

Secure Home Door Bell using Python and Raspberry Pi

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Abstract:

Security is the main concern in the current world. Recently there are many security systems are developed for securing Home, offices and Personal Properties. The security system includes camera, fingerprint identification, RFID and sensors. In all this security system camera face recognition system is most common, it takes less time for implementation and installation.

In this work, a system is implemented that recognise the family members of the home by face recognition and rang a simple bell. Whereas when the unknown person detected by the system then the system rang a different bell and shows the face in the system display. The system also send email to the home owner. The process is performed automatically without human help. In this system, the raspberry microcontroller installed with Open CV & Face recognition library, the raspberry pi camera module is connected for face recognition and bell is connected to Raspberry microcontroller. The data of the persons is stored in the memory card which is connected to the Raspberry Pi. The result shows that it feels secure while opening the door for the persons and alerts home owner.

Keyword: face recognition, Open CV, Bell, E-mail

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I. Introduction:

The current system rang different bell works on face detection and identification. Generally, the door is opened by looking through door hole but it is quite risky. Hence it is necessary to develop such system that identify the difference between the family members and the unknown person. This system also sends the email to the home owner so any accidental situation happened then it helps for investigation. The Raspberry Pi uses Open command Visualization (Open-CV) and the Face recognition library in used in which Source code is open and which is used for image processing. The main aim of this system is to feel free and secure for the door Opener.

II. Literature Survey:

Many Companies providing the home security system that includes various sensor network, network devices and it automatically increases the cost and Power requirement. These system takes more time for installation.

The face detection has been implemented using a method called Histogram of Oriented Gradients.

The Existing system using smart doorbell using raspberry pi send SMS and Email notification to the person in the home.

The existing system of IOT based smart doorbell send video call when someone presses the door bell as well as send an SMS.

In above systems the internet to be continuously on but current system works well without internet.

Hardware Description

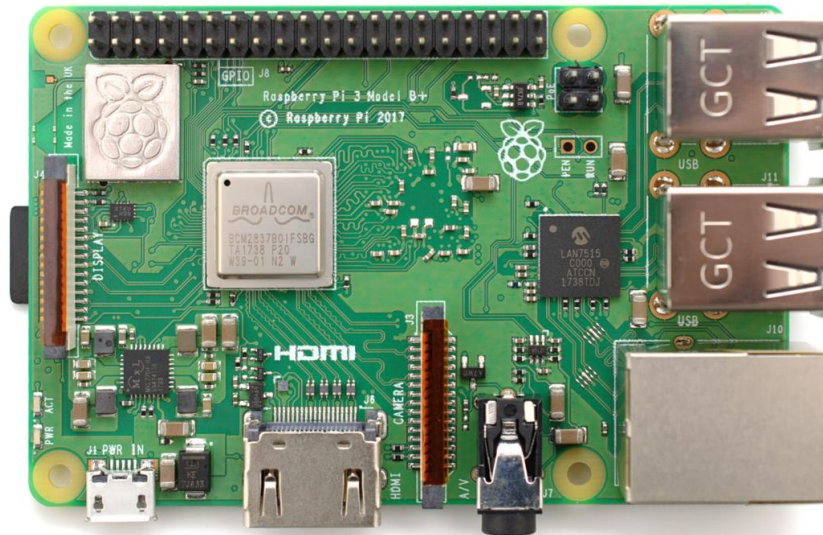
The hardware of the current system is basically consisting of Raspberry pi, Camera module, bell, network device (switch).

Raspberry pi board:

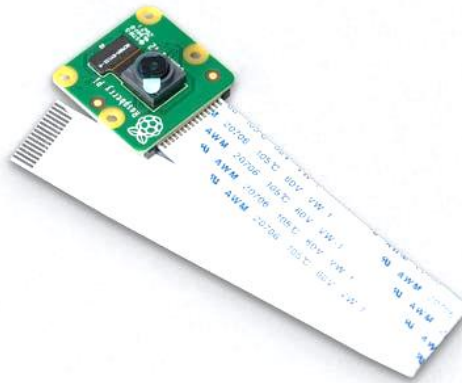
The raspberry pi 3 accept the input from the camera, then raspberry pi identifies the person and sending the signal to bell and send the email to the home owner through the switch.

Specification of Raspberry Pi:

- 1) Broadcom BCM2837 64bit Quad Core Processor 1.2 GHz
- 2) RAM: 1Gbytes DDR2
- 3) Bluetooth: 4.1 LE
- 4) WIFI



Camera Module:



face detected by using of the camera module. It is Raspberry Pi Camera Module with Automatic IR-Cut Night Vision Camera 5MP 1080p HD Webcam for Raspberry Pi 3 Model. It's easily affordable to any inventor for camera projects.

Software Description:

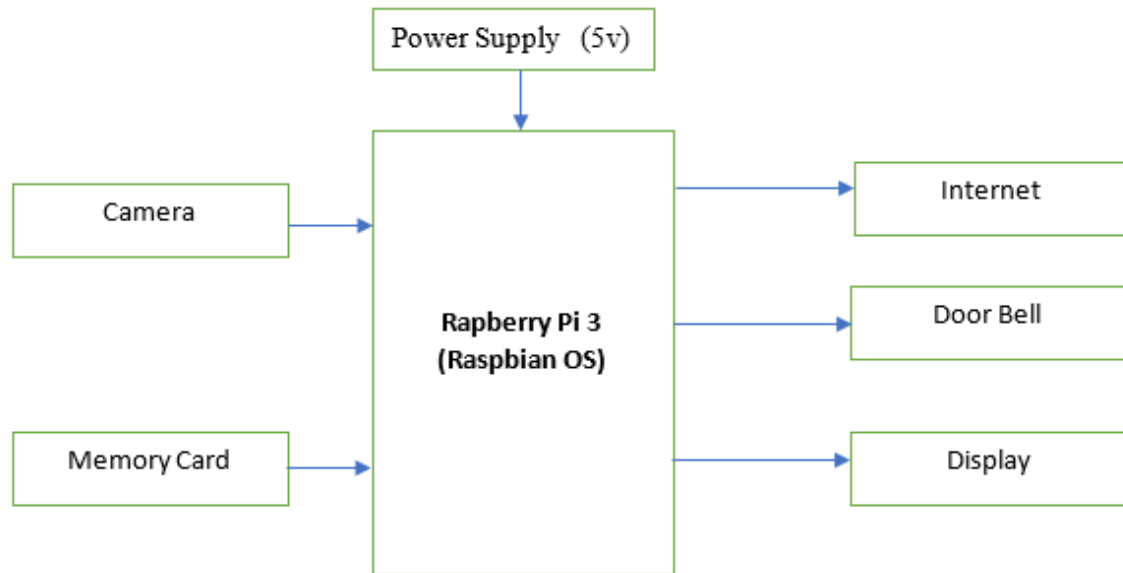
Write the code for the hardware it's required a Linux terminal.

The capture image, its recognition all command written in the Linux terminal. Linux command is:

- Sudo apt-get update = to update the raspberry pi 4.
- Cd /home/pi/Desktop = To use the open file its located on the desktop.
- Sudo apt-get install rpi.gpio = To install a require library for the GPIO pin.
- sudo apt install python3-opencv
- pip3 install face_recognition
- Python face.py = To run the source code.

Proposed Model

The Proposed system is used for home security by using face detection and bell. The system block diagram consists of Camera module attached to the raspberry pi3 and it is placed at the entry of the home. Camera is used to detect the face of the person next to the door.

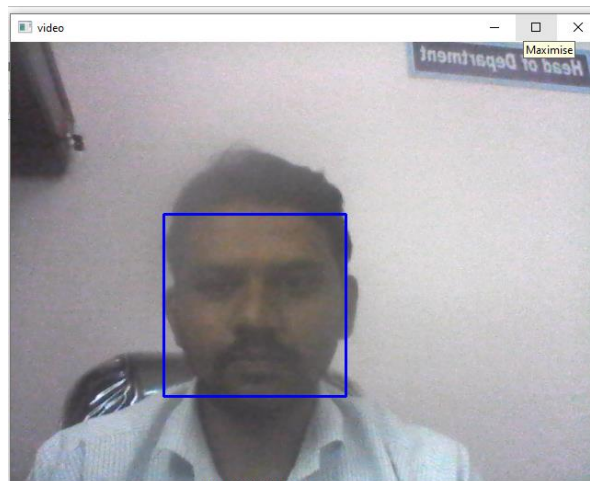


The face of the person is recognized and compare with the face of the family which is stored in the databases through library file present in the Open CV and face recognition. Face recognition is simple and effective method.

The process of face recognition and bell as follows

1) Image from Camera:

The camera is installed in the area where people enter through door. The camera collects the images as well as video from the camera. The collected images is used for face recognition.



2) Creating and verifying the image in the databases:

The image of family member with name is stored in the databases. The database contains the five to six sample of images of each family members with different lightning situation.

3) Detecting faces:

There is different algorithm is present in the Open CV library Here we have to detect the face in real time so Haar cascade Algorithm is used because it is Robust.

4) Face Recognition:

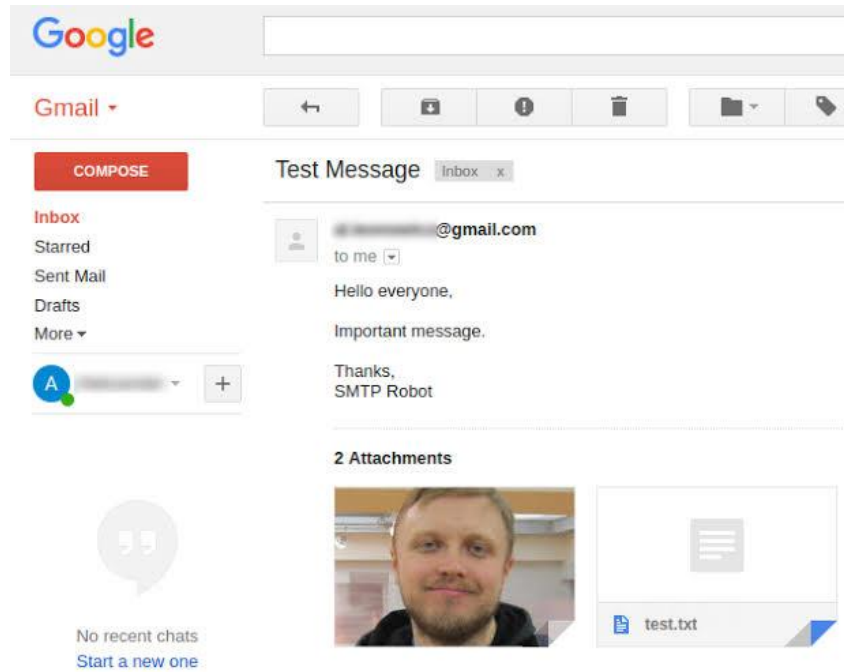
The detected face is compared with the images stored in the databases. The accuracy of image detection is increased by comparing with 30-40 images. The distance from camera to face is also critical while recognition and it is found that ideal distance is 2-6 meters.

5) Bell:

After the face is detected if the person is family member, then Raspberry Pi send the signal to the bell to sound for simple bell and if the person detected is unknown then bell rang differently to indicate new person.

6) Email:

If the identified person is unknown then Raspberry pi send the email to the house owner which helps for security and in accidental situation.



III. Conclusion:

Secure Home Bell system proves the system is robust, safe, cheap, accurate and easy to install. In real time Scenario, the haar cascade algorithm is suitable for work.

Raspberry Pi improves the mobility of the setup and debugging. The work can be improved by night vision camera and HD camera.

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