



## “Smart IOT Based Home Security System”

*Shiva Kumar<sup>1</sup>, Abhinav Kumar Nigam<sup>2</sup>, Harshul Sharma<sup>3</sup>, Syed Zulifqar Ali<sup>4</sup>*

Department of Information Science and Engineering, Dayananda Sagar College Of Engineering

Asst. Professor, Shilpashree S Department of Information Science and Engineering, Dayananda Sagar College of Engineering

### Abstract

The Smart IOT based Integrated Home Security System is an all in one approach using different sensors and modules to keep an eye on the property of the user i.e., to keep the home of the user safe, under all circumstances. The proposed system works 24x7, whether the user is inside or outside his home. The system detects any kind of fire breakout, gas leakage, or intruder in the house and; informs the user in real-time via Short Message Service (SMS). Simultaneously, the system uses a camera to record the ongoing events. The recordings are not stored on local storage but are uploaded to the cloud to keep the cost of the system as low as possible. Additionally, the recordings can be accessed, viewed or downloaded anytime by the user. Hence, we have proposed and designed a 24 x7 smart IoT based integrated home security system.

Index Terms- Security, Raspberry Pi, Temperature and humidity sensor, motion sensor

### INTRODUCTION

Crime rates are escalating on a daily basis and thieves seem to generate new techniques of robbing people of their goods worldwide. With living standards becoming expensive day by day due to inflation, everyone wants to protect their goods and property, even from threats such as fires. Security system products on the market are expensive to set up due to the relative prices of the controllers used and they are also subject to monthly subscriptions since they are monitored by security service companies. Fire safety microcontroller systems available are dedicated to monitoring fire threats only. These products give an alert by only sounding an alarm, which implies a remote homeowner will not be alerted by the system when there is a fire outbreak. On the other hand, fire detection and alarm system are vital for the safety of human beings. However, it simply triggers an alarm. Fire and burglar alarm systems include sophisticated components such as environmental sensors for motion, temperature, lasers, vibration detectors, panic alarms, beam detection, glass break detectors and many more. Yet, they have a high cost. Although surveillance Digital Video Recorder (DVR) or the local physical storage and Network Video Recorder (NVR) consoles now have streaming and motion detection recording features, they are expensive to computational power. Fast-RCNN put forth a fix for ROI pooling layers and multi-task loss layers as a result of these drawbacks. Faster-RCNN used a method of adding additional RPN branch networks to integrate region proposals extraction into deep networks.

Install (online DVR prices average \$100 on amazon). Recordings from these systems are normally lost due to damage by thieves or burnt in case of fire. Previously implemented systems used either only gas sensors [2] or only detected fire [1], but our system is an all in one approach and detects both fire and gas, along with intruder.

### COMPONENTS USED

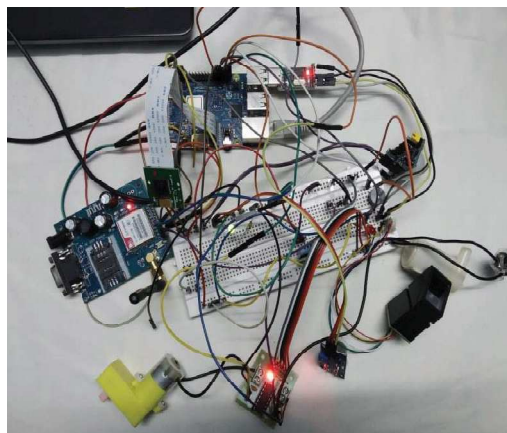
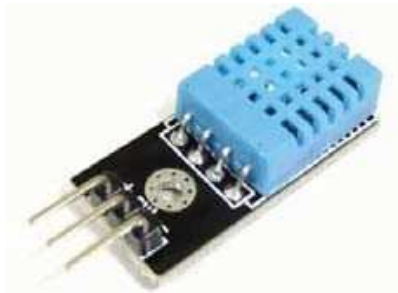
#### A. Gas sensor – MQ135

MQ-135 gas sensor detects gas leakage and measures the number of gases like ammonia, alcohol, benzene, smoke, CO<sub>2</sub>. It has a vcc pin, ground pin, digital out pin and analog out the pin. Digital out gives output in digital form and analog out gives 0-5 V analog voltage according to the intensity of the gas. It also monitors the quality of air.



### B. Temperature and humidity sensor – DHT11

DHT11 senses temperature and humidity. It uses a thermistor and a capacitive humidity sensor to compute the temperature and humidity of the surrounding area. It has an 8-bit microcontroller to give values of temperature and humidity on the data pin. It works on operating voltage and current of 3.5V to 5.5V and 0.3A respectively.



c. Assembled All Hardware Components

### C. Pi camera module

Pi camera module is a lightweight camera that supports Raspberry Pi. It has a 5MP color camera without a microphone. It has a ribbon cable, this cable has to be connected to the camera serial interface port of the Raspberry Pi. It can be used to take HD videos and photographs. It is generally used in image processing and surveillance work.

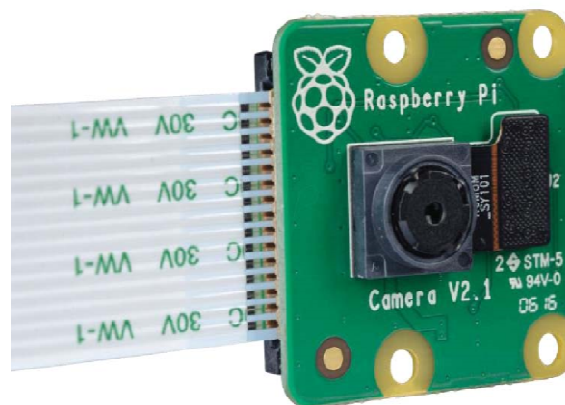


Fig.4: Pi camera

### D. Raspberry Pi

The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python, and using open cv. It is widely used in many areas, such as for weather monitoring, because of its low cost, modularity, and open design. It is typically used by computer and electronic hobbyists, due to its adoption of the HDMI and USB standards.

There are three series of Raspberry Pi, and several generations of each have been released. Raspberry Pi SBCs feature a Broadcom system on a chip (SoCa) with an integrated ARM-compatible central processing unit (CPU) and on-chip graphics processing unit (GPU), while Raspberry Pi Pico has a RP2040 system on chip with an integrated ARM-compatible central processing unit (CPU).



## METHODOLOGY

In designing a home security and automation system one or more platforms are used in order to build a reliable and flexible system that can be easily operated and adapted as a security system. Therefore, for the purpose of this project some specific deliberate choices were made on the type of platforms, hardware components and mode of operation of the home security system.

### A--PRELIMINARY CONSIDERATIONS

Before the actual design of the project work, specific deliberate choices in selection of appropriate implementation platforms and hardware components were made. Priority was given to lowcost availability, reliability, flexibility and simplicity in all these selections.

### B--SYSTEM DESCRIPTION

The PIR(PI camera) sensor can detect the presence of human being who enter into the house. The Raspberry Pi camera module can capture the images and live streaming videos. The owner can directly login and interact with the webpage and the control unit provided. The images captured and the videos recorded will be directly streamed on user pre-decided webpage on smart phone. User can access the video directly using the static IP address or can also stream on local domain with the help of websites.

## IMPLEMENTATION

The system contains various modules such as PIR(PI camera) sensor, camera module, keypad, webpage, relay,328 micro controller, raspberry pi4, GSM module, notification are discussed in detail below:

### 1--Camera module

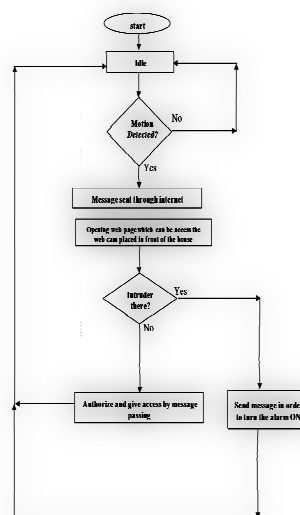
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### 2--Keypad

The 4\*3 keypad provided will allow you to lock and unlock the doors as per the authorization of owner. If unauthorization got anyone can unlock the door using the appropriate password.

### 3--Webpage (Things Speak)

The camera is accessed to the webpage because to see the sensors values and alarm can be controlled with the webpage. The owner can directly login and interact with the webpage and the control unit provided. The images captured and the videos recorded will be directly streamed on user pre-decided webpage on smart phone.



#### 4--Raspberry Pi 4

The images and videos captured are streamed onto webpage are possible by the usage of Raspberry Pi software. We can setup Raspberry Pi by:

- Insert the microSD card into the card slot on the underside of the Raspberry Pi.
- Plug the USB keyboard into one of the USB ports.
- Plug the USB mouse into one of the USB ports
- Turn on your monitor or TV set and make sure it is set to the proper input (e.g. HDMI 1)

#### 5--GSM module (Modules)

GSM was designed with a moderate level of service security. The system was designed to authenticate the subscriber using a pre-shared key and challenge-response. Communications between the subscriber and the base station can be encrypted. The development of UMTS introduces an optional Universal Subscriber Identity Module (USIM), that uses a longer authentication key to give greater security, as well as mutually authenticating the network and the user, whereas GSM only authenticates the user to the network (and not vice versa). The security model therefore offers confidentiality and authentication, but limited authorization capabilities, and no non-repudiation.

#### 6--Notification

If any kind of unusual motion or human detected by the PIR sensor the owner can know it with a notification message. Thus the owner can take correct measures if any problem exists.

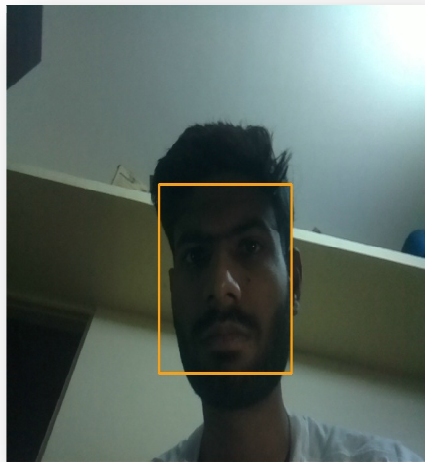
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## RESULT

The final outcome of this project is a prototype for a simple home security system which can control home appliances with a touch of finger and is equally capable of monitoring with live stream video recorded and stored in cloud . Whenever a person come in front of the house the PIR motion detector sensor detect the person and a alert email will send to the house owner and he can see the person through the camera in front of the house.

Then on the backend, there is a raspberry pi which has been programmed to control the status and over all operations of USB pins and thereby controlling the appliances and also capture video using camera Pi and captured that photos and to the user. The result of this project have been upto the mark as expected when the project began initially

#### 1. Face Detection



This application of the module can be explained by an example. Suppose the owner is expecting a guest at his house but he is not available there. Now, as the guests reach at his house the owner will receive a video call. But now the owner can press digits other than 1 (such as 3 for lights, 4 for fan, 5 for A.C., and so on) or even can disable the security system. Similarly if the user or somebody leaves the house, the user will still receive a video call and this time he can switch Off the appliances or can enable the security system again by pressing International Conference on Computing, Communication and Automation (ICCCA2016) 1288 proper digits known to him. Since the appliances are connected to mains supply through a relay they can be easily controlled using micro-controller

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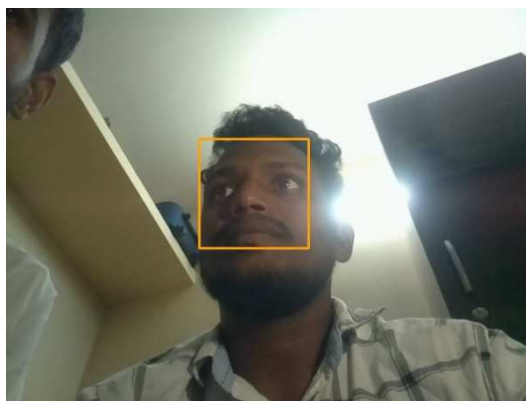
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## 2. Authorization Person

```
Shell
the humidity is 83.0 and the temperature is 27.0
MQ_6 value: 129
['1-Shiva' '1-harshul']
now = 2022-06-20 19:43:30.405307
Welcome20062022194330.mp3
Authorized person Detected1-Shiva' '1-harshul
Authorized person Detected1-Shiva' '1-harshul
the humidity is 83.0 and the temperature is 27.0
MQ_6 value: 129
```

## 3. Face Detection



## FUTURE SCOPE AND IMPROVEMENTS

There are some future works can be done by adding some of the AI technique into the smart home system such as the system can automatically deal with the cases happening in the home

### A. Image Processing

Using image processing, we can detect intruders and fire in the house even when the user is in or outside the house and the system operates in mode. This can be implemented in parallel to this system for better performance.

### B. OTP Based recognition

In case the guest comes to meet the user and the user is not at home then the guest can request OTP. OTP will be sent to the user and will be conveyed to the guest. If a guest enters the right OTP, then he will be given entry as he was authenticated by the user himself.

### C. Speech or voice recognition

In case the fingerprint sensor stops working due to unavoidable circumstances then speech or voice recognition will come into the role. An authenticated user will be given entry on the basis of speech or voice recognition.

#### 4. Unauthorization Person

```

Shell
MQ_6 value: 129
sent email
['1-Shiva' '1-harshul']
now = 2022-06-20 19:45:22.165639
Welcome20062022194522.mp3
Intruder Detected
Intruder Detected
the humidity is 83.0 and the temperature is 27.0
MQ_6 value: 129

```

## CONCLUSION

- The Smart IOT based Integrated Home Security System is an all in one approach using different sensors and modules to keep an eye on the property of the user i.e., to keep the home of the user safe, under all circumstances.
- The proposed system works 24x7, whether the user is inside or outside his home
- The system detects any kind of gas leakage, or intruder in the house and informs the user in real-time via Email.
- The home automation using web of Things has been by experimentation established to figure satisfactorily by connecting easy of appliances thereto and also the appliances were with success controlled remotely through web or pi.
- The designed system not slowly monitors the sensing sensors information, like temperature, gas, motion sensors, however additionally actuates a method per the need, as an example shift on the sunshine once it gets dark. It additionally stores the sensing element values within the cloud (Gmail) and send mail a very timely manner.
- this may facilitate the user to investigate the condition of assorted parameters within or without the home anytime anyplace. using this technique as Security Guard like without the human.

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