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Review on Arduino Based Wireless Health Monitoring System for covid-19 Patients

Dipti S Gandhamwar[1], Sunil Kuntawar[2]

[1]M.Tech Student, Department of Electronics and Telecommunication, Ballarpur Institute of Technology, Ballarpur, Maharashtra, India

[2]Professor, Department of Electronics and Telecommunication, Ballarpur Institute of Technology, Ballarpur, Maharashtra, India

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ABSTRACT

Traditional sensor based finding in average field requires more number of sensors and human endeavors on the off chance that it is prepared in a huge scope. It is a troublesome assignment because of the lack of clinical experts and framework arrangement. To beat this issue an IoT based medical care application is proposed in the examination work. The proposed framework comprises of the web and versatile application dependent on ceaseless remote observing of patients. The goal is paper is to execute a minimal expense framework and send the patient essential signs in crisis circumstances. Sensors are being utilized for estimating the patient fundamental signs by utilizing the remote organization. The sensors information are gathered and sent to the cloud for capacity by means of Wi-Fi module associated with the regulator. The information is handled in the cloud and criticism steps are taken on the dissected information which can be additionally investigated by a specialist distantly. Far off review lessens weight to specialists and gives the specific wellbeing status of patients. Assuming the patient requirements earnest consideration, a message is shipped off the specialist.

Keywords - IOT, Wi-Fi module, Arduino, Sensor.

I. INTRODUCTION

In the consistently expanding total populace, individuals are experiencing persistent illnesses at a high rate. The principle purpose for this is day by day utilization of tobacco, liquor utilization, over pressure, no active work and so on As per the world wellbeing association (WHO), a great many individuals pass on because of expanded cholesterol levels, overweight, high and so on The individual who is influenced by

ongoing infection should deal with his life appropriately with at most consideration and ought to be dealt with and checked by a specialist constantly. The significant boundaries for the constant sicknesses are the pulse, internal heat level, measure of oxygen in the blood and so on The patient checking framework permits specialists to regulate numerous patients all at once. The pulse shows the adequacy of the heart. Pulse for grown-up guys on a normal is 70bpm and for grown-up females on a normal is 75bpm. With the assistance of these qualities, the heart condition can be followed. The internal heat level tells the body condition. The typical human internal heat level is 98.6 ° F ± 0.7°F. Any variety in the upsides of internal heat level can hazard inappropriate human wellbeing. The measure of oxygen in the blood is determined by the Spo2 sensor which is an extremely fundamental boundary for human wellbeing. The ordinary oxygen level in the blood differs between 75 to 100mm of mercury. The measure of oxygen underneath 60mm of Hg is considered as low. It is likewise a significant boundary for human wellbeing.

The ordinary checking of these fundamental boundaries is vital for better wellbeing and incredible wellbeing. For the estimation of these indispensable boundaries, a computerized framework should be intended for persistent observing. In this paper, an Arduino based robotized checking framework for licenses is planned and executed. This can screen the state of being effectively at a lower cost. The proposed framework can be coordinated as a pack and can be provided for minimal expense to all individuals for the significant boundaries oversight. The outcomes be confirmed for some patients and exactness should be determined. The holding up time and disappointment can be decreased for the patients if very good quality sensors are being utilized. The information assortment increments as the quantity of patients increment. To deal with this enormous information with distributed computing strategies can be utilized.

II. LITERATURE REVIEW

Vani Yeri, Dr.Shubhangi D C IoT based Real Time Health Monitoring Proceedings of the Second International Conference on Inventive Research in Computing Applications (ICIRCA-2020) IEEE Xplore Part Number: CFP20N67-ART; ISBN: 978-1-7281-5374-2.

The proposed system is implemented for wireless health monitoring of the patients. The vital parameters are measured by the sensors such as pulse sensor, temperature sensor and SpO2 sensor. The proposed model allows the doctors to monitor patient health from anywhere. The proposed system helps people to consult the specialist all over the world. The system uses IoT and wireless sensor technology for efficient health monitoring. The data from sensors is taken every 30 seconds. The data is stored and can be visualized on the webserver. The system is implemented in such a way that if the sensor data exceeds the threshold values, a message is sent to the doctor. The main advantage is in case of emergency the intervention time between doctor and patient is reduced. The objective is achieved by proposing a low-cost system for saving human lives so that human lives will be comfortable. The limitations are the doctor's availability and the proposed model doesn t include the blood pressure monitoring system. Conventional sensor based diagnosis in medial field requires more number of sensors and human efforts if it is processed in a large scale. It is a difficult task due to the shortage of medical professionals and system setup. To overcome this issue an IoT based health care application is proposed in the research work. The proposed system consists of the web and mobile application based on continuous wireless monitoring of patients. The objective is paper is to implement a low-cost system and transmit the patient vital signs in emergency situations. Sensors are being used for measuring the patient vital signs by using the wireless network. The sensors data are collected and

transmitted to the cloud for storage via Wi-Fi module connected with the controller. The data is processed in the cloud and feedback steps are taken on the analysed data which can be further analysed by a doctor remotely. Remote viewing reduces burden to doctors and provides the exact health status of patients. If the patient needs urgent attention then a message is sent to the doctor [1].

Sachi Marathe, Dilkas Zeeshan, Tanya Thomas, Dr. S.Vidhya A Wireless Patient Monitoring System using Integrated ECG module, Pulse Oximeter, Blood Pressure and Temperature Sensor International Conference on Vision Towards Emerging Trends in Communication and Networking (ViTECoN) 2019.

The vital parameters were picked up using the system developed. The data collected from the sensors were sent to a WiFi module called NodeMCU ESP8266, through which the data is uploaded on cloud, which will allow the healthcare provider to view it. We verified the results obtained from the sensors to mercury thermometer, pressure measuring system, pulse oximetry system and an ECG system. We found that the values varied only by a ± 3 factor. Hence will allow the health-care providers to get an estimate of the patients vital signal measurements. If our patient-monitoring system is integrated with the ambulatory-monitoring system, it will help prepare the healthcare-providers prepare in advance for the arriving trauma. In this author exhibits the design and development of a mobile patient-monitoring system by using four sensors in one system. In earlier times, in areas of large disasters, healthcare service providers conducted vital signs measurements manually, recorded them on papers and communicated over the radio, but when the number of patients drastically increased it led to chaos among the healthcare providers. The advancements in technology has led to increasing expenses in the healthcare sector, so the proposed mobile sensor based system will not only be technologically advanced but will also be cost effective. The system consists of mainly four sensors: Electrocardiogram (ECG) module, blood pressure sensor, temperature sensor and a pulse oximeter module. The sensors will be integrated into one system using Arduino. The data collected from the sensors will be sent to a WiFi module called NodeMCU ESP8266, through which the data will be uploaded on cloud, which will allow the healthcare provider to view it. In this paper we have measured the four vital parameters for 10 different patients and presented it [2].

S. P. McGrath, I. M. Perreard, M. D. Garland, K. A. Converse, and T. A. Mackenzie, Improving Patient Safety and Clinician Workflow in the General Car Setting With Enhanced Surveillance Monitoring, *IEEE J. Biomed. Heal. Informatics*, vol. 23, no. 2, pp.857866, 2019, doi: 10.1109/JBHI.2018.2834863.

Clinical monitoring systems have been implemented in the inpatient hospital setting for decades, with little attention given to systems analysis or assessment of impact on clinician workflow or patient care. This study provides an example of how system level design and analysis can be applied in this domain, with specific focus on early detection of patient deterioration to mitigate failure to rescue events. Wireless patient sensors and pulse oximetry-based surveillance system monitors with advanced display and information systems capabilities were introduced to 71 general care beds in two units. Nursing workflow was redesigned to integrate use of the new system and its features into patient assessment activities. Patient characteristics, vital sign documentation, monitor alarm, workflow, and system utilization data were collected and analyzed for the period five months before and five months after implementation. Comparison unit data were also collected and analyzed for the same periods. A survey pertaining to staff satisfaction and system performance was administered after implementation. Statistical analysis was performed to examine

differences in the before and after data for the target and control units. The enhanced monitoring system received high staff satisfaction ratings and significantly improved key clinical elements related to early recognition of changes in patient state, including reducing average vital signs data collection time by 28%, increasing patient monitoring time (rate ratio 1.22), and availability and accuracy of patient information. Impact on clinical alarms was mixed, with no significant increase in clinical alarms per monitored hour [3].

G. J. Bharat Kumar, Internet of Things (IoT) and Cloud Computing based Persistent Vegetative State Patient Monitoring System: A remote Assessment and Management, *Proc. Int. Conf. Comput. Tech. Electron. Mech. Syst. CTEMS 2018*, pp. 301305, 2018, doi: 10.1109/CTEMS.2018.8769175.

This paper author proposes a device model of wearable facial sensor shield for monitoring facial moments of a PVS patient. This sensor shield is capable of collecting sEMG signals from several facial muscles at a time. The sensor shield is re-usable and adjustable according to individual face orientations. The IOT based Cloud application enables us to monitor the PVS patients moments from any where in the world using mobile application in Mobile Devices and client-server-based browsers in Desktop Computers. The results will be shown in easily understandable sEMG waveforms with 6 channels, one channel for each electrode placed at the 6 facial muscled which are crucial in calibrating the moments of face. Apart form this, the Cloud platform gives a scope for data analysis and decision making by applying specific algorithms available. This proposed design can also be used for other healthcare situations where ever the facial moments are required to monitor in real-time. In this paper author proposes a device model of wearable facial sensor shield for monitoring facial moments of a PVS patient. This sensor shield is capable of collecting sEMG signals from several facial muscles at a time. The sensor shield is re-usable and adjustable according to individual face orientations. The IOT based Cloud application enables us to monitor the PVS patients moments from any where in the world using mobile application in Mobile Devices and client-server-based browsers in Desktop Computers. The results will be shown in easily understandable sEMG waveforms with 6 channels, one channel for each electrode placed at the 6 facial muscled which are crucial in calibrating the moments of face. Apart form this, the Cloud platform gives a scope for data analysis and decision making by applying specific algorithms available. This proposed design can also be used for other healthcare situations where ever the facial moments are required to monitor in real-time [4].

S. Nubenthan and K. Ravichelvan, A wireless continuous patient monitoring system for dengue; Wi-Mon, *Proc. 2017 Int. Conf. Wirel. Commun. Signal Process. Networking, WiSPNET 2017*, vol. 2018- Janua, pp. 22012205, 2018, doi: 10.1109/WiSPNET.2017.8300150.

In this paper author has reviewed the detailed literature on WBAN and the Wi-Mon device which is used to monitor some of the human vital information. It is different than the existing sys tems in the medical field because of the various advantages and the continuous monitoring of the patients vital information through the use of the advanced software like Wi-Mon. This system can be used to monitor many patients physiological signals simultaneously in the real-time hospital environment. The challenges faced by the Wi-Mon are also addressed with future implementations. The real-time testing and the results of the Wi-Mon with the existing system simultaneously in the Clinical Management of Dengue Hemorrhagic Fever (DHF) at the Negombo Base Hospital had proved that the Wi-Mon has less error percentage and with some inbuilt advanced features to the health system. Therefore, Wi-Mon is a

better replacement for Vismo. The future improvements such as GSM based real time monitoring and with the mobile based application will be a great challenge to implant the Wi-Mon in the hospital environments [5].

S. Shaikh, D. Waghole, P. Kumbhar, V. Kotkar, and P. Awaghade, "Patient monitoring system using IoT," *2017 Int. Conf. Big Data, IoT Data Sci. BID 2017*, vol. 2018-Janua, pp. 177–181, 2018, doi: 10.1109/BID.2017.8336594.

In this paper, author have studied different papers for patient monitoring system. Data collection is a main challenge in patient monitoring system. MAC protocols are important in wireless communication system for transfer data from source to sink. Performance of the CSMA is drastically good for varying reporting rate from 10 to 50 packets per sec. CSMA gives 20 to 45% better result for PDR, 40 to 60% better result for PLR, 10 to 40% better result for delay and 15 to 45% better result for throughput as compare to TDMA, SMAC, 802.15.4 MAC protocols. Rate of packet transmission increase then congestion of the network will be increase. So when reporting rate varies then performance of the MAC protocols also decreases like TDMA and SMAC. In future work, will studied more good MAC protocols papers in the network [6].

T. K. Ramesh and C. V. Giriraja, "Wireless sensor network protocol for patient monitoring system," *2017 Int. Conf. Comput. Commun. Informatics, ICCCI 2017*, pp. 5–8, 2017, doi:10.1109/ICCCI.2017.8117798.

In this paper, we have proposed an efficient routing protocol for patient monitoring system using WSN. We have studied different reactive protocols in ADHOC region like AODV, DSR and also different clustering protocols in order to group the people of the village in an efficient way. By simulation results in MATLAB, we have compared different on demand routing protocols for better performance in throughput and end to end delay so that patients can be treated very soon in an efficient way. As a future work, we can extend it to more rural areas considering more parameters to be monitored and also increase in number of gateways in the village. an efficient routing protocol for patient monitoring system in rural areas was proposed using wireless sensor network (WSN) so that the patients can be treated within less time. In this system, a village with GSM network is considered and the people in that village are continuously monitored using AMON sensor, an advanced medical monitoring and alert system. All the AMON's work in ADHOC region and one AMON in the village will work in GSM network acts as a gateway between the other sensors and BS. According to the patient's condition the information has to be sent to base station (BS). In this scenario, the routing of information is based on condition of the patient so on demand or reactive routing protocols are used. Different reactive routing protocols AODV, DSR are studied and modifications are done in them and compared to find the best protocol. Routing is done based on the efficient routing protocol and by simulation it is shown that the routing protocol is best in terms of throughput, end to end delay compared to other protocols [7].

Pratiksha W. Digarse, Sanjaykumar L.Patil "Arduino UNO and GSM Based Wireless Health Monitoring System for Patients" International Conference on Intelligent Computing and Control Systems ICICCS 2017.

The implemented Arduino UNO and GSM Based Wireless Health monitoring system is the enhanced technology as compare to the existing technology because it sends the SMS quickly, easy to use, also it can work in longer distances at a very low cost. It sends measured heart rate (heart beat), body temperature and saline level to the doctor so if any critical situation happens in patient's biomedical

parameters then doctors can easily take action. -In India, near about 20% of the total population loses their lives due to interrupted health monitoring system i.e. in most of the hospitals, doctor visits patients either in morning shift or in evening shift or in both shifts. What happens if patient's health becomes critical in between that interval or when a doctor is not available with a patient. The answer is; a patient may lose her\his life. So to avoid this critical situation; we are proposing a smart embedded system device which monitors patients health continuously.This system monitors patients heart rate, body temperature and saline liquid level (if any).if any of the above parameters goes beyond the threshold value, this smart device informs doctors or care taker and ask for corrective actions to save patients life [8].

III. METHODOLOGY

The customary checking of these imperative boundaries is vital for better wellbeing and incredible wellbeing. For the estimation of these indispensable boundaries, a mechanized framework should be intended for ceaseless checking. In this paper, an Arduino based robotized observing framework for licenses is planned and carried out. This can screen the state of being effectively at a lower cost.

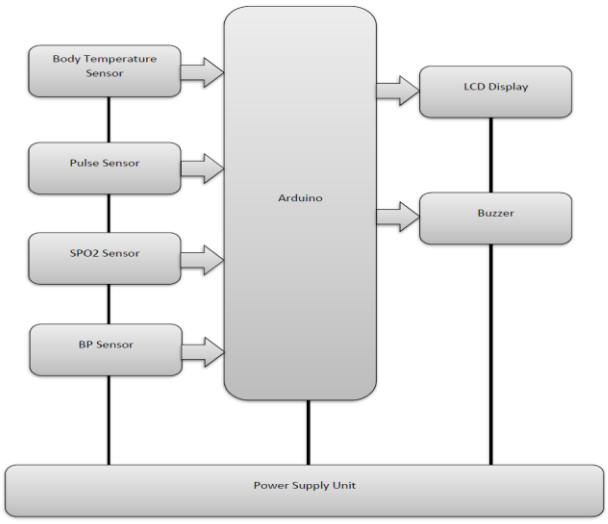

Fig.1. Block Digram of Iot Based System

The framework comprises of the fundamental crucial sensors interfacing with the cloud and versatile application as demonstrated in figure 1. The information is caught by sensors are shipped off the processor Arduino where the information is gained and handled. The information gained by the processor is contrasted and the limit upsides of the ideal sensors. On the off chance that the sensor esteems move equivalent or over the limit, a crisis message or alarm is passed to the specialists in the versatile application through a Wi-Fi module with the subtleties of every sensor. This information is additionally passed to the cloud for subtleties changes of the previous few hours information. The previous few hours can be gotten to on the site and the information is put away in the cloud.

The proposed framework utilizes the sensors like heartbeat sensor (for estimating the pulse), Temperature sensor (for estimating the internal heat level) and SpO2 sensor (for estimating the SpO2 admission) as demonstrated in figure1. The framework estimates the boundaries continuously and shows on the LCD and in the cloud which empowers observing of patient wellbeing when the specialist is with the patient or remote checking for any spot. The proposed framework constant observing of the patient. The sensors information is shipped off the cloud through the Wi-Fi module, on the off chance that the sensors information are not in adequate reach, an alarm message is sent onto the portable application. The specialist can make the move very soon for aiding the patients.

Pulse sensor: it measures the heart rate. It has circuitry for noise cancellation. A finger is placed on the sensor; it calculates the amount of blood in the capillary tube based on the amount of light reflected. The difference in the amount of light transmission and reflection is the result of the sensor.

Temperature sensor: The sensor measures the body temperature from -55 degree celsius to +150 degree Celsius. For every 10 degrees rise in temperature, the output changes by 10mv.

SpO2 sensor: This sensor measures the oxygen content in the blood. A little beam of light passed through the blood within a finger. It measures the amount of change in light absorption.

Wi-Fi module: This module allows connectivity of the internet with the embedded applications. It uses the communication protocol. It transmits the values of sensors to the mobile application.

IV. CONCLUSION

The proposed framework is executed for remote wellbeing checking of the patients. The imperative boundaries are estimated by the sensors, for example, beat sensor, temperature sensor and SpO2 sensor. The proposed model permits the specialists to screen patient wellbeing from anyplace. The proposed framework assists individuals with counseling the expert everywhere on the world. The framework utilizes IoT and remote sensor innovation for proficient wellbeing observing. The information from sensors is required at regular intervals. The information is put away and can be pictured on the webserver. The framework is carried out so that if the sensor information surpasses the edge esteems, a message is shipped off the specialist. The principle advantage is in the event of crisis the intercession time among specialist and patient is decreased. The goal is accomplished by proposing a minimal expense framework for saving living souls with the goal that living souls will be agreeable. The constraints are the specialist's accessibility and the proposed model does exclude the pulse checking framework.

V. REFERENCES

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