

# Raspberry Pi Based Intelligent Security System

Omkar Khaire<sup>1</sup>, Mihir Sawant<sup>2</sup>, Shreyas Gangadhar<sup>3</sup>, Aniket Gamre<sup>4</sup>

<sup>1,2,3,4</sup>Student, Department of Electronics Engineering, Atharva College OF Engineering, Mumbai

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**Abstract** - Our system focuses on the all-round security of the users keeping their comfort levels intact. We will be using an RFID card and reader for the authorized people who would scan the card and an OTP would be generated automatically and sent to the registered number depending on the RFID number where we would be providing a touch-screen display to enter the OTP. Users would be asked to enter the OTP to unlock the door. For unauthorized people the PIR sensor is used to send the image of the person after waiting for a stipulated time so that the user gets a fair chance to do the needful if he is an authorized person. Once the time is over the camera which is connected to the microcontroller would send the photo of the unauthorized person through the application which we would be developing for the ease of the digitally inclined world. In this application we would provide two administrators per lock who would be having a notification in the application and would get a pop-up which would ask the admin whether to unlock the door for that person or not. Once the decision is made to unlock one more pop-up would come up to confirm their decision and if it's again granted then the door would be unlocked else the door remains locked. This would not just level up the security of the place but also the level of comfort for the users.

**Key Words:** Home Security, IoT, Raspberry Pi, Real-Time Security

## 1. INTRODUCTION

The Internet of things (IoT) is one of the growing features in modern technology. IoT enables us to control various physical devices through the use of software. That means access to any connected device irrespective of place and time. As the passage of time, Internet of Things (IoT) has matured and evolved into a comprehensive system encompassing wireless networks, internet, embedded system and with further development AI and ML can also be integrated in it. In its most practical form, IoT, in the rapid orchestration of messages across objects in the Internet, allows objects sharing using remote accessibility across existing network organization. Practically IoT is through the use of internet infrastructure to share objects or packets of data via the internet thus enabling the remote aspect of IoT. This helps achieve better productivity, accuracy and economic benefit at the cost of human involvement.

A Passive Infrared (PIR) sensor works by sensing variations in the amount of infrared radiation impacting upon it, which varies depending on the temperature and surface characteristics of the objects in front of the sensor.

When an object, like an individual, passes ahead of the background, like a wall, the temperature at that time within the sensor's field of view will rise from room temperature due to blood being at a different temperature than the room and will fall back when the person passes the field of vision. The change is detected by the sensor and an output voltage is generated. Each object has a distinct infrared emission pattern based on the surface characteristics irrespective of the temperature.

Smart security system using IoT with PIR sensor and camera module is an interesting idea to involve detection of sensing of the moving objects. This system can be integrated along with a lock system consisting of a RFID system to generate a one-time password that can be used to control the lock. The security is increased due to multiple layers of authentication thus increasing the security. Thus, surveillance systems can also be used as a security system.

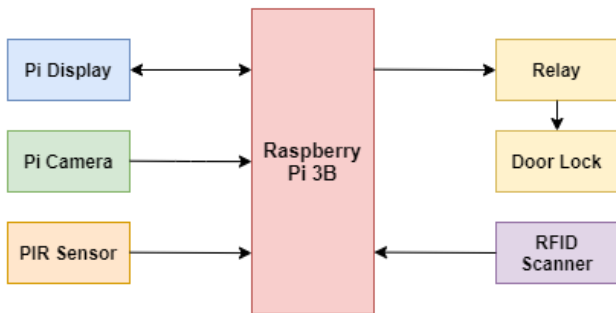
## 2. LITERATURE REVIEW

Home based IoT automation and Surveillance System using Internet of Things are some major applications in the current world. It is used to analyse and collect the information from the various sensors and actuators and it then sends the data to the user over a wireless connection. Security is an imperative issue nowadays as the opportunity for intrusions is growing. In this paper, the proposed system is designed on Raspberry Pi 3B. The Raspberry Pi 3B is interfaced with a door strike to control the door lock and also a camera is connected to the Raspberry Pi- 3B Board.

Nowadays people use technology to automate their tasks. Cameras present in particular places are greatly helpful, as users can monitor the feed and record video.

The sensors automate the task of alerting the user via mail, mobile applications and various software's. Since, the sensors can be used to detect activity and perform predetermined tasks. The task can be ranging from simple in nature to complex tasks [1]. Next generation appliances are developed with the thought of automation in consideration. Sensors can sense the temperature, gas leakage, humidity, light etc. increasing functional abilities to include smart alarm systems, and controlling the household appliances from a remote location. These systems are specially designed for home automation with some increased functionalities and using Internet connection protocol i.e. Wi-Fi as a connecting link between the device and the user [2].

### 3. BLOCK DIAGRAM



**Block Diagram of the System**

The main operating block of the system is Raspberry Pi 3B as it is the main controller of the system. The system consists of many devices. The RFID Scanner is used to identify the user. The Display acts as a user interface of the system. The PIR Sensor is used to detect motion and the camera is used to capture the detected motion. When the correct passcode is entered into the system the door is unlocked via the relay.



**Fig 3. Raspberry Pi Camera**



**Fig 4. PIR Sensor**



**Fig 1. Raspberry Pi 3B**



**Fig 5. RFID Reader and Tags**



**Fig 2. Raspberry Pi Display**



**Fig 6. Relay**

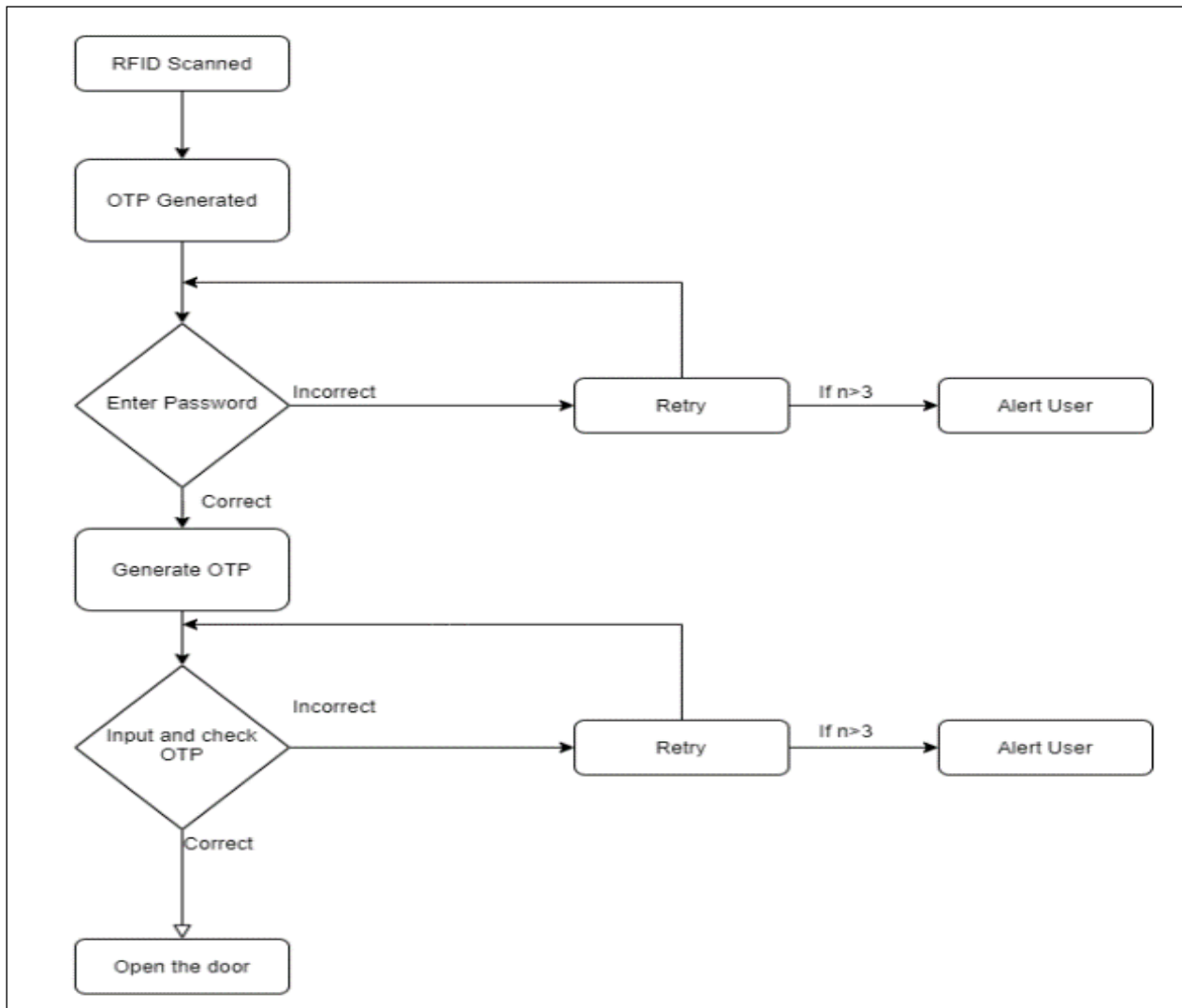
### 4. WORKING

The PIR Sensor used in the project gets activated when it detects motion when the amount of infrared radiation impacting on the sensor varies. A timer of 60 seconds gets

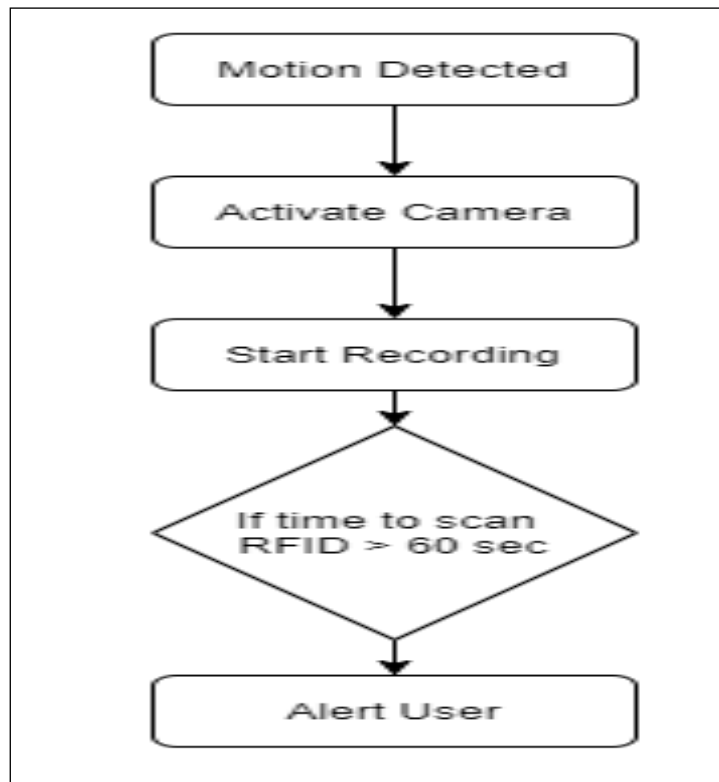
activated upon the activation of the PIR Sensor. And the camera starts recording until the timer reaches 0. If no RFID input is detected the user is alerted of possible intrusion. If RFID input is detected the recording stops after 60 seconds and is stored in the database. Each RFID Tag is distinct for each user. The user inputs its user specific password as doing such the user can be identified.

After giving the correct password to the system an OTP is generated and sent to the user registered mobile number to increase security. After the OTP is entered correctly the relay gets activated and the door is unlocked.

### 5. FLOWCHART



Flowchart 1

**Flowchart 2**

## 6. CONCLUSION

This system can be used to increase home security next level, since this method is cost effective and highly reliable. This system can be implemented in a real-time environment. This system can reduce human intervention and it is an effective solution to real-time security.

## 7. REFERENCES

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