Name, Ratings and Genre using pandas libraries. This dataframe was then converted into csv file with hundred book details or hundred rows.Csv file snapshot is shown in Fig.no.4:

Fig no.4

IV. CONCLUSION

While this project may not be as sophisticated as web scrapers made by large corporations, there is enough scope in this application to make a decent impact in the world of book recommendation. By first scraping and then utilizing a set of information like genre and ratings, users may be recommended books based on collaborative andcontentbased recommendation techniques, that would help both the users and the business. Users' search time for the right book may be significantly reduced, thereby the saved time may be invested in reading the recommended book.

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TABLE NO.1. Chronological Order: Discovery of problem navigating through them successfully

PROBLEM	IMPLEMENTED SOLUTION
The Good Reads page throws the registration pop-up, once the user has accessed around 10 books.	Using Selenium, I checked for the presence of a sign-in pop-up on the page. If a pop up was encountered, page refresh function of selenium was invoked, resulting in the page being displayed in its normal state, without the sign-in pop up bothering us
Selector of the "Genre Element" changing on page refresh	When the Good Reads page was refreshed, to deal with the 'sign-in' pop-up, the program could no longer identify that 'Genre Element' which it was seamlessly able to find, pre-refresh. On Printing the HTML code in the 'except' snippet, I observed that the locator of the 'Genre Element' has changed. I handled this using programming conditional statements on 'locators' - pre and post refresh.
Some Good Read books were in languages other than English, and did not have a Genre associated with it.	This is a special and rare occurrence on the Good Reads page for a book not to have a Genre. This was handled, using conditions statements.
Program was trying to find the Genre Element before the entire page loads.	Selenium's Desired Capabilities allows to set the 'page-strategy' to 'normal' which will allow the program to run only after the page has fully loaded.
Program execution was slow	To improve the speed of the program, Selenium helped us to have some options with Chrome Browser, in which I chose not to load images of the page, because Image takes more time to load than text. Secondly, Selenium also gives us the options to run the Chrome Browser in Headless mode. Both these helped us to fasten the execution by 50% with regards to execution time.

Blockchain -The Emerging Technology

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ABSTRACT

Blockchain is an emerging Technology that leads to significant changes in business, finance, government, healthcare, real estate industry and will have a huge impact in the upcoming year. It is way through which economy will going to transform. It is chain of blocks that contain information. It is a shared immutable ledger that facilitates the tracking of assets in a business network (assets can be tangible: a house, a cash or intangible like intellectual property, patent, copyright, branding) and it keeps track or process of transactions. Blockchain is system where no one can hack data, make changes or cheat the system. As Blockchain is **Decentralized** system and distributed **Ledger** that aims to ensure security, transparency and integrity. Since it can't be forged. Most of current research related to Blockchain technology focusing on applications like CryptoCurrency such as Bitcoin, Ethereum, etc. The number of live Blockchain is growing everyday at ever increasing pace. As of 2022, there are more than 10,000 active CryptoCurrency based on blockchain with several hundred now CryptoCurrency blockchain. It's another application are like Government, Healthcare, Banking, Finance, Accounting, and Business Process Management therefore it is very important to study and explore this technology that is being used to solve the real world challenges. Thus large number of published studies were carefully reviewed and analyzed based on their contribution to the body of blockchain Knowledge.

Keywords: Blockchain, Technology, Ledger, Application, Business, CryptoCurrency, Decentralized.

I. INTRODUCTION

Blockchain is constantly growing technology that keeps the permanent records and process of all the transactions that have taken in a very secure chronological and immutable way. It can be used for secure transfer of money property, contract etc. The fundamental element of blockchain is **Ledger.** It is same as the book we keep record in it or we can say it is a database. Blockchain is made up of two words that is Block + Chain , where "Block" is nothing but keeps encrypted digital records of transactions then this each block get linked with another block which is termed as "Chain" in chronological order. These block

will contain copy of last transaction since previous block was added. In this way this is a shared block or ledger which is linked to all participants who can use their computers in the fully fledged network to validate or confirm transactions and in turns which don't require any third party. Blockchain is used to protect and distribute data in a very trending new way. There is no single intermediate rather than it will have distributed environment. This transaction cannot be hacked, manipulated or disrupted.

Data is immutable it means that once it has been written to block then nobody can change it, delete it or alter it not even System Admin. It can't modify in Simpler form. Through the cryptographic signature each block is get linked and this blocks are timestamped. Blockchain technology can be applied in any kind of transaction such as money, goods, land ownership, medical records, stocks, voting system, etc.

Blockchain doesn't support migration in a project. All the important transaction data is stored on the ledger and status will be then derived from it. Since Blockchain is a distributed system without a central control point or authority and it is not regulated by a single control center as there might be with a system administration, there's no single point of failure. Hence, in an enterprise, theoretically, there would be no need for an IT professional to monitor security on a blockchain database.

Despite these possibilities,it becomes very important to emphasize that Blockchain is a very new technology. As a result, there are only a small number of examples in which the technology has been applied. A proven example, could be the Bitcoins which is the most successful implementation of the Blockchain Technology, and has confirmed to be a viable solution in creating trust in a trust-less ecosystem without central authority.The purpose of this paper were mainly: data collection and grounded theory. Data collection and ground theory were done in very several ways. For example, the paper thoroughly searched all published works found in the existing literature, books, academic journals, presentations, conferences, technical reports, searching several databases using keywords. The objective of this study is to present a review of Blockchain Technology and its current or future practical applications. Thus, in the next section we present a systematic literature review to identify current Blockchain applications and discuss future practical applications. The remainder of the paper is organized as follows: Section II presents an overview of the Concept of Blockchain Technology; Section III describes in detail the Applications of Blockchain Technology in Business; Section IV presents the Challenges and Barriers of Blockchain Technology; and finally Conclusions and Recommendations are drawn in Section V. II. The Concept of Blockchain Technology Blockchain Technology is a continuously growing list of records, called blocks, which are linked and secured using cryptography. Each block typically contains a cryptographic hash code of the previous block, a timestamp and transaction data , which was designed so that these transactions are immutable.

II. THE CONCEPT OF BLOCKCHAIN TECHNOLOGY

Blockchain Technology is a continuously growing list of records, called blocks, which are linked and secured using cryptography. Each block typically contains a cryptographic hash code of the previous block, a timestamp and transaction data,which as designed so that these transactions is immutable
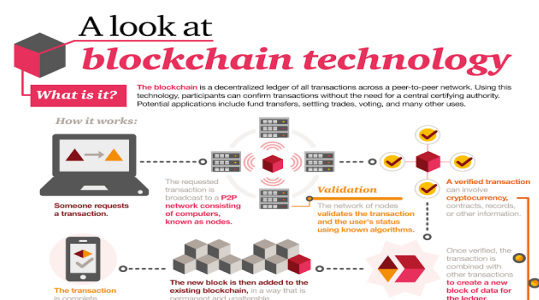

Figure 1: The Concept of Blockchain Technology
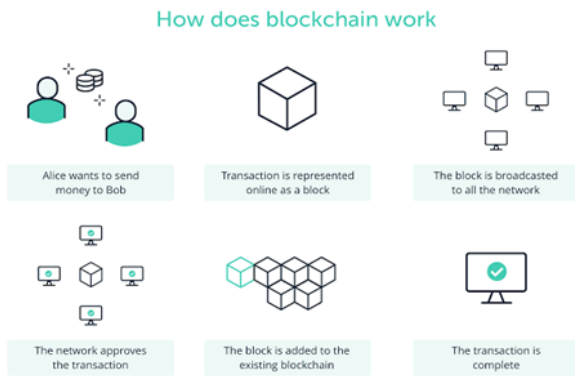**Source**: World Economic Forum

Figure 2: The Concept of Blockchain Technology:
Source: Ledger

Hence, the Blockchain Technology has the following characteristics:

1) Distributed ledger
2) Decentralized data management
3) Data security
4) Transparency and integrity
5) Anti-tampering and anti-forgery
6) High efficiency
7) Low cost
8) Programmable features that increase flexibility and reliability and no risk of a centralized database failure.

There are several types of Blockchains, some of the most important are:

A) Public Blockchain
B) Private Blockchain
C) Consortium Blockchain (hybrid Blockchain).

Each type has its advantages and disadvantages.

Figure 3 illustrates the Types of Blockchain Technology. Specifically, using

a) Public Blockchain, anyone can transact on the network transactions which are transparent and are anonymous.

A Public Blockchain, such as bitcoin, is completely decentralized. The system operates based on users' consensus; there is no central point of failure.

However, Public Blockchain is vulnerable to system attacks. For instance, an attacker could recreate and properly chain all the blocks that had been modified, without being detected by the participants.

b) Private Blockchain, the transactions are secret, the data is not available for public view, but the members are known.

In a private Blockchain network, a participant cannot read or write the Blockchain unless the participant has a permission or an invitation to join the network. Private Blockchain is usually used by large companies with permissions defined between various stakeholders of the enterprise Blockchain. For instance, a bank can have its own Blockchain network for its private use with restricted access to its various stakeholders such as customers, employees and suppliers

c) Consortium Blockchain is a hybrid model of both Public and Private Blockchain. Choosing this model, enterprises or institutions can have their own Private Blockchain network to share the data among the consortium participants (such as banks, institutions and other enterprises or firms).
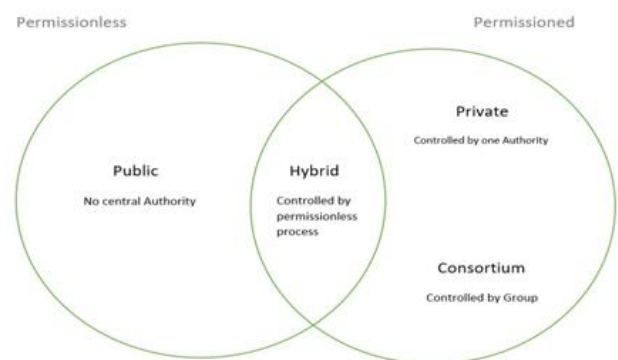

Figure 3: Illustrates the Types of Blockchain Technology

III. THE APPLICATIONS OF BLOCKCHAIN TECHNOLOGY IN BUSINESS

Some of the practical applications of Blockchain Technology in different sectors are given below:.

Applications have been categorized into the following groups:

1) Smart Contracts
2) Government
3) Financial industry
4) Accounting
5) Business Process Management

1. Smart Contracts

A Smart Contract is a computerized protocol that executes the terms of a contract. Simply, Smart Contract is an ordinary contract, but it is written in computer code to be executed in the Blockchain environment. Therefores, such agreements in the IT-environment are mainly referred to as Smart Contracts.A Smart Contract is designed to assure one party that the counterparty will fulfill his promises with certainty. The Blockchain concept aims to remove third-party intermediaries for transactions. Traditionally this third-party is responsible for maintaining and executing the contracts and building the trust between any involved parties. Therefore, Smart Contracts can reduce moral hazard problems such as strategic default, and they can dramatically reduce costs of verification and enforcement. One of the most promising areas of implementation of Blockchain Technology is its use for creating fully automated Smart Contracts, which are performed without human involvement. Smart Contracts allow for automatic procedures for repeat transactions, or transactions with a certain level of importance. Blockchain will automatically verify, execute and enforce the contract terms between agreed parties. These contracts are called Smart because they can be partially or fully self-executing and self-enforcing . Some Blockchain Applications of Smart Contracts are the following:

● Contract Management - Blockchain Technology in a Contract Management provides a solution for companies validating contract information that could be highly beneficial for organizations and enterprises of all kinds of businesses, such as in the technical industries and construction. Thus, Contract Management via Blockchain Technology would allow organizations to optimize the performance of their supply chains, evaluating vendors and obtaining higher value and shorter lead times.

● Entertainment - Blockchain within Smart Contract provides a transparent transference of royalties in real-time distributions to everyone involved in both the music and film industries .

● Healthcare - The healthcare sector has already taken steps to use Blockchain Technology. Smart Contracts can be used in medical industries for keeping tabs between payers, providers, and drug manufacturers. Healthcare providers can set up Smart Contracts for any payer or supplier, which is then stored in their digital records.

● Insurances - Insurance is a new sector for Blockchain Technology where the industry is estimated to spend more than $2 billion each year on fraud and compliance. The use of Blockchain Technology has significant potential for the entire insurance value chain. Certain insurance products can be automated through Smart Contracts. Blockchain has the potential to eliminate error, negligence and detect fraud and verify the authenticity of customers and their policies.

● Blockchain Internet-of-Things - Internet-of-Things (IoT) is a system of interconnected computing devices to the internet, mechanical and digital machines, objects, animals or people that are provided with unique identifiers with the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. It allows the collection and exchange of data with one other using sensors, embedded software, and a common language to communicate. It was predicted that there will be 20.4 billion IoT devices by the year of 2021. With this number of devices to join IoT hubs in the future, the system could show

vulnerability, such as network security, speed, and affordability. Blockchain Technology deals with the problems mentioned and strengthens the interconnectedness of IoT. Its network will enable devices to perform smoothly, securely, and autonomously by creating Smart Contracts that are only implemented upon the accomplishment of specific requirements. This encourages better automation, cheap transfers (no need for third-party to supervise transactions), scalability, and security (prevents overrides and compromise of network security.

2. Blockchain Technology for Implementing e-Government

The ability of Blockchain Technology to record transactions on distributed ledgers offers new opportunities for governments to improve transparency, prevent fraud, and establish trust in the public sector. Blockchain has the potential to make government operations more efficient by improving the delivery of public services and increasing trust in public sectors.Blockchain Technology presents a lot of benefits for governments such as data integrity, improving transparency, Enhance security, preventing fraud, and Establish trust and privacy by recording transactions on distributed ledgers for the state management system.

Thus, a distributed ledger is a unique tool for the improvement of transparency of the budgetary process and the reduction of corruption factors. Using Blockchain Technology, cryptocurrency tools and Smart Contracts, it is possible to build an e-Government. Since a distributed ledger contains legally valid information, a number of mechanisms and procedures of interaction between citizens and the state could be implemented through Smart Contract. The source code eliminates the risk of unauthorized changes and ensures the uniqueness of the execution of the contract algorithm at any time and at any node of the network. Thus, state documents, e-voting, auctions, public procurement

and the registration of companies could be possible through Blockchain Technology, preventing fraud, establishing trust between the citizens and the state, and enhancing business performance in the public sector . In the present, numerous countries such as the USA, China, United Kingdom, Sweden, Netherlands, United Arab Emirates and Estonia announced Blockchain initiatives to explore its uses in the public sector and in government. Some of the potential benefits such as trust and transparency can be especially beneficial for developing countries since they are more vulnerable to corruption, fraud, and lack of trust than developed countries. In closing, adopting Blockchain Technology and Smart Contracts will be possible to implement an e-Government. Thus, e-Government with Blockchain Technology will significantly reduce bureaucracy, exclude hard copy paperwork, minimize transaction costs, fully control officials, eliminate fraud, fight corruption and as a result, it will improve business performance in the public sector.

3. Blockchain Technology for Financial industry

Blockchain is a foundational Technology having the potential to dramatically reduce the cost of transactions and reshape the economy. Harvard Business Review stated that Blockchain Technology will do to financial institutions what the internet did to media. Blockchain was initially developed as the backbone for Bitcoin, which is the most popular decentralized digital currency. Blockchain is particularly beneficial for financial transactions and banks, and has the potential to solve a lot of problems, when it comes to exchanging data, information, and media.

Financial institutions and banks can handle sensitive information with Blockchain and provide secure services with minimum risk that can be decentralized and transparent at a low cost Forrest (2016). The importance of Blockchain in the financial settlements, and in enhancing the reliability of financial statements. Similarly, Blockchain as a technology can

revolutionize economic sectors resulting in lower transaction costs, and highlighted numerous advantages of this technology. Nowadays, the leading platforms for Blockchain development in the financial industry are Hyper Ledgers, an open-source industry consortium formed by the Linux Foundation, and Ethereum, a custom-built platform that was introduced in 2013. As of February 2018, more than 1,500 cryptocurrencies have a market capitalization in excess of $ 400 billion, with Bitcoin accounting for more than $ 150 billion. In closing, financial institutions have realized the potential of Blockchain Technology compared to the existing infrastructure and legacy systems. Blockchain will resolve a lot of problems for the financial industry and boost their business performance dramatically such as Trade Finance, Smart Assets, Payments, and Smart Contracts.

4. Blockchain Technology and Real Time Accounting

Digitalization of the accounting system is still in its infancy compared to other industries, some of which have been massively disrupted by the advances of Blockchain Technology. Using Blockchain will improve audit efficiency as auditors will increase the potential of the accounting profession by reducing the cost of maintaining, providing a highly secured environment and reconciling ledgers. Blockchain will ensure traceable audit trails, automated accounting and reconciliations, tracking of ownership of assets and authenticating transactions. Specifically, Blockchain Technology can assist accounting by writing the firm's transactions directly into a joint register, creating an interlocking system of enduring accounting records. Since all entries are distributed and cryptographically sealed, changing or destroying them to conceal activity is practically impossible. This is similar to transactions that are being verified by notary, since all entries are distributed electronically and cryptographically stamp.Moreover, using Blockchain technology all accounting data could be

recorded permanently with a time stamp, preventing it from being altered. The firm's entire joint register would then be visible to customers, suppliers, shareholders, bank creditors, or any other interested party. Thus, accounting transactions, balance sheets or income statements could be available at any time, and would no longer need for someone to rely on a company's quarterly financial statements, enhancing business performance in the organization. Concerning security issues, all accounting transactions will be digitally time-stamped with a cryptographic hash code, which is a unique 64-digit alpha-numeric signature that is recorded to every single transaction. Hash code will make the transaction immutable and transparent while establishing greater security. Therefore, blockchain will ensure greater data security and authenticity of recording to a degree that not even the system administrator would be able to alter the data written to a Blockchain . Thus, Blockchain Technology has the potential to reshape the nature of today's accounting and auditing.

5. Blockchain Technology and Business Process Management

The traditional Business Process Management (BPM) is concerned with the design, execution, monitoring, and improvement. Business processes consist of two categories, intra and inter-organizational processes. Intra-organizational processes are those processes within an organization, whereas inter-organizational processes are those processes that go beyond the boundaries of an organization. However, business processes such as interoperability, flexibility to adapt to changes, lack of trust and security are not fully addressed in inter-organizational collaborations between mutually untrusted parties. Blockchain Technology has the potential to provide a suitable platform to execute inter-organizational processes in a trustworthy manner. Blockchain technology has the potential to significantly transform business processes. The difference, however, is that traditional BMP services tend to handle internal workflows within a

6) Immaturity of the Technology: Blockchain is a new technology, represents a complete shift to a decentralized network and might lead to organizational transformation, including changes in strategy, structure, process, and culture.

IV. CONCLUSION AND RECOMMENDATIONS

From a theoretical perspective, based on the literature review, Blockchain Technology has high value and good prospects in resolving problems of data integrity, improving transparency, enhancing security, preventing fraud, and establishing trust and privacy. Blockchain Technology can bring revolution in the areas of Finance, Accounting, e-Government, BPM, insurance, entertainment, trading platforms, healthcare, internet-of-things, as well as law firms and others.

Hence, Blockchain Technology has a huge potential in introducing innovative solutions, depending on the area or the sector of its implementation, since

Economic efficiency and social benefits can be achieved through technical innovation and applications. However, implementing Blockchain Technology at organizations in different industries could prove to be very costly. Migrating or moving legacy systems require a significant amount of investment from organizations.

Therefore, Blockchain Technology may not replace legacy systems or old applications soon. However, Blockchain can certainly be a complementary application to legacy systems and may even lead to the development of new systems in the near future.

In conclusion, more intensive research in this area of Blockchain Technology is necessary to advance the maturity of this field, since it is still in the exploratory stage and there are many legal and technical issues to be resolved. Therefore, this review offers a useful starting point for future research themes for the development of Blockchain applications, and assists practitioners and researchers.

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Cloud Computing For the Advancement of the E-Learning Process

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ABSTRACT

As an aid in the teaching-learning process, online communications systems are used to facilitate e-learning, a form of virtualized computing and distant learning. The rise of E-learning platforms emerged drastically in the past two years. Data mining for education information processing uses facts generated from internet databases to enhance the educational learning paradigm for educational purposes when the learning process is computerized. Cloud computing is a suitable platform for supporting e- learning solutions. It can be automatically altered by providing a scalable solution for transforming computer resource consumption in the long run. It also makes things simpler to use data mining techniques in a distributed environment when interacting with massive e-learning datasets. A summary of the current state of cloud computing is provided in the study and examples of infrastructure explicitly designed for such a system. In addition, it also discusses examples of cloud computing and e-learning methodologies.

I. INTRODUCTION

E-Learning emerged due to the widespread use of the internet and other digital communication systems and distance education. It makes use of multiple formats and functions that might best aid classroom instruction. These include Virtual instruction, emails and web links, discussion boards, and other learning platforms, among other things. As a result of the online integration of students, content producers, and professionals, the learning experience is better handled. Learning with web-based tools has many benefits, the most prominent of which are the tasks' consistency and recurrence, adaptability, accessibility, and easier access. E-learning or virtual teaching platforms are becoming increasingly popular in information technology (IT), particularly after the outbreak of Covid-19 and digital advancement. Different educational levels have associated efforts, such as Massive Open Online Courses (MOOCs), Blackboard, Desire to Learn (D2L), and the Virtual Learning Center at various universities, implemented as E-learning format globally. Compared to the conventional attendance class, virtual programs, fully endorsed by the e-learning paradigm, have an obvious optimal learning environment, a notably greater frequency for those who can acquire their material online. These proportions have a lot of consequences;

for example, the infrastructure requirements to provide a concurrent service for that many learners far surpass the capability of traditional web application users.

Moreover, the need for instructional resources often fluctuates rapidly and dynamically, with significant activity spikes. To respond to requests without affecting other system services, a much more advanced infrastructure will be needed than what is normally required for the learning institution to function normally during these periods. Providing services based on usage and only paying as the pay-per-use policy for resources that are used is an option. Cloud computing technology provides the solution to these problems. Cloud computing was first proposed to reduce computational costs while enhancing system reliability and availability. These goals have since evolved into those of cloud computing. Nevertheless, there is a distinction between the two regarding how the tasks are calculated in each setting. In terms of technical resources, a computing grid is more stable, and it is primarily designed to maximize the performance of a computer system. On the other side, Cloud computing aims to provide transparent mobility while allowing users to acquire various services rather than familiar with the basic infrastructure. It does not have a limited range of services, including hosting services and word processing. It's important to note that one of the foundations of cloud computing is Service Oriented Architecture (SOA). There are many dispersed organizational computing barriers that this type of technology is intended to help programmers to transcend, such as application integration, concurrency control, and security protocols, as well as numerous different systems and protocols and the use of hardware and software to which we might have direct exposure, and existing data systems. All of a cloud platform's functions are made accessible in a way that hides the location and other technical aspects of the computing infrastructure from users. In comparison to other competing technologies, the advantages of this new computing paradigm are plain to see. Users don't have to invest money on new hardware to use the application because cloud software vendors attempt to deliver comparable or better capabilities and functions than if the applications were loaded locally on end-user machines. This storage capacity and computing initiatives help corporations to get their software fully operational faster, with a lesser provision of services from the IT division because it instantaneously intends the business needs by interactively assigning IT assets (servers) based on the computation complexity in virtual environments. Massive e-learning environments, such as those discussed earlier, also produce large archives of student participation with peers and teachers. Significant data is stored in these systems that haven't been explicitly declared. You'll need to use data mining algorithms. Educational data mining (EDM) is a technique that helps both instructors and learners enhance teaching and learning in this situation. The creation of novel strategies for examining the data created by the aforementioned current education system activity is the focus of this discipline. This method's ultimate goal is to understand student performance better and create protocols and resources that will make learning more engaging and easier. There are computer-based tutoring systems that are specifically developed to assist in the teaching and learning process and directly link to this approach. These are sophisticated programs that support students learning by monitoring their performance and providing them with feedback. An instructional model interacts with the EDM process, which extends and refines the knowledge it has. Considering the size and capacity expansion of computer capabilities (solid space, ram, and CPUs), cloud hosting is a sequence for adopting data mining algorithms and implementing them towards every database. Several more data mining methods, on the other hand, aren't very scalable. This is a topic that is becoming extremely relevant, and scholars and businesses alike are taking notice.

Due to the Covid-19 pandemic educational institutions around the globe moving to either use blended learning or fully E-learning. The major challenge is to deliver secure and adequate resources to support the E-learning process. This research aims to review cloud computing services for E-learning to enable the educator to utilize the benefits of cloud services such as scalability, flexibility, and security to support and enhance the E-learning process. The remainder of this paper is organized as follows. Section 2 introduces the fundamental notions of cloud computing, section 3 discusses E-learning tasks and cloud computing, section 4 describes the perspective challenges of E-learning and cloud computing. Finally, section 5 concludes the paper.

II. FUNDAMENTAL NOTION OF CLOUD COMPUTING

All the analysis in the preceding sections are the review of the cloud computing. The review is based on the qualitative analysis, which allows researchers to present the notion in elaborative way. A literature review examines publications, academic papers, and any other source materials pertaining to a particular issue, area of investigation, or concept, and provides an overview, synopsis, and analysis of a research subject in order to address the research. Cloud computing is an emerging approach in which different resources and services such as data storage, servers, databases, networking, and software are delivered via the web. This brings us to the conception of SOA, a framework for integration consisting of a combination of a rational and technology framework to assist and incorporate all range of facilities. In essence, service in the context of cloud computing is a function that has been wrapped in a somewhat form that it could be mechanized and delivered to customers in a standardized and structured way. Any element, from those adjacent to equipment, such as storage capacity or processing time, to software elements targeted at verifying a user

or handling mail, database administration, or regulating the use of the operating system, can be regarded as a service.

Essentially, the cloud computing philosophy suggests a shift in how challenges are tackled through technology. Using and combining services is the basis for application design. Instead of relying on the concept of processor algorithms, as with more conventional methods, such as distributed systems, the provision of functioning depends on the use and integration of services. In other words, this has benefits in terms of adaptability, dependability, scalability, and so on. For illustration, more instances of a specific service could be launched so that the application's response time stays appropriate for consumers during a spike of resource requirements due to a rise in customers or a rise in computational load.

As a consequence of a decline in demand, available resources should be made available. Everything is done sensibly to the customer. Among the most notable cloud computing are its minimal connection, high degree of interoperability, and protocols that separate the provider's execution and environment. It's not uncommon for an SOA to divide its operations into levels or layers (rather than in precise boundaries). Some components make usage services rendered by lower tiers to allow other capabilities to higher ones. Aside from that, these divisions could have multiple corporate frameworks, architectural designs, and so on. According to the type of arrangement being offered, there are generally three basic types of layers together, which form what is described as According to the kind of arrangement being offered. There are generally three basic types of coatings together, which include what is described as a cloud-based storage system that provides data storage depending on "files" or "blocks." Cloud computing is a collection of registers, columns, or entities that offer services and complete execution services are available by a compute cloud. Mega projects benefiting from the cloud computing model.

Many scientific and business applications are well-known burdened by heavy computational requirements. A constant data flow necessitates an elevated communication link since it involves handling enormous amounts of data contained in stable systems, which indicates a high amount of storage space.

Service-oriented systems can be grouped into a variety of areas. The complexity degree that these systems provide to the system user is a commonly used parameter for grouping them. As illustrated in Figure 1, this method frequently distinguishes between three distinct levels.

Infrastructure as a Service (IaaS) provides infrastructure, i.e., data centres, network technology, memory, or computing, and essential components like computer systems and abstraction of hardware elements. If we compare the IaaS to a mono computer platform, the software and computer program together represent the IaaS. The operating system manages the system resources and makes them accessible. Rather than purchasing and establishing its entire computing infrastructure, the IaaS customer leases computational capabilities from the IaaS provider. Since services are typically priced based on actual usage, the customer only charges for whatever they consume. Because of cloud computing's dynamic scalability, they utilize (and spend for) fewer resources when the workload is light. Where there is a more critical requirement for help, IaaS can make them available to meet the demands of that specific customer. Most service agreements specify a maximum value that a customer may not go beyond. As an example, scholars and practitioners in the scientific community are prototypical IaaS customers. These clients can design experiments and interpret information to the degree that would not be feasible without the IaaS and the large amount of infrastructure it provides as a service. Amazon's Elastic Computer Cloud is one of the most popular IaaS suppliers today (EC2). Other notable IaaS

providers include RackSpace, Google Compute Engine, and Windows Azure.
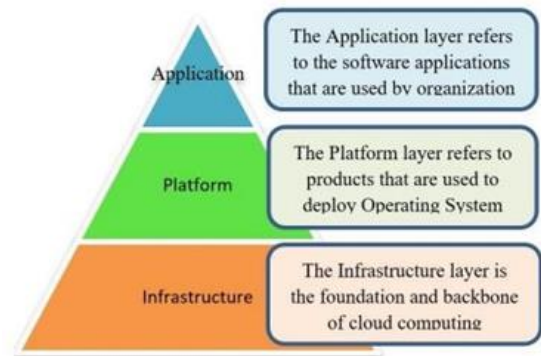
Figure 1: Layers of Cloud computing

The second level, namely Platform as a service (PaaS), is a provider-provided infrastructure that includes an integrated software package with everything a development hub to construct apps at the design and delivery stages. PaaS providers don't offer infrastructure explicitly, but utilizing IaaS services provides developers with the tools they have to have an indirect connection to the IaaS infrastructure and, therefore, the architecture they require. The PaaS could be regarded as a software layer,' allowing elements for apps and apps altogether to be produced on top of the PaaS. An interconnected developer setup or a collection of stand-alone tools will help engineers work on software glitches throughout the entire software development lifecycle. This includes everything from analysing and modelling a challenge to designing a remedy to testing and deploying it. Similar to this, a computer language that uses several operating mechanism compilers and modules makes it possible to deploy the same application on numerous systems without having to rewrite any code. Major examples of PaaS-cloud computing services market players include "Google App Engine", "Amazon Web Services", "Heroku", "OpenShift- Red Hat" etc.

Software as a Service (SaaS) is the highest level in the pioneering use of cloud services when internet usage was growing in prominence [32]. Originating in the host functions of the Platform as a service, some organizations provided to everyone the applications appeared as customer interaction managements from

these applications [28]. There are now numerous options available, both for businesses and private individuals as well as for education. Even though these services are delivered over the internet, which allows for geographic versatility, the direct sharing of data in this manner does not ensure its confidentiality. That's why VPNs are frequently used, as they enable data to be sent over the internet in an encoded file, keeping user and SaaS data safe and secure.

III. E-LEARNING TASKS AND CLOUD COMPUTING

E-learning systems advent expand at an exponential rate due to the suspension of on-campus classes, tremendous expansion in the number of students, instructional content, services available, and materials made accessible. It's essential to select a platform that can scale to meet demand while still keeping expenses in check while optimizing resource processing, storing, and communication requirements. Cloud computing is what's happening here in the shape of delivery and retrieval of information and content. In contrast to previous 'traditional' learning environments, defining the promise of SaaS applications for resilient and comprehensive distance learning may help us comprehend the advantages of cloud computing mostly on a technological and pedagogical level. Throughout terms of achieving a beneficial system for online tools and interactive services, such as teaching materials, recordings, educational materials, peer instruction, and so on, we ought to offer the 'road' for supporting migration to such a model.

Many educational institutions are now using cloud technology, and it's evident that it has a promising future in. In many countries, namely the UK, initiatives like JISC (2012) are in place to include an education cloud with the required tools to manage data and store the data. Education SaaS refers to a cloud-based e-learning system that allows users to gain the benefit of cloud computing. Due to its

modest hardware requirements, it can be swiftly deployed by the end-user. Moreover, it relieves the supplier of system service and maintenance responsibility, permitting the manufacturer to focus on the most critical business while receiving free automatic updates and providing essential resources via Web 2.0.

E-learning system architecture and cloud computing systems as part of consistency, harmony, effective resource use, and the long-term stability of the e-learning ecology from a technological standpoint in education. In, the authors summarized the repercussions and ramifications of developing e-learning solutions in the cloud computing system. At the onset, there is a greater demand for web development abilities because the application may be accessed from anywhere, at any time. As a result, the subscriber has saved money by not paying for software, deployment, or server management. As a result, the institution will spend less money overall, have a faster deployment, and need fewer IT workers. This will be equally handy for the situations like Covid-19 where the moment is restricted. It is appropriate for the program type education sector to pay for content peruse, making it available to more sophisticated programs and required applications. Numerous educational establishments can use a SaaS server. Scalability is built-in to the system because it is hosted on a cloud server. The software's performance will not deteriorate as student usage increases. To acquire the confidence of consumers and a comprehensive providing users system software, the SaaS provider needs a sophisticated level of security. The consumer data is dispersed throughout various services and therefore must be consolidated in obtaining a comprehensive picture of the business, resulting in an increased need for platforms and data integrators for education. The advantages of a cloud-based curriculum have previously been studied from a technological standpoint by specific authors. While affordability is the most frequently cited concern, other considerations include those highlighted for

cloud use throughout the practice. It is not necessary to back up and move data between devices using a hard drive. Creating a reservoir of information means that students can keep it for as long as they desire, and it will continue to grow with them. Recovering after a crash seems to be almost entirely superfluous in this situation. There's essentially no information lost if the user machine fails. While working from numerous locations, students can access their files and modify them using virtualized programs that have also helped institutions implement E-Learning recently and notably during the lockdown. It offers academic organizations a minimal cost-effective alternative for their academics, staff, and students.

Data access monitoring is made simpler by the notion that just one location must be controlled rather than hundreds of computers dispersed across a larger region. Furthermore, because the cloud has a single database for all users, cybersecurity modifications can be efficiently evaluated and deployed. Subsequently, even though more efforts are required to determine how cloud-related pedagogies or assessments of learning purposes, from a scholarly perspective, one of the advantages of the cloud is its ease of access, as it is mainly created to permit users to collaborate from anywhere at any given time. It can reach more learners outside the traditional teaching environment and meet their requirements. It can provide more meaningful information to a broader spectrum of students in a more comprehensive range of contexts. Figure 2, shows the dimensions of cloud computing in its association to E-Learning.
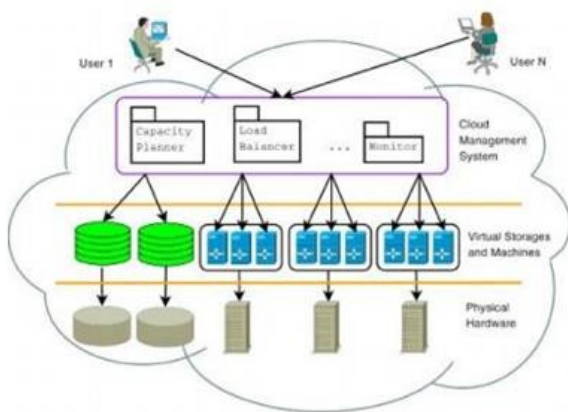
Figure 2: A glimpse of Cloud computing for E-Learning.

It's easy to see in Figure 2 that most cloud e-learning techniques use three fundamental layers: a virtualized platform on top and a cloud management system and services layer underneath that. Two computer pools are used for teaching: a C pool with a thin client and a server pool running the hypervisor, with the private cloud architecture created using vSphere. It is possible to observe and manage all of the virtual infrastructure's hosts and services instantaneously using a web browser. Things like efficiency and configuration can be monitored along with saving alarm information and permission settings.

To allow multiple operating systems, a single hardware host hypervisor is essential. A hypervisor prevents virtual machines from interfering with one another by allocating resources to each element as they are required. In this case, a hypervisor that runs directly on the underlying hardware is the better option. This layer, which serves as an interface to the outside world, provides the PaaS and SaaS cloud users' needs. The instructional coordinators build the virtual PCs, choosing the baseline images and installing the software they've chosen afterward [27]. Thus, standardized web technologies are generated for specific course projects, and learners may connect to the respective VM using the remote network. Figure 3. shows the personalized virtual model for E-Learning.
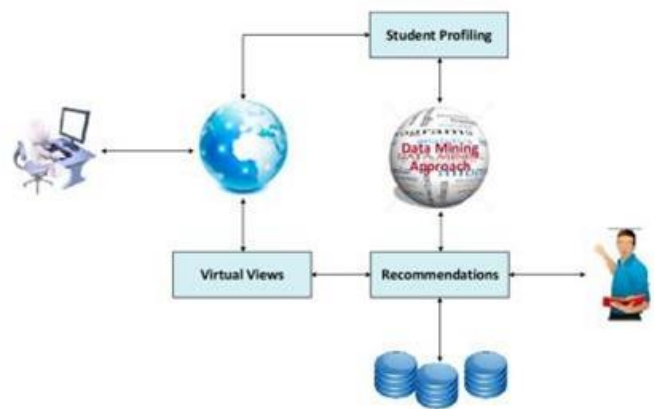
Figure 3: Personalized E-learning Architecture.

The integration of cloud technology and e-learning has received more attention from the institutions due to its high demand to continue education. Almost all the institutions of schooling deemed it to be an operative and suitable alternative for e-Learning. Nevertheless, an absence of research may provide a theoretical foundation from which a methodology could be constructed. The flexibility implicit in the cloud strategy, on the other hand, could've been highlighted as a considerable advantage in producing an analytical framework and creating successful teaching techniques. The drawback in this field is that few studies provide a strategic or tactical of the subject.

Conversely, the overall characteristics of the cloud are associated with social engagement and collaboratively learning pursuit in the literature. In, the authors investigate students' views of excellence and responsibility about various kinds of interaction within Google Docs. Instructional methods that use technology to alter and improve students' collective experience when producing a joint assignment. Additionally, various cloud-related studies may be found for measuring the results of online models to conventional approaches.

IV. PERSPECTIVE CHALLENGES OF E-LEARNING AND CLOUD COMPUTING

E-learning may benefit greatly from today's cloud computing, applications, and capabilities as a lucrative industry. A cloud-based e-learning system can provide significant assistance in overcoming the shortcomings of conventional local physical labs and computing platforms. Nevertheless, fundamental problems and barriers must be solved before the cloud can be widely used and adopted to facilitate and promote e-learning.

It is essential that instructors and students undergo a learning curve and that academic institutions give IT support to make good use of cloud computing for e-learning and teaching. Use third-party solutions or current public or commercial cloud resources or services however you like. Along with training, the instructor should be well-versed in cloud capabilities and consult with the university's IT department to establish the best cloud model for the class's requirements. The instructor must be taught how to set up and assign cloud resources and manage student accounts. Students must also be coached and instructed on how to access and use the cloud-based course resources. Depending on the course design and requirements, the learning curve for instructors and students might be steep or easy. Faculty in fields like computer science and related courses may have an easier time learning about and using the cloud than faculty in other areas.

A cloud-based system integrates the inherent advantages of cloud technology, such as cost savings, fault tolerance, and enhanced accessibility and remote connectivity into e-learning. Cloud technology benefits can be maximized with proper pre-implementation planning. Businesses can utilize any options listed below to move from their present e-learning system to cloud-based e-learning. The process of converting an e-learning program involves several steps, including installing the operating system and middleware and implementing the server and client modules. A migration feasibility study must include user needs, existing IT infrastructure availability, and a cost/benefit analysis. A system's monetary cost can be kept to a low by optimally mapping existing resources to the cloud tiered architecture using virtualization to reduce resource under-utilization.

Even though connectivity and speed have improved dramatically over the previous decade to an acceptable level worldwide, a slow internet connection can significantly impede cloud-based education and e-learning. The situation is exacerbated even further when data and services are accessed from non- regional cloud data-centers. Due to this problem, users and students of cloud-based e-learning systems may be subjected to excessive delays. The

cloud may not be the appropriate Platform for teaching specific topics and disciplines if students need to use specialist software or equipment and resources in physical labs. Digital forensics, mainboards, physical network devices, and robotics can be considered equipment if they require a hardware dongle. It is possible to use the cloud in part for this purpose, although it may not be possible in all cases. The use of cloud power must be thoroughly investigated and studied for such topics. Tools that closely imitate the hardware environment may hold the key to this problem's resolution. Using resources and software from both on- and off-cloud should be part of the hybrid cloud concept.

V. CONCLUSION

The overview presented in the analysis assert that using cloud services in E-learning is a nice alternative because it allows teachers to leverage cloud adaptability, flexibility, and security to represent the main framework of E-learning — instruction providing access anywhere, at any time, and from any gadget. When an efficient learning environment with specialized content is easily adaptable to today's educational paradigm, we can fully utilize the opportunities it presents. Increased storage, computation, and network connectivity are a few advantages of integrating an e-learning system into the cloud. Software and hardware savings should be prioritized. In contrast, it has a more incredible selection of educational programs at a lesser license cost. However, the replacement rate for student computers is reduced due to the longer machine life. These savings are boosted by the decrease in IT personnel costs associated with computer lab maintenance and software updates.

Today's e-learning services and systems fall short when it comes to customizing and personalizing learning for each user. Students obtain generic e-learning that is not personalized to their needs as a result of this practice. New research and development

are required for cloud-based personalized learning to be used and developed across many topic areas. In most modern systems, the interaction between professors and students is critical to increasing the quality of the learning experience for each individual. Integrating cloud-based e-learning services, such as video conferencing or instant messaging, should be possible with online and real-time training. Modern cloud-based e-learning systems make up for these shortcomings by using email, voice-over-IP, and apps like Skype. For the great majority of cloud-hosted services, this is still a concern. There are numerous factors to consider when estimating the size of a problem. Cloud service providers have made significant investments in cloud infrastructure and platforms in response to client concerns about security and privacy. Furthermore, country restrictions are essential since some countries demand that data be kept within their borders, making data storage remotely or outside the country a criminal offense. According to the current research, academics have an abundance of data at their disposal to aid in the development of cloud-based e-learning frameworks and implementations. a quantitative evaluation of the impact on numerous parameters such as access speed, influence on educational quality, and return of migrating to a cloud e-learning environment will be a future inquiry.

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Digital Transformation

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ABSTRACT

"Digital transformation is all about becoming a digital enterprise—an organization that uses technology to continuously evolve all aspects of its business models (what it offers, how it interacts with customers and how it operates)."

As technology evolves, so should your business. At this point, it's not about enterprises choosing to transform; it's more about deciding how to transform.

Digital transformation is about evolving your business by experimenting with new tech and rethinking your current approach to common issues. Because it's an evolution, a transformation doesn't necessarily have a clear end point. The MIT Sloan Management Review, a publication that focuses on how management transforms in the digital age, says, "Digital transformation is better thought of as continual adaptation to a constantly changing environment."

For enterprises, that means continually seeking out ways to improve the end-user experience. This could be through offering improved on-demand training, migrating data to cloud services, leveraging artificial intelligence, and more.

Key areas of Digital Transformation:

1. Customer Experience — working to understand customers in more detail, using technology to fuel customer growth, and creating more customer touchpoints

2. Operational Processes — improving internal processes by leveraging digitization and automation, enabling employees with digital tools, and collecting data to monitor performance and make more strategic business decisions

3. Business Models — transforming the business by augmenting physical offerings with digital tools and services, introducing digital products, and using technology to provide global shared services

I. INTRODUCTION

Importance of Digital Transformation

While every digital transformation initiative will have its own specific goals, the main purpose of any digital transformation is to improve your current processes. Digital transformation is important because companies must evolve to remain competitive in their industry. If you aren't evolving, you're falling behind. A Bain & Company study shows that "only 8% of global companies have been able to achieve their targeted business outcomes from their investments in digital technology." One of the strategies that sets leaders apart is that they spend more on transforming their businesses instead of just running them.

Digital transformation is important because it allows organizations to adapt to ever- changing industries and continually improve how they operate.

For enterprises, that means continually seeking out ways to improve the end-user experience. This could be through offering improved on-demand training, migrating data to cloud services, leveraging artificial intelligence, and more.

The Benefits of Digital Transformation:

1. Increases productivity while reducing labor costs — Using technology to work more efficiently is one of the most impactful ways to transform your business. For example, for enterprises, the time and money they spend training new employees and updating digital resources can quickly get out of hand. With the proper tools, you can keep costs down and productivity up.
2. Improves the customer experience — Tech-savvy customers want a great experience through multiple touchpoints — mobile apps, social media, email, live chat, etc. Digital transformations are the driving force behind improved customer experiences.
3. Drives innovation, keeping you ahead of your competition – Your competitors are looking into

digital transformation regardless of whether or not you are. Choosing not to embrace digital transformation is essentially deciding that you don't mind being left behind. Investing in your organization's future allows for

Examples of Digital Transformation by Job Function

Job Function	Digital Transformation	Real-World Example
Sales	Spreadsheets to a Cloud CRM	Sophos improves win rates, streamlines customer relationships, and improves customer data by implementing Salesforce.
HR	In-person training to online elearning.	Comiva improves its onboarding quality, cost of training, and more by moving its onboarding online.
Customer support	Call support center to online knowledge bases and self- support portals.	Cardinal Health improves its customer satisfaction score, reduces time to resolved tickets, and reduces overall support tickets with self-help.

Examples of Digital Transformation by Industry

Industry	Digital Transformation	Real-World Example
Healthcare	Virtual visits, telemedicine, and patient portals	Brigham Health uses virtual visits allowing patients to schedule appointments online and conduct a screening via web video.

Hospitality	Online check-in, amenity booking tools	Harrah's uses online check-in for guests to skip the in-person process.
Insurance	Virtual quotes and online claimsprocess	Lemonade uses an online portal for prospective customers to get instant quotes, as well as a portal for customers to file claims online – both using AI-powered technology.
Retail	Loyalty cards, e-commercestores	Target encourages its uses to download the Target App where it can reach customers through in-app and push notifications instantly, as well as creates a new stream of revenue with its online store

Aspects of Digital Transformation

To successfully transform, keep the momentum of any initiative moving toward your ultimate business goals. To do so, continually address the main drivers of digital transformation: digital twin, privacy, culture, augmented intelligence, and digital product management.

According to Gartner, CIOs need to focus on these five areas to enable successful digital transformations in their organizations.

1. Digital Twins

Gartner defines digital twin as "a digital representation of a real-world entity or system. The implementation of a digital twin is an encapsulated software object or model that mirrors a unique physical object, process, organization, person or other abstraction."

Digital twins support digital transformation because they facilitate experimentation and collect data that supports more informed business decisions.

2. Privacy

If you can't manage privacy, your digital transformation is destined to fail. As more digital solutions become available, organizations tend to jump on trends that offer more convenience. However, Gartner's research reveals that a large portion of consumers and employees are not willing to give up safety and security just for convenience. CIOs need to take privacy seriously. Employees and consumers won't support a transformation if they feel it violates their privacy or personal data security.

3. Culture

Resistance to change is a human instinct. When you ignore the cultural aspect of a digital transformation, you'll start hitting walls of resistance fairly quickly. In fact, 46% of CIOs say culture is their biggest barrier to change. Addressing culture ensures you get internal buy-in for your transformation initiative. When you have change leaders — vocal supporters of your digital transformation — you can use their voices to drive your initiative forward.

4. Augmented Intelligence

Augmented intelligence goes beyond artificial intelligence (AI), allowing humans and machines to work in tandem. AI's data collection and analysis capabilities far surpass that of a human worker. But augmented intelligence isn't about replacing employees with machines — AI collects and presents data in a way that allows people to augment their knowledge.

5. Digital Product Management

Gartner explains digital product management as the shifting of mindsets from projects to products. Those products must be designed to improve the customer experience and be delivered through digital channels.

Digital product management is about knowing your industry and designing products that serve it. For example, instead of expecting the healthcare industry to align with Apple's offerings, Apple created a watch that monitors the health of the wearer .CIOs who focus on these five key drivers can stay ahead of their competition by constantly improving and growing their businesses

Digital Transformation Challenges:

Digital transformations fail for many reasons, but most issues can be linked back to one of three digital transformation challenges: people, communication, and measurement.

1. People

People can make or break your digital transformation. Remember: culture is both a top driver of digital transformation and one of the six pillars of successful ones. If you don't put enough focus on people and culture, your initiative is bound to fail. Sixteen of McKinsey's 21 keys to success in digital transformation involve people.

2. Poor communication

Announcing a digital transformation initiative is not the same as communicating with your team about it. Often, leadership simply mandates changes without taking the time to explain the why and how. If you don't provide specific and actionable guidance before, during, and even after a transformation, your initiative won't make it very far. You can learn more by reading our guide to change communication.

3. Lack of measurement

You can't have a successful digital transformation if you failed to define what success means to you. Companies sometimes assume they can monitor success based on the key performance metrics (KPIs) they've already established for their business. But if you're changing the way you do business, you'll need to set additional KPIs to monitor the effects.

Get Started with Digital Transformation:
A digital transformation strategy is a plan of action for introducing, analyzing, and driving a digital transformation initiative forward. Your strategy will define what business goals you aim to achieve through digital transformation.

An effective digital transformation strategy will create a framework for you to follow throughout this ever-evolving process. But before you begin, it's important to know what you hope to achieve so you can designate KPIs to track along the way.

For example, if you are migrating users from Salesforce Classic to Lightning, your high- level metrics for measuring adoption would be log-in rates, usage, data quality, and business performance.

In this case, you might drill down further and monitor metrics such as:

- Monthly sales volumes
- Opportunities created
- Sales productivity (e.g., time saved, volume of sales activity per rep)
- User log-in rates
- Prospect account with key fields populated

A well-thought-out strategy will also address how the transformation will affect your customers and your employees. Start internally by designating change leaders who will publicly support your transformation. Putting trusted change leaders in charge of announcing and supporting the transformation will help generate momentum. Regularly soliciting feedback from anyone affected by the change will also help keep the momentum going.

Don't forget to include your team's accomplishments as part of your progress tracking. Whether you're pointing out a quantitative achievement, e.g., a 10% increase in user log- in rates, or qualitative, e.g., Beth created a Slack group to answer questions about the transformation – celebrating milestones throughout the process is important.

Customers and employees alike will turn to the people initiating the transformation to gain the knowledge they need to be successful. It's up to you to provide the necessary tools.

Those tools may come in many forms, but if you're making a digital transformation, chances are, there are digital resources that could support your transition. Will you use e-learning tools for training? Could videos allow users to learn at their own pace?

Keep in mind that transformations are an evolution, so leveraging tools that can adapt quickly, like digital adoption platforms, could save you time and effort down the line.

Digital Transformation Trends:

Different types of transformations rise and fall in popularity as technology changes. Keeping up with trends is a great way to see how you can improve your own digital transformations and prepare for inevitable changes in your industry.

Right now, the hottest trends in digital transformation all tie back to one thing: creating a better customer and employee experience. Although many people, employees in particular, fear that some technology is designed to replace humans, great digital transformations involve technology that complements human work.

AI, Robotic Process Automation, 5G, mobile development, and personalized user experiences are all examples of digital transformation trends that aim to work alongside humans to do everything from improving communication to limiting repetitive work.

Digital Transformation and Digital Disruption

The COVID 19 pandemic forced many companies to adopt new business models based on digital solutions. The in-person collaboration came to a sudden halt. Businesses that survived discovered new, efficient digital workflows.

Digital transformation simultaneously requires businesses to adapt and enables them to do so. By embracing change, a business can keep up with an evolving market and consumer expectations while addressing challenges specific to the pandemic.

Smartphones

Digital transformation disrupts established industry. Perhaps no other emerging technology has caused a more noticeable supply chain disruption than the over three billion smartphones in circulation worldwide. In effect, a smartphone is its own digital platform, having an impact on markets ranging from music to entertainment to transportation to photography.

For example, digital transformation has completely reworked every industry associated with photography. Embedded cameras nullify film manufacturing and camera sales.

Smartphone cameras have a virtually unlimited "film roll" and no need to develop prints.

The rise of social media has occurred in lockstep. Users can upload photographs immediately to the internet, driving the popularity of apps that use digital photos. Instagram, for instance, started in 2010 and now features users who share more than 40 billion images every day, according to the IEEE Digital Reality white paper.

Smartphone use has infiltrated other industries as well. In manufacturing, smartphones have enabled real-time monitoring of productivity, sales, and supply chain performance.

Internet of Things Advancements in Health Analytics

Beyond just monitoring, though, manufacturers have embraced digital transformation to predict and react. Retailers are learning to harness artificial intelligence to support data analytics. Smart devices can "talk" to the internet and connect with each other, a phenomenon known as the Internet of Things, or IoT. Complex sensors on these networked devices feed machine learning algorithms.

This modernization, part of what's known as the fourth industrial revolution or Industry 4.0, involves a transformation of the entire production line: supply

chain, distribution, and operations. Certain countries, such as Finland and Germany, have launched initiatives that encourage all stakeholders to rethink the entire manufacturing value chain.

These initiatives include friendly regulations, investment in infrastructure, support for research, IoT deployment and expansion, and fiscal support for participating industries. In short, Industry 4.0 uses digital technology to create a more sustainable, efficient business model.

II. CONCLUSION AND RECOMMENDATIONS

Digital is the way forward. Based on the above literature is very clear that organization failed to adopt the digital transformation lost the market share and out of the business. Business has to move where their potential customers are. Customers are started using digital platform to fulfil their needs and requirements. Digital payments, API and Smar Phone play a major role in digital transformation.

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Optimized Image Processing using Big Data Dynamic Handover Reduce Function (DHRF) in Cloud - Review

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ABSTRACT

Processing of hard task like this can be solves by using the concept of Hadoop, Map Reduce .Hadoop is a framework that allows to process and store huge data sets. Map Reduce is a programming model which allows you to process huge data stored in hadoop. Map is a concept of splitting or dividing data and Reduce function is the process of integrating the output of Map's input to produce the result. The Map function does two various image processing techniques to process the input data. Java Advanced Imaging (JAI) is introduced in the map function .The processed intermediate data of the Map function is sent to the reduce function for further process. The Dynamic Handover Reduce function (DHRF) algorithm is introduced in the Reduce function. This algorithm gives final output by processing the Reduce function. MapReduce concept and proposed optimized algorithm is made to work on Euca2ool(cloud tool) to produce an effective and better output compared to previous tasks in field of Big data and cloud computing.

Keywords -Hadoop, MapReduce, DHRF, Euca2ool, Cloud Computing

I. INTRODUCTION

Hadoop is an open source framework which is used to processing on large data sets. Many times hardware failures are occur and it will be handled by Hadoop framework. Hadoop image processing library provide solution to store large amount of images on Hadoop distributed file system. This library provides the implementation with opencv (open source computer vision library).Hadoop working with different demeans such as name-node is run on master node. Data-node is runs on Slave-node. The Name node instructs data files to be split into blocks, each of which are replicated three times and stored on machines across the cluster. Client machine is responsible for loading data into the cluster. It will

submit Map Reduce jobs and viewing the results of the jobs. Job-tracker tracks jobs which split into cluster. The Task-tracker accepts tasks from the Job-Tracker. The reduce phase extract image stored in HDFS the specific processing in shown figure 1
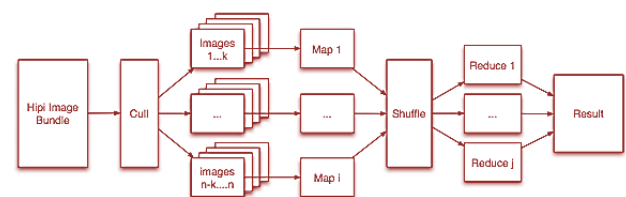

Fig 1 Hadoop Image Processing

Hadoop image processing interface library designed is used with parallel programming framework. It provide how to storage a large collection of images on Hadoop distributed file system and make available or efficient distributed processing and it is integrated with opencv a popular open source library. The HIP Image is base class provide to the underlying grid of pixel image value as array , bytes and floats, respectively. it provide a number of useful function like crop, color space and conversion and scaling.

1. **Hipi Image Bundle:** It is open source framework. It maintained by a group of dedicated researchers and developers.

2. **Cull:** The initial stage of a Hadoop image processing interface program is a culling step that allows filtering the images in a Hadoop based on a user denied condition are used in spatial resolution and criteria related to the big data.

3. **Images:** The primary presentation for a collection of images on the Hadoop distributed file system. Map reduce is optimized to support efficient processing of large file system. HIB is actually compared two file stored on the system.

4. **Shuffle**: shuffle can start before and after map phase has finished to save same time. Reduce status is greater than 0 percent but less than 3% when map status is not yet 100%.

5. **Mapper:** Take the data and convert into another set of data where Individual elements are broken down into tuples.

6. **Reducer**: Take the data from mapper and combine those data tuples into smaller set of tuples.

II. Data Processing

In the proposed work, two various types of image processing techniques are applied for the input (Big Data) as shown in the Fig.3.The first technique is the combination Grayscale and Sobel edge detection. The second technique is the combination of Gaussian Blur

and Fast Corner detection method. The Grayscale conversion is the best method to convert the original image into Black and White image and Sobel edge detection is the method of detecting the edges of the images
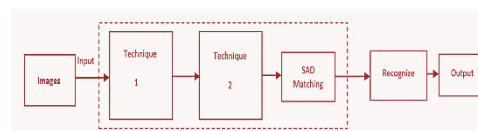
Fig 2 – D9ata processing techniques

Gaussian Blur is the best blurring technique ever, used here to blur the input image. Finally the Fast Corner Detection technique, since that is the best technique. After the completion of both the processing, the data is then transferred to the next level of Matching called SAD matching. Then the integration of the intermediate data is done to recognize the output

III. DHRF

DHRF (Dynamic Handover of Reduce Function) is an algorithm implemented in the proposed work. The function of this algorithm is to reduce the waiting time during the Reduce function. The work of the reduce function is to integrate the processed data. Two sets of image processing techniques are applied on the intermediate data such as Grayscale, Sobel, Gaussian and Harris Corner detection. These techniques are applied on the spitted data which are produced after the application of Map function. Each and every intermediate data are applied with two techniques.

BufferedImage
res = new BufferedImage(width,height,BufferedImage
.TYPE_BYTE_GRAY);
// Initialize the image process
byte[]bytesCompressed=compressor.compress(image toCompress);

```
Deflater                    deflater             =
new Deflater();deflater.setInput(bytesToCompress);
//Produce the data compression
 BufferedImage         resizedImage       = new
BufferedImage(IMG_WIDTH, IMG_HEIGHT, type);
Graphics2D g = resizedImage.createGraphics();
g.drawImage(originalImage,    0, 0,    IMG_WIDTH,
IMG_HEIGHT, null);
g.dispose();
// put the data into scaling
 Static{
URL.setURLStreamHandlerFactory(new FsUrlStream
HandlerFactory());
} // write the map reduce structure
 in = new URL(PATHTOBEMAPPED).openStream();
IOUtils.copyBytes(in, System.out, 2, false);
//set the server to handle mapper
FSDataOutputStreamout = fileSystem.create(path);
InputStream   in  = new   BufferedInputStream(new
FileInputStream(new File(source)));
// mark data into HDFS of Hadoop
Process   the   image   until   completing   the
grayscale,sobel, guassian, fast corner, SAD matching
of the image.
 // operate the data process until the data processed
map(in_key,        in_val)            -> list(out_key,
intermediate_val)reduce(out_key,
list(intermediate_val)) -> list(out_value)
//Set the MapReduce Operation
FileSystem fs = file.getFileSystem(context.getConfigur
ation());FSDataOutputStream
fileOut = fs.create(new Path("your_hdfs_filename"));
// write the data mapper
reduce(WritableComparable,
Iterator, OutputCollector, Reporter)
 continue until reducer task is complete
 // send mapper output data to reducer
 JobConf.setNumReduceTasks(int)
 // set small unit value to the task and reducer
wait queue
interrupt.task
```

store the result(image).

When the image is processed by the template, the image is compressed and scaled then produces the Map functions. In the first set of Grayscale method, it delivers the image in black and white without noise disturbances. The Grayscale image output hand over's the edge detection technique to the next process. It removes the outer layer of noise disturbance. So enhancement of the best edge detection technique called Sobel edge detection technique is done. Then the implementation of Gaussian blur reduces the image noise. It is for pre-processing stage for any image enhances structure. So the retrieval of formal blur image can be used for the detection of corners. The corner method defined as a point of two different edge directions and dominant. In this, corner detector works uses only a segment test, so the result is very accurate and quality at the mean time of time reducing in the .jpeg format.

Finally Map function results are sent to reduce operation. The implementation of DHRF algorithm focuses on Reduce function integrating the task and allots the process to produce the result .Jpeg format. In Reduce function, it involves the small unit of value for determining the task and sequentially it completes the process. Whether the process is completed, it produces the result .jpeg format.

IV. Proposed methodology

Euca2ool is a Cloud tool that is private cum hybrid Cloud Tool. Though there are many tools to solve the problems in big data..This enhanced tool will definitely give the better result in both the time and cost estimation. Basically Hadoop is enhanced of HDFS and MapReduce function. Since the MapReduce function is an open source, the codes can be edited and modified. The coding is edited now in the Map part. The coding is made in such a way that, the inputs are split into maximum of ten parts. Sothat the Map function will be easy while processing. This change in the Map function will reduce the

processing time.The coding or the application set up of the image processing techniques is installed on the Euca2ool, to run the experiment.Basically Map is the primary function in the process of Big Data. Splitting the data into maximum number of part is called as MapFunction. In the proposed work, Pre-Map concept is implemented. Pre-Map is the concept of Map the Map function. The situation in which, when the Map function is proposed to do, the data will be mapped before the Map function into maximum number of parts.

a) *How Cloud Computing is involved in Image Processing*

The HDFS is used to store, retrieve and process the data. Few image processing techniques are used in the cloud computing. Since, Big Data is referred to the context called image/data. When the data is taken as the input, it is made to undergo the Map Function. The function of the Map function is to Split the data into maximum number of data called as intermediate data. Those intermediate data are split to process further. Two set of image processing techniques are used in Cloud Computing.
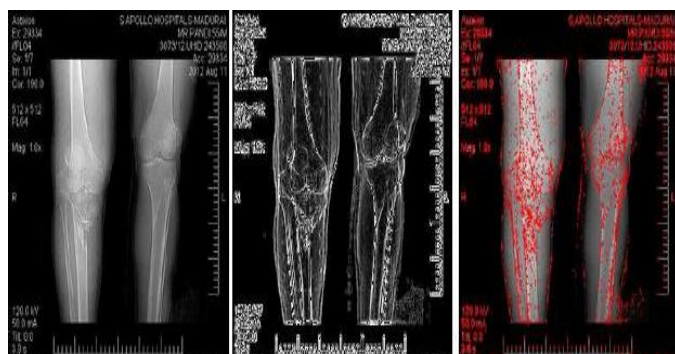

Fig 3 Results

JAI does the task of converting the data. Either the data may be a structured or unstructured one. By using the JAI, the data are converted to structured data. Fig 4 shows the results of obtained from the data processing techniques. Further, the inputs are processed first with the Pre-Map technique. Pre-Map technique is used, to split the data before sending the data to Map function.This Pre-Map

function split data in to maximum number of parts, in order to reduce the processing time during the Reduce application. After the function of Pre-Map and Map Function gets over on the Data, the data are set to intermediate data. The Map function is done by the client machines. These intermediate are made to undergo the two set of image processing techniques. To avoid the waiting time, the Dynamic Handover Reduce Function (DHRF) is applied on each and every intermediate data. This results in the output of the input (Big Data).

V. RESULT

Fig 4 shows the result of the Fast Corner method. In this figure, the sharp edges and the damaged parts are pointed out sharply. The red mark shows the infected corners. When compared with the Harris corner method in the existing work [2], this is proved to be the best corner detection. The application of the two image processing techniques, gives the expected result
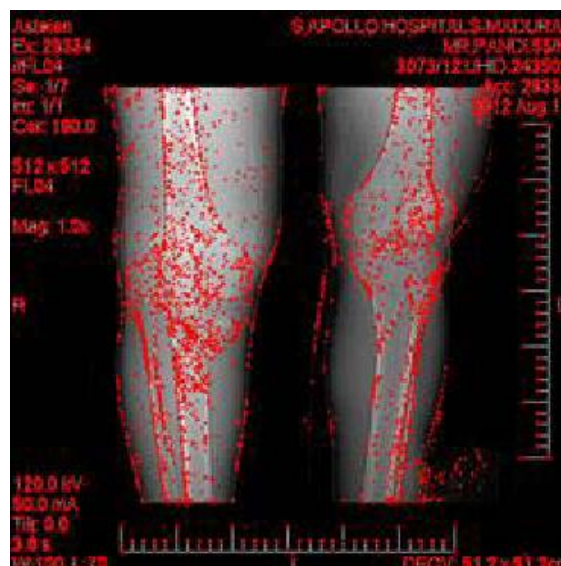
The result shows the sharp edge and damaged part through Fast Corner method The Fig 5 graphical representation is betweenthe estimated time and total number of Machines. In theproposed system,

the taken to process the image iscomparatively less than that of existing system.
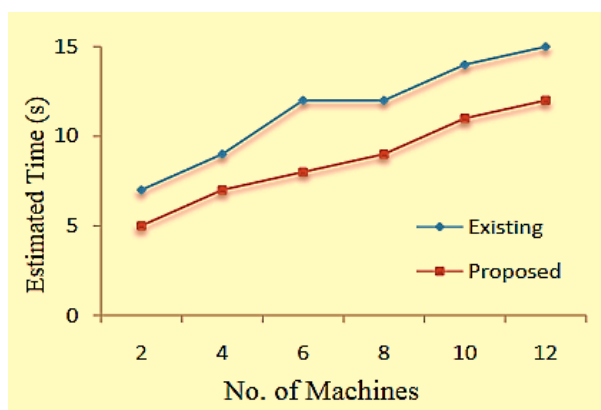

Fig. 5 Proposed and existing techniques

finally, this Fig 6 shows the graphical representation between Existing Map function with the Proposed Map function. In the existing Map function, the data will simply just get splitted in the normal way. But in the proposed system, we have introduced Pre-Map technique, it basically Maps the data before sending to the Map Function. By default the data processing will be simple. This is graphically explained in the bellow picture.
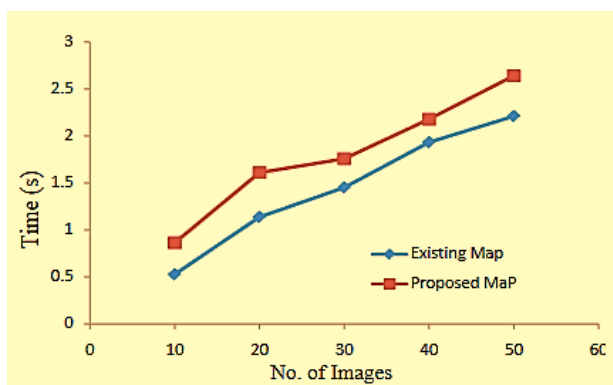

Fig 6. Effect of mapping techniques

VI. CONCLUSION

This proposed system, the image processing techniques have reduced from four to two image processing techniques, with proposed an optimized scheduling algorithm. This work resulted with waiting time and error percentage. An application of

JAI and pre-Map technique with hadoop over Euca2ool results with far better results in entire when compared with the existing system. Further, our research works will be an application of scheduling over heterogeneous networks for scheduling and resource allocation.

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Behaviour of Black Buck in Kaimure Wild Life Sanctuary Mirzapur Sonebhadra, UP

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ABSTRACT

The research activities are the least priority area in Vindhyan region. Though, it is high time to organize research well as monitor conservation activities in this area. Therefore, the present work has been undertaken to study the ecology, and behavior of black-buck so that some contribution could be made in the proper conservation and management of the wild life biodiversity of Vindhyan region with special reference to this prey-base animal which has an ornamental value also. The seals of the Indus valley civilization (Circa 3500 BC) depict black-buck, as do the rock paintings of central India (Circa 5000-2500 BC). The black-buck continued to remain a favorite subject of the Rajput. Mughal and later the Pahari painters. The word "Mriga" (deer) is a generic term in the classical Indian language implying both doers and antelopes and appears often in the Vedas, the Purana. the Buddhist Jatakas and stories of the "Panchatantra". When depicting on illusory; mriga with the Golden Fleece, with which the demon Rawan tempted Sits, is an incident of vital significance in the Ramayana epic. Medieval painters always portray the black-buck. Akbar's son Jahangir was a keen observer of animal behavior and patron of arts. Jahangir nominated his favorite black-buck 'Mansaraj' as the "Chief' of his captive black-buck and when the animal died, an imposing 'hurl (around fortress like building) surrounded by a moat was built in his memory (Tuzuk-l-Jahagiri, Janhangir). The monument still exists.

Keywords : Mriga, Panchatantra, Vindhyan region

I. INTRODUCTION

The present study is confined to the ecology and behavior of an endemic, timid and beautiful antelope commonly known as black-buck in Kaimur wildlife sanctuary. Kaimur wildlife sanctuary is situated in the civil district of Mirzapur and Sonbhadra between 24033' and 24073' North latitudes and between 82012' and 82021' East longitudes. This area is characterized by tropical dry deciduous and scrub forests, interspersed with open Savannah patches of central Vindhyan ranges covering a part of drainage basin of the Ganges river system,

which has been ancient home for number of wild species. Since black-beck forms an important component of food chain and major prey base for carnivores, their destruction will he danger point for them. White, a hue and cry is raised about poaching of tiger, the silent hunting of black-buck is still going an without a word of protest. Gentleman, farmers and tourist in hotels just outside the protected area have no feeling of moral consideration in picking up venison. Villagers living at the fringe of forest also think that they have right to pick up some good meat occasionally. All eyes are focused on tiger and on the contrary, the number of this timid beautiful mammalian fauna is dwindling fast.

Despite such a rich traditional and socio religious background, India is still witnessing serious depletion of this beautiful biological heritage. The drastic-decrease in the population of black-back had led the emphasis to work out the ecological and natural behavior of the animal and also to workout serious conservation techniques for the increase of the population in protected areas as well.

Materials and Methods:

The newly formed divisional head quarter 'Vindhyanchal' in U.P. comprises of three districts viz. Mirzapur, Sonebhadra and Sant Ravidas Nagar (Bhadohi). The present investigation is confined to the study of ecology and behaviour of Black-buck *(Antelope cervicapra)* with special reference to conservation and management of the species in Vindhyan forest ranges which covers the southern part of district Mirzapur and Sonebhadra. This region is made up of alluvial plains, Vindhyan sand stone rocks, along with tropical dry deciduous and scrub forests, interspersed with open savannah patches.

The six months before the registration of my synopsis were devoted chiefly to the study of black-buck in the study area i.e. Vindhyan forest ranges, to determine which aspects of ecology and social behavior are important to quantify their number, to record details of social interactions and to trace the development of fawn of known age in order to establish the basis for comparison with other free living herbivores.

It soon became apparent that a wild life study such as I had in mind was feasible only in a sanctuary because the animals in the unprotected forest were usually so shy and sparse that prolonged observations proved difficult. It was also desirable to locate a site with low human and livestock populations as well as one where the possibilities of viewing the wild life were adequate throughout the year.

BEHAVIORAL STUDIES OF BLACK-BUCK
DAILY ACTIVITY CYCLE

Daily routine of grazing and resting of *Antelope cervicapra* changes somewhat with the seasons. During the cool weather the animal rise with the first pale light at about 6 '0' clock morning and then grazed intermittently throughout the day. Resting period remains usually between 9 p.m. and 4 a.m. The rest periods are utilized for ruminating. One herd, which was

observed during the night of 27-28 February, 2004 grazed until about 9 p.m. in Mahuaria, Robertsganj.

During the hot weathers the animal rose at about 5 'O' clock morning and feed until around 7.30 a.m. After that they often withdraw themselves into the shades until late afternoon, spending much less time in foraging during day light than in the previous season (Photoplate 25A, 25B). During the monsoon, with its abundant forage, the *Antelope cervicapra* stand around and walk a great deal but seems to feed little.

In the Halia range I saw that *Antelope cervicapra* move closer to agriculture or crop grounds towards the evening but not actually enter the field till the dark. The early part of the night was a period of rest, around mid night intermittent grazing, thereafter, an intensive grazing from predawn onwards. They frequently continued to feed in field well past sunrise till the cultivators drive them off.

FOOD AND FEEDING BEHAVIOUR

I observed the daily, monthly and annual pattern of activity of black- buck and observed that the black-buck is primarily diurnal. Once I observe in Halia range that a black-buck caught a ripe bel fruit *(Aegle marinelos)* by inserting a hook which was left on the ground the black-buck reached near

and ate it. However, the food intake of the black-buck the sanctuary mainly consisted of grasses, sedges and herbs and agricultural crops. At the onset of the monsoon, black-buck feed on *Cynibopagon caerius rotundus, Cynodon dactylon* and *Astrids* species. In the dry season, black-buck consume mainly *Tridax procumbenS Calotropis procera,* leaves of *Carisa* species, *Acacia nilotica* and fruits *of Phoenix sylvestris.*

It is relatively easy to determine the principal food species of the black-buck in a given area, even though this changes with the season. However, these principal food species are very frequently not the preferred food species of the animal. The later can be assessed by the percentage of a food species in the diet divided by the percentage of its availability in the habitat. Since black-buck population in all the ranges of sanctuary live in areas adjacent to agricultural crops which they raid whenever available, it is difficult to assess precisely its preferred foods, especially the wild grasses.

COURTSHIP MATING BEHAVIOUR

MATURITY PERIOD

Maturity period of female black-buck was assessed with the help of local people as well as the sanctuary workers. As per information gathered some black-buck reached sexual maturity just prior to attaining the age of 4 years, but would have been able to reproduce at least a year earlier. An immature male whose period of birth was approximately known, mated in Halia range at the age of a little over 3 *V2* years. However, in view of the harem and quasi-harem situation in most of the herds, the breeding is very largely carried out by males of the age group 5 to 7 years. While, I observed at the Halia range, a female first fawned at the age of 2 years and one month, another at the age of almost *2.5* years and a third at the age of 2 years 1 month and 22 days. Three females gave birth when approximately 22 months old. In black-buck valley, Mahuaria, Robertsganj the earliest record of a conception and birth is at the age of 8 months and at the age of *13.5* months, respectively. During the estrous cycle the female is receptive for approximately 24 hours.

COURTSHIP BEHAVIOUR

Initially *Antelope cervicaprca* males thrashed the bushes or saplings available with horns in aggression. The forelegs were slightly spread angled for better balance and occasionally the pre-orbital glands were also wiped on the vegetation during and after thrashing. In barren or semi-arid areas, thrashing of vegetation of course was hardly witnessed further this appeared to be substituted by a vigorous rubbing of the ground with horns in a, semicircular motion.

The rutting behaviour is marked by prolonged courtship, terminating in short forceful copulation. The courtship and copulation is primarily the activity of adult dominant male and female in heat, through unsuccessful attempts are made by the younger males and yearling males.

Courtship is initiated by the adult dominant who searches and follows the females in heat. The dominant male in the rutting period sniffs the vulva of every adult females and, at times, of yearling females too. Generally when the adult male sniffs the vulva of female in heat, she urinates and the adult buck licks the streaming urine with rapid head movements and finally after sniffing the ground gives a head-up display with twisting lips. This gesture have been termed as 'Flehmen' the bucks are able to determine the state receptivity in females by her odour. On finding such a female the dominant male exhibits 'tending behaviour'. The buck remains close to the female, puts his neck on her rump, walks gracefully by her side and occasionally sniffs and licks her hind parts. If the female standstill, the dominant male also stands by her side and gives a head-up display which is some times reciprocated by the female. If the female lies down, the male also rests by her side or at a few feet away.

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receptivity in females by her odour. On finding such a female the dominant male exhibits 'tending behaviour'. The buck remains close to the female, puts his neck on her rump, walks gracefully by her side and occasionally sniffs and licks her hind parts. If the female standstill, the dominant male also stands by her side and gives a head-up display which is some times reciprocated by the female. If the female lies down, the male also rests by her side or a t a few feet away.

SOCIAL BEHAVIOUR WITHIN GROUP

In both mixed and female herds, affinity between two females, often of different age groups, was noticeable. This was expressed in proximity in
movement, rest and feeding and in the general co-ordination of actions though there was no way of ascertaining it positively, this could will be a bond between a mother and a grownup daughter.
Yearlings sometimes grouped together in a herd, both in movement and in play. Fawns which are over a fortnight old also associate with each other. Older fawns are usually the first to be allowed to approach a new born
fawn in a herd,. A bond of association develops amongst the fawns which frequently leads to the establishment of close companionship between two fawns who do almost everything together except nurse.

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Synthesis and in Vitro Cytotoxicity Evaluation of Isatin-Pyrrole Derivatives against HepG2 Cell Line

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ABSTRACT

This paper reports the synthesis and *in vitro* cytotoxicity evaluation of isatin-pyrrole derivatives 5–8, obtained from the appropriate isatins with pyrrole, with good yields and purity. The product structures were confirmed through spectroscopy methods. Furthermore, the MTT assay on the human liver cancer HepG2 cell lines revealed moderate activity in all compounds, which was highest in sample 6 (IC50 0.47 µM). The anticancer activity was affiliated with the presence of a nitro group at C-5 and *N*-methyl of the isatin scaffold.

Keywords : isatin; isatin-pyrrole derivatives; anticancer; HepG2 cell line.

I. INTRODUCTION

Cancer is a serious threat to human health and a leading cause of death globally [1]. According to the GLOBOCAN 2018 database, 18.1 million people of all ages have various types of cancer, leaving almost half of the total affected individuals dead [2]. Additionally, chemotherapy is one of the most common treatments and is known to confer several disadvantages, including toxicity to normal cells [3]. Hence, there is a need to develop drugs with lower cytotoxicity. Moreover, the most promising approach is molecular hybridization or pharmacophore hybrid [4]. This involves the combination of two distinct pharmacophore functions to produce synergistic, more powerful, selective, and safer drugs [5].

Great efforts have been made to promote this technique, based on the isatin skeleton to develop cancer drugs [6], and recent studies show good anticancer activity in isatin **1** and its derivatives [7]. For example, the isatin-podophyllotoxin and nitroimidazole-isatin hybrid were reported to be active against human leukaemia and breast cancer cells, respectively [8,9]. These effects are altered by modifications at the C-3, amide group, and phenyl ring of the isatin hybrid, as better activity was detected with the presence of a nitro group at C-5 isatin and a methyl or benzyl group at N-isatin [10,11,12].
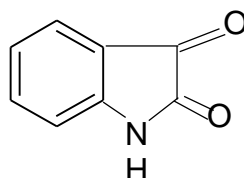
Pyrrole is another important active chromophore with heterocyclic aromatic characteristics. It contains a nitrogen atom and is part of the cofactors and natural products of vitamin B12 and porphyrinogens [13,14]. Furthermore, pyrrole possesses broad-spectrum bioactivities, including anticancer and antibacterial functions [15,16], while molecular hybrid derivatives, including oroidin and sophoridine, recently exhibited remarkable anticancer activity against MCF-7 and HepG2 cancer cell lines [15,17]. Moreover, the trimethoxybenzaldehyde-pyrrole hybrid demonstrated good effects against HeLa and MCF-7 [18].

These findings suggest the need to investigate the combination of pharmacophoric elements including isatin and pyrrole, in a single chemical framework, and to investigate their cytotoxicity. Additionally, the effect of the nitro and amino group at the C-5 region of isatin and the methyl group of N-isatin on the compound's anticancer activity was also investigated. This study, therefore, reports on the synthesis of isatin-pyrrole derivatives alongside with their anticancer activity against HepG2 cancer cell lines.

Materials and method

All chemicals and solvents were purchased from commercial suppliers and used without purification. Melting points were measured using a Fisher John apparatus and are uncorrected. The Fourier-Transform Infrared (FT-IR) spectrum was confirmed using FTIR spectrophotometer Shimadzu 8400S. The mass spectra were recorded using LC-MS Mariner Biospectrometry Hitachi L 6200 with ESI Waters LCT Premier XE or TOF-MS Waters LCT Premier XE mass spectrometer. The proton (^{1}H) and carbon (^{13}C) nuclear magnetic resonance (NMR) were measured in acetone-d $_6$ solvent using FT-NMR JNM-ECA500 500 MHz and FT-NMR JNM-ECS400 400 MHz.

1. Synthesis of N-methyl-5-nitroisatin (3)

The synthesis of **3** was performed by stirring 5-nitroisatin **(2)** (200 mg, 1.04 mmol) and sodium hydride (100 mg, 4.16 mmol) in anhydrous dimethyl sulfoxide (10 mL) at rt for 1 h. Dimethyl sulfate (0.40 mL, 4.16 mmol) was added, and the mixture was cooled with ice with stirring for 2 h before adding cold water. The resulting precipitate was filtered off, washed with water, and dried to yield N-methyl-5-nitroisatin **(3)** as a yellow solid (200 mg, 95%), mp 145–146°C (lit. 132–134°C [19]). IR (KBr) ν cm^{-1}: 3,063 (C–H aromatic), 2,945 (C–H sp^3), 1,743 (C=O), and 1,608 cm^{-1} (C=C aromatic). ^{1}H-NMR (500 MHz, acetone-d $_6$): δ, ppm 3.36 (s, 3H, CH$_3$), 7.41 (d, J = 9.1 Hz, 1H, ArH), 8.32 (d, J = 2.6 Hz, 1H, ArH), and 8.60 (dd, J = 9.1, 2.6 Hz, 1H, ArH).

2. Synthesis of 3-hydroxy-3-(1H-pyrrol-2-yl)indolin-2-one (5)

A solution of isatin **(1)** (0.15 g, 1.02 mmol) in methanol:water (1:1) (20 mL) was stirred at 50°C, and then potassium carbonate (7.0 mg, 0.051 mmol) and pyrrole **(4)** (71 μL, 1.02 mmol) were added. After stirring for 30 h, cold water was then incorporated, and the product was extracted several times with dichloromethane. The extracts were combined, dried over magnesium sulfate, followed by evaporation under reduced pressure. Subsequently, the crude product was purified using column chromatography with chloroform:ethyl acetate (3:1) eluant to yield 3-hydroxy-3-(1H-pyrrol-2-yl)indolin-2-one **(5)** as a black solid (100 mg, 45%), mp 151–152°C. IR (KBr) ν cm^{-1}: 3,375 (N–H), 3,198 (O–H), 1,710 (C=O), and 1,622 cm^{-1} (C=C aromatic). ^{1}H-NMR (500 MHz, acetone-d $_6$): δ, ppm 5.37 (s, 1H, O–H), 5.67 (1H, d, ArH pyrrole), 5.90 (t, 1H, ArH pyrrole), 6.80 (d, 1H, ArH pyrrole), 6.89 (1H, d, ArH isatin), 7.02 (1H, t, ArH isatin), 7.23 (1H, t, ArH isatin), 7.27 (1H, d, ArH isatin), 9.26 (bs, 1H, N–H isatin), and 10.04 (bs, 1H, N–H pyrrole). ^{13}C-NMR (125 MHz, acetone-d $_6$): δ, ppm 73.3, 107.1, 107.4, 110.0, 119.4, 122.0, 125.2, 129.4, 129.8, 131.8, 141.9, and 177.3. HRMS (ESI): m/z calcd for C$_{12}$H$_9$N$_2$O$_2$, [M − H]$^+$ 213.2121; found: 213.1722.

3. Synthesis of 3-hydroxy-5-nitro-3-(1H-pyrrol-2-yl)indolin-2-one (6)

A solution of 5-nitroisatin **(2)** (72 mg, 0.37 mmol) in methanol:water (1:1) (10 mL) was stirred at 50°C, and then potassium carbonate (2.6 mg, 0.019 mmol) and pyrrole **(4)** (0.026 μL, 0.37 mmol) were added. After stirring for 5 h, cold water was added, and the product was extracted several times with dichloromethane. These combined extracts were dried over anhydrous magnesium sulfate and evaporated under reduced pressure to produce 3-

hydroxy-5-nitro-3-(1H-pyrrol-2-yl)indolin-2-one (6) as a green solid (49 mg, 51%), mp 163–164°C. IR (KBr) ν cm⁻¹: 3,375 (N–H), 3,279 (O–H), 1,720 (C═O), and 1,627 cm⁻¹ (C═C aromatic). ¹H-NMR (500 MHz, acetone-d ₆): δ, ppm 5.82–5.83 (m, 1H, ArH pyrrole), 5.84 (bs, 1H, OH), 5.97–5.99 (m, 1H, ArH pyrrole), 6.89–6.90 (m, 1H, ArH pyrrole), 7.18 (d, J = 9.1 Hz, 1H, ArH isatin), 8.28 (dd, J = 9.1, 2.6 Hz, 1H, ArH isatin), 8.36 (d, J = 2.6 Hz, 1H, ArH isatin), 9.95 (bs, 1H, NH pyrrole), and 10.30 (bs, 1H, NH isatin). ¹³C-NMR (125 MHz, acetone-d ₆): δ, ppm 74.9, 108.6, 108.8, 111.3, 121.3, 121.9, 127.0, 129.0, 134.3, 144.9, 149.1, and 180.3. HRMS (ESI): m/z calcd for $C_{12}H_{10}N_3O_4$, $[M + H]^+$ 260.0671, found: 260.0674.

4. Synthesis of 3-hydroxy-N-methyl-5-nitro-3-(1H-pyrrol-2-yl)indolin-2-one (7)

A solution of N-methyl-5-nitroisatin (3) (110 mg, 0.53 mmol) in methanol:water (1:1) (20 mL) was stirred at 50°C, and then potassium carbonate (5.37 mg, 0.039 mmol) and pyrrole (4) (26 μL, 0.37 mmol) were added. After stirring for 2 h, cold water was added, and the product was extracted several times with dichloromethane. These extracts were dried over magnesium sulfate and evaporated under reduced pressure to generate 3-hydroxy-5-nitro-3-(1H-pyrrol-2-yl)indolin-2-one (7) as a green solid (88 mg, 63%), mp 139–140°C (lit. 102–103°C [20]). IR (KBr) ν cm⁻¹: 3,543 (N–H), 3,325 (O–H), 1,710 (C═O), and 1,614 cm⁻¹ (C═C aromatic). ¹H-NMR (500 MHz, acetone-d ₆): δ, ppm 3.27 (s, 3H, CH₃), 5.81–5.82 (m, 1H, ArH pyrrole), 5.89 (bs, 1H, OH), 5.96–5.98 (m, 1H, ArH pyrrole), 6.88–6.89 (m, 1H, ArH pyrrole), 7.25 (d, J = 7.8 Hz, 1H, ArH isatin), 8.34–8.37 (m, 2H, ArH isatin), and 10.32 (bs, 1H, NH pyrrole). ¹³C-NMR (125 MHz, acetone-d ₆): δ, ppm 29.9, 73.8, 108.1, 108.4, 109.6, 121.0, 121.1, 127.3, 129.3, 133.3, 144.3, 150.3, and 176.9. HRMS (ESI): m/z calcd for $C_{13}H_{12}N_3O_4$, $[M + H]^+$ 274.2521, found: 274.2660.

5. Synthesis of 5-amino-3-hydroxy-3-(1H-pyrro-2-yl)indolin-2-one (8)

5-Amino-3-hydroxy-3-(1H-pyrrol-2-yl)indolin-2-one (8) was produced by reducing 3-hydroxy-5-nitro-3-(1H-pyrrol-2-yl)indolin-2-one (6). This reduction involved heating a mixture of 6 (75 mg, 0.29 mmol) and Pd/C (7 mg) in ethanol (10 mL) at reflux for 1 h. Then, hydrazine hydrate (40 equiv) was added dropwise, followed by heating at reflux for an additional 1 h and subsequently filtered after cooling. The filtrate was evaporated under reduced pressure, followed by crude product purification using column chromatography with chloroform:ethyl acetate (1:3). Then 8 was generated as a brown solid (31 mg, 47%), mp 170–171°C. IR (KBr) ν cm⁻¹: 3,365 (NH₂), 3,225 (O–H), 1,703 (C═O), and 1,624 cm⁻¹ (C═C aromatic). ¹H-NMR (500 MHz, DMSO-d ₆): δ, ppm 4.80 (2H, bs, NH₂), 5.59 (1H, s, OH), 5.91 (1H, d, ArH pyrrole), 5.90–5.91 (m, 1H, ArH pyrrole), 5.99–6.00 (m, 1H, ArH pyrrole), 6.68–6.79 (m, 1H, ArH pyrrole), 7.23 (d, J = 9.0 Hz, 1H), 8.26 (dd, J = 9.0, J = 2.6 Hz, 1H, ArH isatin), 8.36 (d, J = 2.6 Hz, 1H, ArH isatin), 9.88 (bs, 1H, NH isatin), and 10.76 (bs, 1H, NH pyrrole). ¹³C-NMR (125 MHz, DMSO-d ₆): δ, ppm 74.3, 106.8, 107.0, 110.4, 112.7, 114.3, 119.3, 131.1, 131.7, 133.5, 144.3, and 177.7. HRMS (ESI): m/z calcd for $C_{12}H_{10}N_3O_2$, $[M + Na]^+$ 252.2224, found: 252.1999.

6. Cell culture conditions

The HepG2 cell line was obtained from the Agency for Assessment and Application of Technology, Indonesia. The cells were routinely maintained and grown at 37°C, 5% CO₂ in a 95% humidified atmosphere. Additionally, the growth medium was prepared from Roswell Park Memorial Institute (RPMI) 1640 (Gibco) using phenol red, 2 mM glutamine, 100 U/mL penicillin, 0.1 mg/mL streptomycin, 1 mM sodium pyruvate, and 10% foetal bovine serum (FBS), which was previously inactivated at 56°C for 30 min. Cell passaging was performed using 4 mL of trypsin-EDTA at room temperature for 3 minutes. A total of 10 mL of media with 10% FBS was then used to reduce the action of trypsin on cells, and the resulting cells were plated after centrifugation.

7. Preparation of cytotoxicity test solutions:

The stock solutions of **5–8** and the doxorubicin control compound were individually combined with dimethyl sulfoxide (DMSO) and diluted serially in RPMI to yield the varying concentrations (12.5, 25, 50, 100, 200, and 400 µg/mL). A final concentration of 0.1% DMSO was obtained in the medium, and this was also used in the corresponding control. Additionally, no serum or antibiotics were introduced to the test and control mediums. All solutions were freshly prepared and protected from light.

8. Cytotoxicity test

The cytotoxicity test was performed using the MTT method [21]. The HepG2 cells were maintained as monolayer cultures in RPMI 1640 medium and supplemented with antibiotics, including 100 IU/mL penicillin and 100 µg/mL streptomycin, and 10% FBS in a humidified incubator containing 5% CO_2 at 37°C. The subcultures were obtained by trypsin treatment of confluent cultures, and the resulting suspension (100 µL) (5 × 10^4 cells) was transferred to 96 well plates. These were then incubated in a CO_2 incubator for 24 h. The cell culture medium in each well was discarded and replaced with 100 µL of test solutions at various concentrations or the positive control (DMSO) before incubation for 24 h. Phosphate-buffered saline solution and 100 µL of MTT (0.5 mg/mL) were added to the wells, and the cells were incubated for an additional 4 h until blue coloured formazan crystals were observed. Subsequently, a 10% solution of sodium dodecyl sulfate in 0.1 N HCl was added, and the cells were incubated for the next 4 h at room temperature. The absorbance was measured using an ELISA plate reader at 570 nm, and the percentage of cell viability was then calculated. The IC_{50} value was determined by plotting the percentage of cell viability against sample concentration, and the assay was performed in triplicate.

Ethical approval: The conducted research is not related to either human or animal use.

Results and discussion

N-Methyl-5-nitroisatin (**3**) was synthesized using techniques from previous works [22,23,24]. This synthesis involved a reaction between 5-nitroisatin (**1**) and sodium hydride and dimethyl sulfoxide, followed by a reaction with dimethyl sulfate to generate the yellow solid N-methyl-5-nitroisatin (**2**) (Scheme 1). Subsequently, the structure of **3** was confirmed with (1) FT-IR, where the spectrum showed peaks at 3,063, 2,945, 1,743, and 1,608 cm^{-1} designating C–H aromatic, C–H sp^3, C=O, and C=C aromatic groups, respectively. (2) In ^{1}H-NMR, the spectrum showed a singlet at 3.55 ppm which indicated methyl group protons and two doublets at 7.41 and 8.32 ppm and another doublet at 8.60 ppm for aromatic protons. A previous report [25] showed the presence of singlet signal at 3.38 ppm for methyl group protons, based on ^{1}H-NMR data (in $CDCl_3$). However, the chemical shift reported in this research at 3.55 ppm due to measurement was carried out in different solvents (in acetone-d6); and the absence of NH proton signal in the NMR data suggests the successful synthesis of compound **3**.
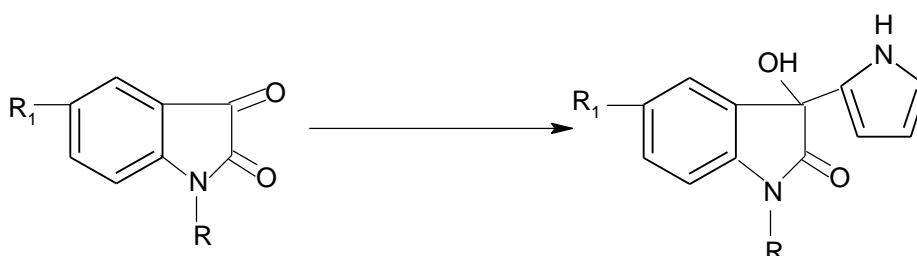
1.R=H , R$_1$=H	4. R=H , R$_1$=H
2.R=H , R$_1$=NO$_2$	5. R=H , R$_1$=NO$_2$
3.R=Me , R$_1$= NO$_2$	6. R=Me , R$_1$=NO$_2$

Scheme 1

Synthesis of **3**. Reagents/conditions: (a) (i) NaH (4 eq), DMSO, rt 1 h; (ii) DMS (4 eq), cold 2 h, 89%

The isatin-pyrrole derivatives **5–8** were prepared through a reaction between the appropriate isatins **1–3** and pyrrole (**4**), using method from previous work for indoles [26]. This process was initiated by dissolving the isatins in methanol:water, followed by the introduction of potassium carbonate as a catalyst. Then pyrrole (**4**) was added to obtain the final derivative products **5–8** (Scheme 2). The yields were of acceptable purity and were further subjected to analysis using FT-IR, ^{1}H-NMR, ^{13}C-NMR, and mass spectrometry. Additionally, the FT-IR spectra showed peaks at the 3,375–3,424 cm^{-1} region, indicating an N–H group, at 3,198–3,325 cm^{-1} for an O–H group, at 1,703–1,720 cm^{-1} for a carbonyl group, and at 1,624–1,627 cm^{-1} for a C=C aromatic. The ^{1}H-NMR spectra showed greater deshielding in the NH pyrrole than the NH isatin, and the inverse was the case with the aromatic protons. This was due to the relatively lesser aromatic characteristics of pyrrole. The isatin-pyrrole derivative **7** showed a singlet resonance in its ^{1}H NMR at 3.27 ppm (in acetone-d $_6$) for the methyl group protons, which is similar with Li et al. data [20] at 3.25 ppm (in CDCl$_3$). Moreover, ^{13}C NMR spectra exhibited peaks corresponding to quartener carbons (C-3) at 73.3–74.9 ppm, carbonyls at 176.9–180.3 ppm, and the quaternary aromatic carbons were less deshielded than the tertiary form. The treatment of isatin derivative (**6**) with hydrazine and palladium on charcoal in ethanol led to the production of compound (**8**), following nitro group reduction method of previous work [27]. This exhibited an FT-IR spectrum with an NH$_2$ peak at 3,543 and 3,423 cm^{-1} for unsymmetrical and symmetrical N–H, respectively.

Scheme 2 Synthesis of **5–8**. Reagents/conditions: (a) **4** (1 eq), MeOH:H$_2$O (1:1), K$_2$CO$_3$, 50°C 2–30 h, **5** (45%), **6** (51%), **7** (63%); (b) (i) Pd/C, EtOH, reflux 1 h; (ii) NH$_2$NH$_2$.H$_2$O (40 eq), EtOH, reflux 1 h,

The cytotoxicity test of isatin derivatives (**5–8**) against the liver cancer cell line HepG2 was performed using a colorimetric method. This method was based on the ability of mitochondrial dehydrogenase enzyme to convert 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide to formazan, indicated by a colour change from yellow to blue. Furthermore, the result was analysed using an ELISA reader, and the IC$_{50}$ values of **5–8** against HepG2 cells are shown in Table 1. The results showed the ability for substitutions at C-5 and the presence of N-methyl on the isatin scaffold to influence bioactivity. Meanwhile, isatin-pyrrole **6** bearing a nitro group at C-5 of the isatin scaffold was identified as the most active compound, due to the IC$_{50}$ of 0.47 μM, although the N-methyl group tends to reduce the effect.

Table 1. Anticancer activity of synthesized compounds

Compounds	IC$_{50}$ (μM)
5	10.33
6	0.47
7	1.33
8	4.64
Doxorubicin	0.00035

Table 2. In vitro Antibacteria activities of the N-methyl isatin and its derivatives (*MIC's in ug/ml)

Microorganism/drugs	C-1	C-2	C-3	C-4	TM	SM	NFX
Salmonella paratyphi A	156.25	312.25	312.5	78.125	156.25	2500	9.76
Staphylococcus aureus	625	5000	1250	>5000	>5000	5000	2500
Vibrio cholerae 01 ogawa	1250	2500	312.5	5000	5000	5000	<0.01
Klebsiellapneumoniae	>5000	5000	2500	5000	5000	2500	1250
Shigelladysentriae	5000	2500	1250	5000	-	2500	1.22
Plesiomonasshigelliods	>5000	156.25	312.5	156.5	4.88	5000	9.76
Salmonella paratyphi B	5000	2500	2500	5000	9.76	5000	<0.01
Morganellamorganii	5000	625	312.5	78.125	156.25	2500	2.44
Edwardsiellatarda	156.25	312	312.5	15625	312.5	5000	9.76
Shigellaboydii	78.125	156.25	312.5	156.25	9.76	2500	<0.01
Shigellaflexneri	78.125	78,125	3125	1250	156.25	2500	2.44
Salmonella enteritidis	5000 ,	2500	2500	5000	4.88	2500	<0.01
Aeromonashydrophila	5000	2500	4250	>5000	1250	2500	0.3
Enterobacter	5000	625	1250	2500	156.25	1250	<0.01
Staphylococcus aureusATCC 225923	625	2500	312.5	5000	>5000	5000	250
Escherichia coli ATCC 292122	625	1250	2500	5000	19.53	2500	1.22
Shigellasonnei	1250	1250	2500	5000	9.76	2500	9.76
Vibrio mimicus	78.125	312.5	2500	5000	-	2500	0.1
Vibrio cholerateinaba	5000	5000	2500	2500	312.5	5000	0.1
Proteus mirabilis	>5000	5000	2500	>5000	156.25	2500	<0.01
Citrobacterferundii	5000	5000	2500	>5000	19.53	5000	<0.01
Salmonella typhimurium	5000	2500	2500	2500	>5000	5000	0.
Enterococcus faecalis	5000	5000	2500	22500	78.12	5000	9.76
Pseudomonas aeruginosa	5000	2500	2500	2500	5000	78.425	19
Escherchia coli	5000	5000	2500	5000	19.53	2500	1

MIC – Minimum inhibitory concentration (-) activities not found

Conclusions

Total of four isatin-pyrrole derivatives (5–8) were successfully synthesized in good yield and purity, and the structure was confirmed using FTIR, NMR, and MS. These products were tested for anticancer activity using the liver cancer cell line HepG2, and their IC_{50} values were calculated. The cytotoxicity assay of all compounds showed moderate action, although (6) exhibited the highest effect, with an IC_{50} of 0.47 μM.

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Concentration of Sulphur Dioxide in Ambient Air with Respect to Various Air Pollutants at Varanasi

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ABSTRACT

This paper deals with the study of concentration of sulphur dioxide, a strong air polluting gas at Varanasi, generated from brick industries and automobiles (heavy and light vehicles). The study was performed during the year 2004 - 2005 at the five different sites, located in different areas of Varanasi, at monthly interval. The result indicates that the concentration of sulphur dioxide is higher than the permissible limit at all the study sites except at control site.

Keywords : Polluting, Control Site.

I.   INTRODUCTION

Now a days, almost all the important cities in India are being highly polluted. During general survey at Varanasi, various sources of pollution have been marked, which include industries, locomotives, automobiles, aircrafts, open refuge burning, various kinds of kitchen stoves, domestic furnaces and electric generators etc. As already stated, Varanasi is an ancient city of Uttar Pradesh (25° 18' N. 83° 24' E and 76.19 m above the sea level). It consists of traditional and narrow roads, which ultimately lead to the traffic congestion, during which excess amount of pollutants are emitted by incomplete combustion of fuels. Due to clumping of tall buildings and poor ventilation in some areas, the emitted pollutants remain confined at lower level in the atmosphere.

It was revealed that, there is heavy load of vehicular transportation and about 1588 small scale industries are located in and around the city of Varanasi, where crude oil and coal are used as a fuel material for power generation. In Varanasi, locomotives and automobiles play a significant role in polluting the atmosphere by the continuous discharge of Nox, Sox, Co, hydrocarbons, SPS etc. Huge amount of the above pollutants are released every day into the ambient air due to the operation of heavy and light vehicles. Air composition also varies from place to place and time to time. CO_2, Sox and NOx may be presented in higher proportion in the place, where fuel combustion is taking place Li et al.[5]. In proportion, sulphur containing gases are reported to be relatively higher in the paddy growing area Yang et al. [11] and Mueller et al.[7.]

Among industries, although numerical strength of brick industries is very low in Varanasi i.e. 3.34%. However, brick industries are treated as most polluting industries because, the brick kilns are provided with the most inferior quality of coal (Grade III/IV), which has very high ash and volatile matter content i.e. 45 - 70%

Aslam[1] Higher quantity of sulphur dioxide is also released from burning of these III/IV grade coal. Burning of one ton of grade III coal releases 0.4536 kg of sulphur dioxide in the air Pandey[8]. At national level, more than one lac brick industries are working, which consume 20 million tones of coal per year. According to one estimate, about 9.072 million kg (0.4536 x 20 million kg) SO_2 is released in the atmosphere every year.

By advancement of science and technology, the variety of pollutants is also increasing. This geometrical increase in the rate of pollution has ruined the quality of air Cooper and Jenkins[3], Elbir et al.[4]. However, scientific study still lacks some essential information about the actual impact of the automobile exhaust and brick industries on the surrounding pollution and its management.

Materials and Methods :

For detailed investigation, five study sites were selected in the different parts of the city -

Site-I   :   Bhelkhan (Brick Industry Site
Site - II   :   Chamaun (Brick Industry Site)
Site - III   :   S. B. P.G. College, Baragaon (Control Site)
Site - IV   :   Chaukaghat (Heavy Vehicle Site)
Site - V   :   Godowalia (Slow Moving, Light Vehicle Site)

For ambient air quality monitoring at the various sites of brick kilns and road side, air samples were collected and analysed using High Volume Air Sampler (Environment APM - 410) at least six samples were collected at an interval of thirty minutes for ambient air analysis.

The concentration of SO_2 is calculated as follows -

Concentration of SO_2 = (μg SO_2/ml x V) Vair

where μg SO_2/ml = Value from Standard Curve,

V = Total volume of absorbing solution

and   Vair = Volume of air in m^3 (flow rate x time).

With the above mentioned method, the concentration of SO_2 at various selected sites has been computed.

Results and Discussion :
Concentrations of SO_2 were estimated from the samples of ambient air collected at different study sites, with regular interval of one month. The results obtained on monthly basis are given in the Table.

Analysis shows that the site II (brick industry site at Chamaun) was the most polluted site. This brick industry has a high kiln capacity i.e. 29,000 bricks are produced in a day i.e. 3,000 more than that of the brick industry at site - I. Due to low stack height at site II, the pollutants are released at a lower height, which remains suspended in the air very close to the earth surface. Similar observations for low height stacks were also reported by Boev et al. [2]

Sulphur dioxide concentration in the stack was found to be in between 194.31 to 197.52 µg m^{-3} at site - I, whereas 223.31 to 227.81 µg m^{-3} at site - II. In July, August, September and October (2004) due to rainy season, all the brick industries were found to be non-functional. This may be the major factor for appearance of low level of pollutants in ambient air. During these four months, the wind rose was also more or less symmetrical.

Sulphur dioxide concentration in ambient air, at road sites with vehicular movement was found to be ranging from 40 to 21 μgm^{-3} at site - IV, while 43 to 25 μgm^{-3} at site-V, which is higher than that of site - IV due to slow moving vehicles and clumping of tall buildings and poor ventilation in some areas. Pollution load

in the ambient air of brick industry study sites - I and II was much higher as compared to the control site - III, similar observations were also observed by Singh et al. [*] and Matkoric and Juretic[6].

Table

Concentration of SO₂ ($\mu g\ m^{-3}$) in Ambient Air at Different Study Sites in Varanasi

Months	I (Bhelkhan)	II (Chamaun)	III (C) College	IV (Chaukaghat)	V (Godowaliya
May 2004	195.95 ± 4.76	225.38 ± 2.89	18.31 ± 0.89	39.00 ± 0.81	42.00 ± 1.31
June	195.76 ± 4.09	226.18 ± 5.98	18.00 ± 1.45	40.00 ± 0.92	43.00 ± 0.81
July				33.00 ± 0.32	31.00 ± 1.30
August				21.00 ± 1.00	25.00 ± 1.05
September				29.00 ± 0.68	29.00 ± 1.07
October				30.00 ± 0.78	34.00 ± 1.11
November	197.52 ± 6.06	227.25 ± 4.87	14.62 ± 1.09	29.00 ± 0.35	36.00 ± 1.31
December	197.31 ± 3.00	227.81 ± 1.78	16.51 ± 1.48	32.00 ± 0.48	37.00 ± 1.03
January 2005	196.50 ± 4.43	222.71 ± 2.89	16.89 ± 1.65	34.00 ± 0.69	30.00 ± 1.07
February	196.35 ± 7.00	224.53 ± 6.09	17.41 ± 1.87	33.00 ± 0.89	33.00 ± 1.07
March	195.52 ± 4.59	225.61 ± 4.90	17.91 ± 1.09	35.00 ± 1.20	37.00 ± 1.06
April	194.31 ± 2.09	223.31 ± 4.89	18.02 ± 1.50	37.00 ± 0.89	39.00 ± 1.31

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