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# Internet of Things(IoT) Based Home Security Using Raspberry Pi

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## ABSTRACT

A smart home application highlights extraordinary help to our everyday life. This framework revives offices of a house to advance into a brilliant home by including greater security highlights. The change in security perspective offers inventive and beneficial degree to the methods for living. Every one of these qualities is adjusted by utilizing Internet of Things (IoT) and Raspberry Pi. The acknowledgment issue is constantly flawed in smart home applications. Along these lines, recuperation is done to recognize the gate crasher as known or obscure by the utilization of picture preparing methods for confront acknowledgment. This has a tendency to fathom numerous issues regarding verification. This insurance instrument advises the client likewise, giving a reasonable photo of the situation occurring at the client's home. The sensor based framework features numerous highlights enabling it to be broadly utilized. Fire sensor identifies any temperature increment in the front room and posts its status in the URL given to the client. The gas sensor helps in distinguishing the nearness of any gas spillage in view of the power of the gas in air. With the assistance of DC engine, auto entryway locking component is impelled. This is extremely helpful. All the statuses are handled between the sensors and the client through IoT. Raspberry Pi interfaces every one of the segments and delivers the correct working of the entire bundle. The systems that are utilized here are exceptionally straightforward. Henceforth, even beginner clients could comprehend the framework's propelled highlights and utilize it easily. The utilization of observation camera additionally helps in recognizing the nearness of fire and along these lines a signal is initiated on account of flame recognition.

**Keywords:** Home Automation, fire detection, Internet of Things (IOT), Raspberry PI, intruder, image processing and face recognition.

## I. INTRODUCTION

This paper manages the security bases home automation framework. Home Automation Systems are of incredible use to the general population since they help in keeping up a secured home condition and makes taking care of family unit works simpler, along these lines making a more astute and effective method for living there are number of security construct home automation framework based with respect to raspberry pi controller.

**Fig -1**: Home Automation System

Huu-Quoc Nguyen et. Al. proposes an easy framework observing in light of the Raspberry Pi, a single board

PC which takes after Motion Detection figuring written in Python as a default programming condition. Furthermore, the system uses the development acknowledgment estimation to through and through lessen limit utilize and save wander costs. The estimation for development ID is being executed on Raspberry Pi, which enables live observation camera nearby acknowledgment of development. The live camcorder can be seen from any web program. The standard focus of the structure in is to display the limit of picture taking care of computations on a bit of preparing stage. Especially to make a road sign affirmation system in perspective of an embedded structure that examines and sees speed signs. The paper delineates the traits of speed signs, necessities and difficulties behind executing a steady base Raspberry pi structure and how to oversee numbers using picture dealing with methods fit as a fiddle and estimation examination. Wilson Feipeng Abaya et. Al. proposes a framework with night vision ability. The framework comprises of raspberry pi controlled PIR Sensor and an altered camera which is changed to gain pictures of extensive determination even in the evening time. Additionally a smoke sensor is connected in the framework. The alarm message is sent to the mail of the client. Patchava VamsiKrishna et. Al. proposes a framework in light of GSM and Raspberry Pi joined to identify the interloper and send SMS to the client with the assistance of open CV. Face acknowledgment based reconnaissance and entryway opening instruments has additionally been presented.Some of the drawbacks in the existing systems include

- ✓ Memory management is important issue to be considered in real time surveillance
- ✓ In home surveillance, alerts sent to the users even for authorized people
- ✓ Accuracy of face recognition is less
- ✓ Detecting face from low resolution video is difficult
- ✓ No Automated door locking system
- ✓ Fire and gas leakage system are not automated
- ✓ No cloud back up of surveillance videos

This paper aims at creating an integrated Smart security system in light of sensors and actuator with picture handling strategies added to it, Sensors and actuators perform gas spill identification and oversees entryway locking component. The framework advises the client about the gate crasher through IOT module. The framework additionally proposes a picture handling based reconnaissance in which the gate crasher face and fire or fire identification should be possible.

## II. System Design

The proposed framework incorporates gas sensor for distinguishing gas spillage and to impel fumes fan, IR sensor to recognize entryway open/close condition and incites engine, PIR sensor identifies interruption and initiates camera to catch reconnaissance video. From the video key edges is distinguished utilizing foundation subtraction calculation and fantasized by Singular Value Decomposition to get high determination pictures. Face district is divided from the key casings utilizing Viola Jones calculation. The face sectioned is prepared utilizing arrangement free fractional face acknowledgment framework to check in the event that it is gate crasher or verified one. The client is informed about the interloper and the video is transferred to the reinforcement drop box. The camera ceaselessly screens the home and fire is distinguished utilizing multi master framework which tests for shading, shape and the development of the fire.

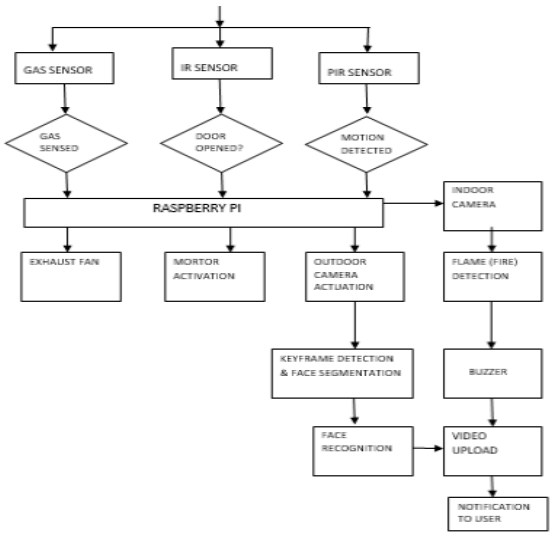


**Fig – 2:** System Design

## 2.1 Implementation

Step1: The sensors continuously monitor the environment to find gas leakage, door open/close and intruder detection

Step2: The actuators are activated based on the sensor signals

Step2.1: Exhaust fan is activated whenever gas leakage is sensed

Step2.2: Motor is activated when IR Sensor senses the open door

Step2.3: Camera is activated when PIR senses intruders

Step3: Video obtained from the camera processed to obtain the key frames using background subtraction algorithm

Step4: Key frame is hallucinated using singular value decomposition method

Step5: Face is detected from the key frame using Viola Jones Algorithm

Step 6: The detected Face is identified using non alignment partial face recognition algorithm using the modified Gabor Filter and Multi Keypoint Detection Method.

Step 7: The surveillance video is uploaded to the cloud drop box using IOT Module in the kit.

Step 8: The Fire recognition is done by

Step 8.1: Colour recognition i.e., dominance of Red colour is checked for in RGB Frame

Step 8.2: The shape of the flame is analyzed

Step 8.3: The growth of Flame is analysed and buzzer is actuated.

This framework can be executed progressively condition. The sensors and actuators are controlled by the Raspberry Pi controller. The framework goes about as brilliant home security framework by effective interloper, gas spillage and fire discovery and furthermore oversees robotized entryway locking component. In Key Frame Detection calculation, right off the bat, the present edge picture and the foundation picture contrast subtraction to get distinction picture and the distinction picture bear on digitization preparing. The present casing will be as the key-outline if the distinction surpasses a specific basic threshold. Hallucinated picture is acquired by choosing the initial couple of huge solitary estimations of Eigen estimations of disintegrated lattice of the picture. Face Segmentation is finished utilizing the Viola Jones technique which depends on HAAR Features and acknowledgment is finished by Multi Key pointer descriptor portrayed.

**Fig – 3:** Raspberry Pi

Fire acknowledgment is finished by looking at the R, G and B estimations of the fire blob divided and the development of the fire is found by contrasting the connection estimations of flame measure in back to back casings.

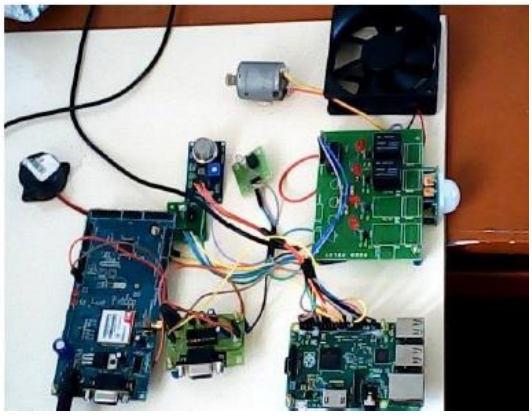

**Fig – 4:** Implementation Kit

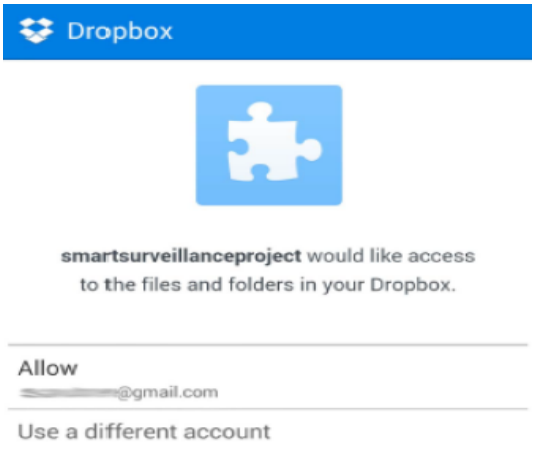


**Fig – 5:** Drop Box Account

## III. Results

The whole framework execution can be estimated as far as sensor precision, Face discovery and acknowledgment exactness and fire location exactness. In this stage, the execution of sensors exactness is gotten to and in next stage faces acknowledgment and fire discovery. Precision of the security framework is vital to guarantee the lessening of false disturbing and to successfully recognize the state of the earth.

**Table -1:** Accuracy

| | Gas Leakage | Intrusion Detection | Door Open/close | Face Recognition | Fire Recognition |
|---|---|---|---|---|---|
| Week 1 | 100 | 95 | 92 | 90 | 95 |
| Week 2 | 100 | 94 | 93 | 92 | 94 |
| Week 3 | 100 | 97 | 95 | 94 | 94 |

## IV. Conclusions

The framework incorporates gas sensor for distinguishing gas spillage and to impel fumes fan, IR sensor to recognize entryway open/close condition and incites engine, PIR sensor identifies interruption and actuates camera to catch observation video. From the video key edges is distinguished utilizing foundation subtraction calculation and daydreamed by Singular Value Decomposition to get high determination pictures. Face locale is sectioned from the key casings utilizing Viola Jones calculation. Acknowledgment is finished utilizing multi key point descriptor. Fire discovery is finished utilizing shading and shape assessment and phony fire is perceived utilizing development assessment. Future work may incorporate extra highlights like electronic gadget control; control administration could be added to the home automation framework. Extra sensors and actuators could be added to the framework.

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