

Door Security System

PROJECT REPORT

Microprocessor & Interfacing (CSE2006)

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Submitted to:-

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Slot- L39+L40



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ABSTRACT

In Recent, Home Automation is on horizon. Door Automation is emerging technology in Home Automation. From the last decades a number of standards have been defined for Door Lock Appliances. The main objective of Door automation is to provide Security locks for door, comfort, connivance security and energy efficiency for user with help of IOT and WSN. The aim of this Paper is to develop Door Automation application using Raspberry Pi and GSM. Raspberry Pi operates and controls motion detector and cameras for remote sensing, surveillance capture the image of the intruder and sends it to the mobile phone of the owner and finally alerts the user about the intruder. In this paper, Biometric is used as secondary for security purpose. Programming has been developed in Python environment for Raspberry Pi operation.

In this Project, we will build a Door Security System using IR Sensor and PI Camera. This system will detect the presence of Intruder and quickly alert the user by sending him alert mail. This mail will also contain the Picture of the Intruder, captured by Pi camera. Raspberry Pi is used to control the whole system. This system can be installed at the main door of your home or office and you can monitor it from anywhere in the world using your Email over internet.

Introduction

In today's world burglary, murder, sexual assaults have become serious issues. One of the main reason is because of the lack of proper security system. In the world of Internet of Things (IoT) when we have all the technologies to revolutionize our life, and automation becoming the centre of 21st century a smart house security alert system is the next step towards smart home. Using this system we can control and monitor our house from anywhere. There are many types of good security systems and cameras out there for home security, but they are much expensive so we built a low cost simple Raspberry Pi based Intruder Alert System, which not only alert you through an email but also sends the picture of Intruder when it detects any.

Objectives

Our objective is to build an easy to install and low cost smart home door security system with the function of intruder alert through mail . We aim to maximize security and optimize convenience in order to provide a safe and comfortable home security. Door alarms are effective burglary protectors. At the moment a door is opened by a burglary attempt, the sensors can activate a mail, a loud siren and a phone call, or any combination of the above. The phone call system can be connected to the owner's phone, to a private security contractor or to a law enforcement agency.

Literature Survey

Specific Techniques	Problems
Face Recognition Based on Auto-Switching Magnetic Door Lock System Using Microcontroller (https://www.researchgate.net/publication/261381471_Face_recognition_based_on_auto-switching_magnetic_door_lock_system_using_microcontroller)	Need to improve reliability and robustness.
Iris Recognition for Palm-Top Application Chun-Nam Chun and Ronald Chung (https://link.springer.com/chapter/10.1007/978-3-540-25948-0_59)	High resolution scanner is needed
Face Recognition System for Unlocking Automobiles Using GSM and Embedded Technology Sarvesh Veerappa Arahunasil , Chetana (https://www.ijareeie.com/upload/2016/july/37_Face.pdf)	2D recognition is affect by changing in lighting, the person hair, and if the person wear glassless.

<p>Finger Vein Recognition Based on Local Directional Code</p> <p><u>Xianjing Meng</u> <u>,Gongping Yang *</u> ,<u>Yilong Yin</u> and<u>Rongyang Xiao</u> (https://www.mdpi.com/1424-8220/12/11/14937/htm)</p>	<p>More memory required to store the data.</p>
<p>One time password RFID systems integrated OTP security authentication design (https://ieeexplore.ieee.org/document/6694342)</p>	<p>Timeout in few seconds and multiple uses means multiple lockouts.</p>
<p>Design and Implementation of a Digital Code Lock using Arduino</p> <p>Shweta Chanda , Deepak Rasaily ,Perna Khulal (http://ijettjournal.org/2016/volume-32/number-5/IJETT-V32P243.pdf)</p>	<p>Can't change the password, during power failure system will gets off.</p>

Components Required: -

- Raspberry Pi
- Pi Camera
- IR sensor
- Bread Board
- Connecting wires
- Power Supply

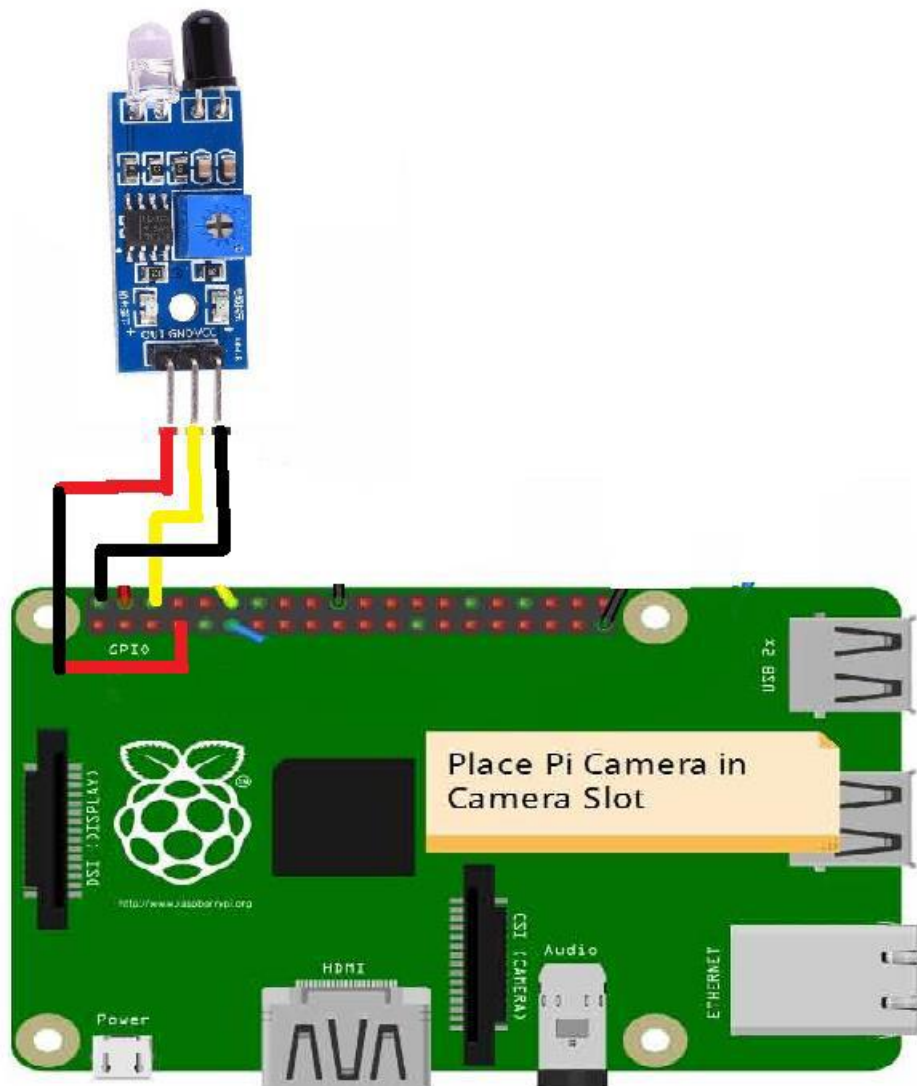
Circuit Design:-

The Raspberry Pi 3 Model B+ is the latest product in the Raspberry Pi 3 range.

- Broadcom BCM2837B0, Cortex-A53 (ARMv8) 64-bit SoC @ 1.4GHz
- 1GB LPDDR2 SDRAM
- 2.4GHz and 5GHz IEEE 802.11.b/g/n/ac wireless LAN, Bluetooth 4.2, BLE
- Gigabit Ethernet over USB 2.0 (maximum throughput 300 Mbps)
- Extended 40-pin GPIO header
- Full-size HDMI
- 4 USB 2.0 ports
- CSI camera port for connecting a Raspberry Pi camera
- DSI display port for connecting a Raspberry Pi touchscreen display.
- 4-pole stereo output and composite video port
- Micro SD port for loading your operating system and storing data
- 5V/2.5A DC Power Input
- Power-over-Ethernet (PoE) support (requires separate PoE HAT)



Raspberry Pi 3B+



Circuit Diagram

Circuit Description

In this **Intruder Alert System**, we only need to **connect Pi Camera module and PIR sensor to Raspberry Pi 3**. Pi Camera is connected at the camera slot of the Raspberry Pi and PIR is connected to GPIO pin 18. A LED is also connected to GPIO pin 17 through a 1k resistor.

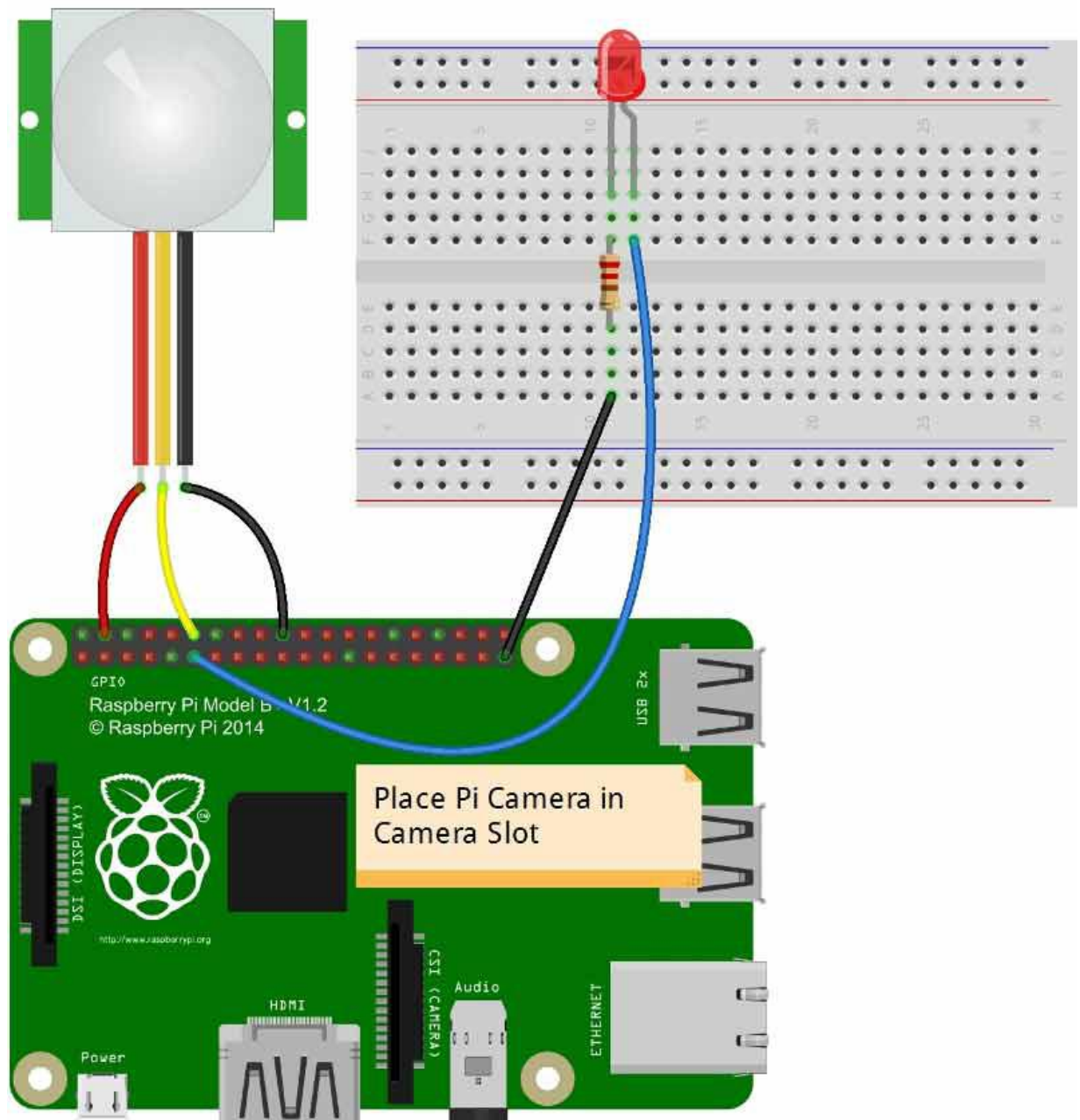


FIG. 5

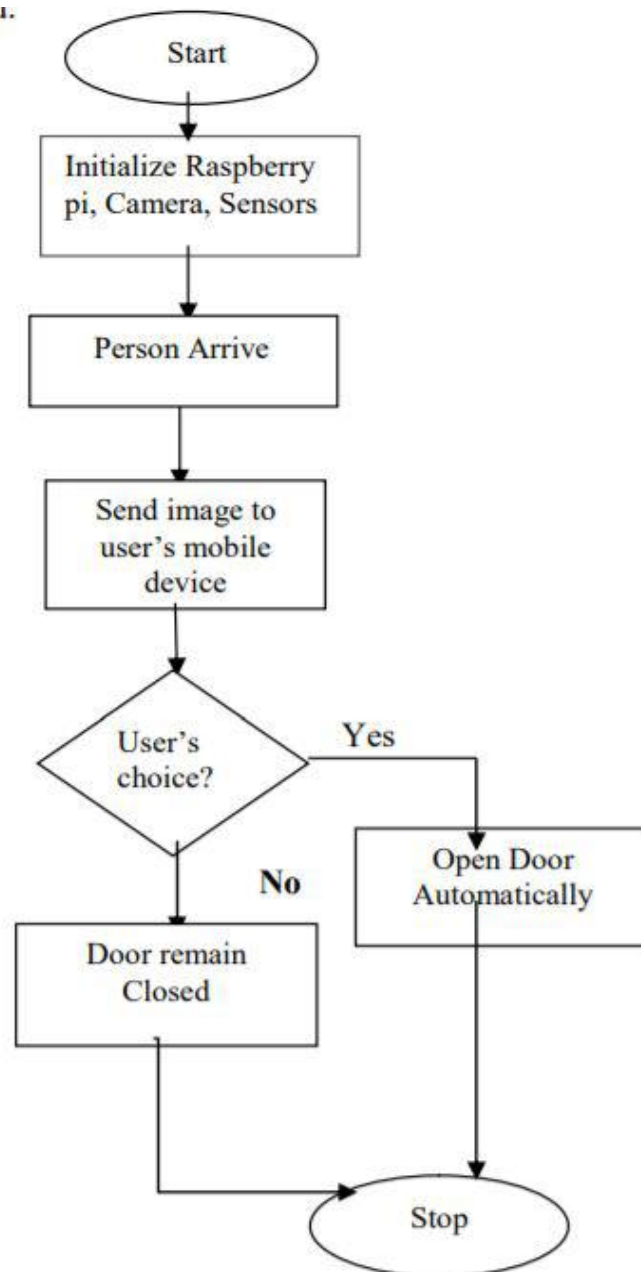


Fig.5, Flowchart

III. SYSTEM ARCHITECTURE

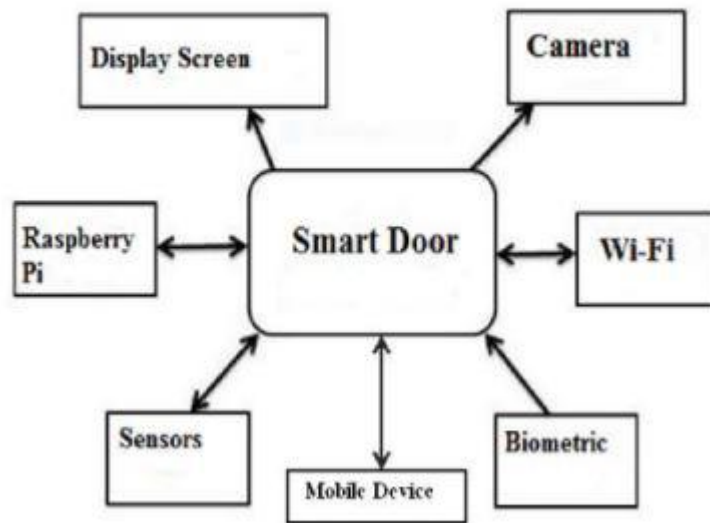
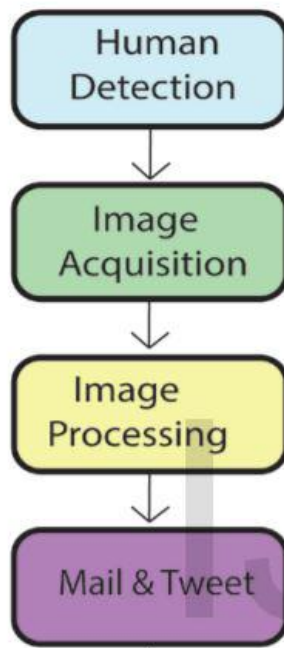


Fig.1 Proposed Architecture



At first the system detects human and automatically raspberry pi take a snapshot which means the image acquisition part. After that image is attached and mailed to user that is the image processing, mail part.

Working

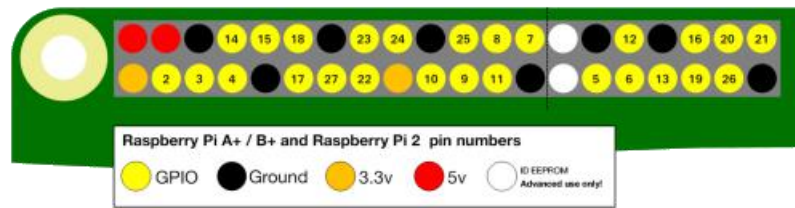
An IR sensor is used to detect the presence of any person and a Pi Camera is used to capture the images when the presence is detected.

Whenever anyone or intruder comes in range of IR sensor, the IR Sensor triggers the Pi Camera through Raspberry Pi. Raspberry Pi sends commands to Pi camera to click the picture and save it. After it, Raspberry Pi creates a mail and sends it to the defined mail address with recently clicked images. The mail contains a message and picture of intruder as attachment.

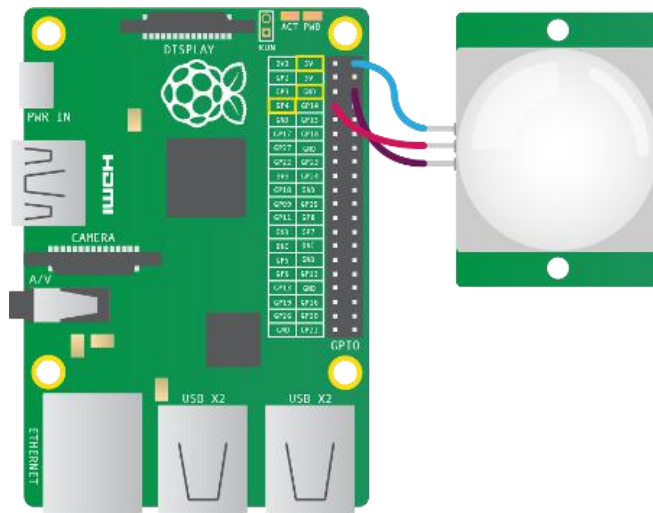
One powerful feature of the Raspberry Pi is the row of GPIO pins along the top edge of the board. GPIO stands for General-Purpose Input/Output. These pins are a physical interface between the Raspberry Pi and the outside world. At the simplest level, you can think of them as switches that you can turn on or off (input) or that the Pi can turn on or off (output).

The GPIO pins allow the Raspberry Pi to control and monitor the outside world by being connected to electronic circuits. The Pi is able to control LEDs, turning them on or off, run motors, and many other things. It's also able to detect whether a switch has been pressed, the temperature, and light. We refer to this as physical computing.

There are 40 pins on the Raspberry Pi (26 pins on early models), and they provide various different functions.



The pulse emitted when a PIR detects motion needs to be amplified, and so it needs to be powered. There are three pins on the PIR: they should be labelled **Vcc**, **Gnd**, and **Out**. These labels are sometimes concealed beneath the Fresnel lens (the white cap), which you can temporarily remove to see the pin labels.



The flex cable inserts into the connector situated between the Ethernet and HDMI ports, with the silver connectors facing the HDMI port. The flex cable connector should be opened by pulling the tabs on the top of the connector upwards then towards the Ethernet port. The flex cable should be inserted firmly into the connector, with care taken not to bend the flex at too acute an angle. The top part of the connector should then be pushed towards the HDMI connector and down, while the flex cable is held in place.

If you have a RasPiO pin label, it can help to identify what each pin is used for. Make sure your pin label is placed with the keyring hole facing the USB ports, pointed outwards.

LIBRARIES INSTALLED:

For running pi camera

```
$ sudo apt-get install python-picamera
```

```
$ sudo apt-get installpython3-picamera
```

```
$ sudo raspi-config(To enable camera)
```

After setting up the Pi Camera, we will install software for sending the mail. Here we are using *ssmtp* which is an easy and good solution for sending mail using command line or using Python Script. We need to install two Libraries for sending mails using SMTP:

```
sudo apt-get install ssmtp
```

```
sudo apt-get install mailutils
```

After installing libraries, user needs to open *ssmtp.conf* file and edit this configuration file as shown in the Picture below and then save the file. To save and exit the file, Press 'CTRL+x', then 'y' and then press 'enter'.

```
sudo nano /etc/ssmtp/ssmtp.conf
```

```
root=YourEmailAddress
```

```
mailhub=smtp.gmail.com:587
```

```
hostname=raspberrypi
```

```
AuthUser=YourEmailAddress
```

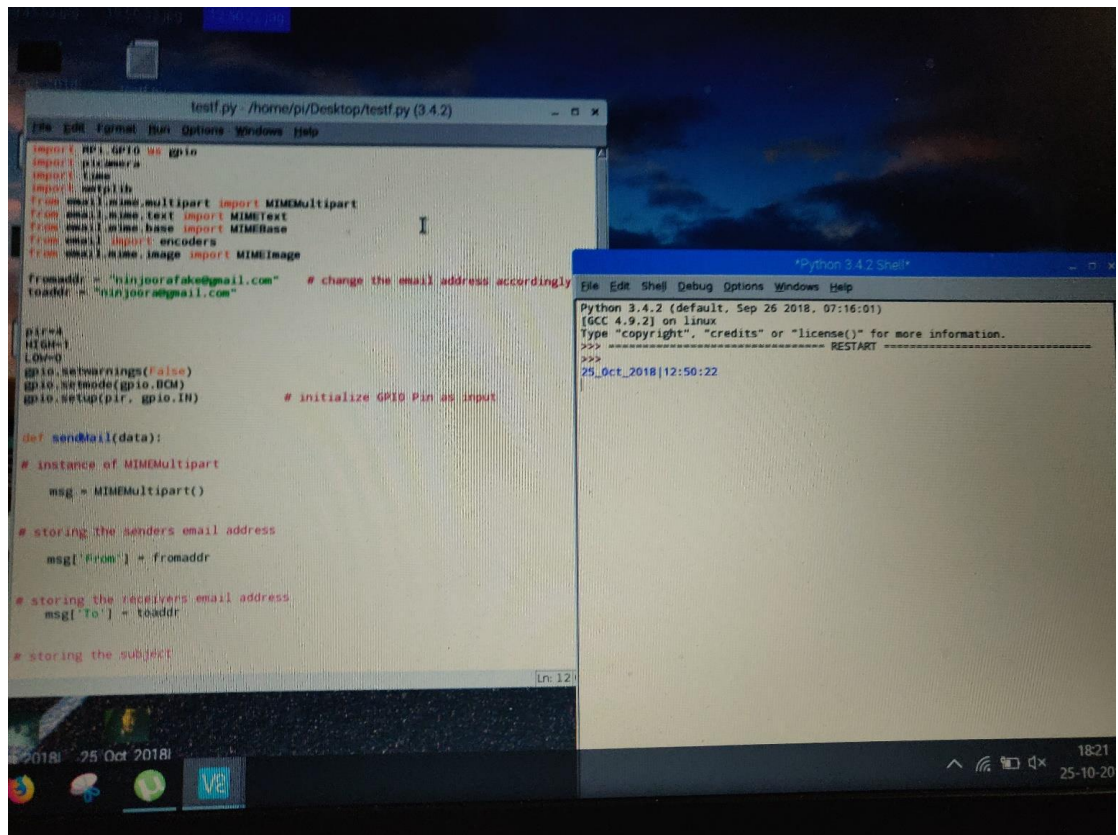
```
AuthPass=YourEmailPassword
```

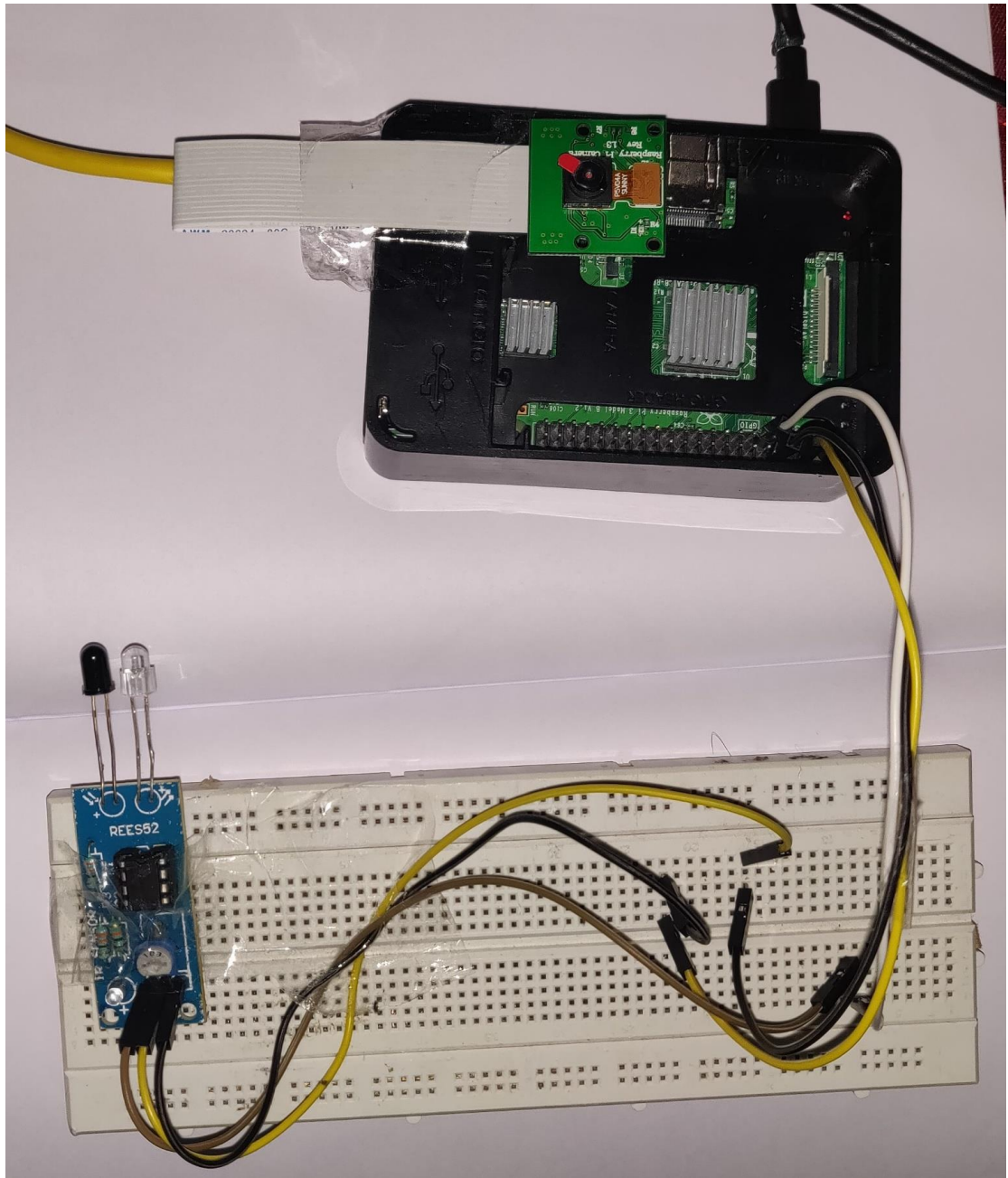
```
FromLineOverride=YES
```

```
UseSTARTTLS=YES
```

```
UseTLS=YES
```


Snapshots:-





Conclusion

We designed the System which reduces human efforts and provide security. Proposed system is cheap, reliable and components are easily available. It is also portable and easily upgradable. System provides Security locks for door, comfort, connivance security and energy efficiency for user. Raspberry Pi-3Model B operates and controls motion detector and cameras for capturing the image of the guest. The security level is increased due to the usage of Raspberry Pi-3Model B which sends the images to the user. It has in built capabilities of connecting to external devices. Raspberry pi proves to be smart economic and efficient platform for implementing the home security system and for automation. Two advantages provided by the system is that, Necessary action can be taken in short span of time. Biometric is used as back-up plan. For Future Enhancement - Retina Scanner can be used instead of biometric.

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