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## FACE RECOGNITION BASED DOOR LOCK USING RASPBERRY PI

M. Manasa\*<sup>1</sup>, B. Sanjay Kumar\*<sup>2</sup>, K. Harshavardhan Reddy\*<sup>3</sup>,

A. Rajesh\*<sup>4</sup>

\*<sup>1,2,3</sup>Student, Department of Electronics and Communication Engineering,  
ACE Engineering College, Hyderabad, Telangana, India.

\*<sup>4</sup>Assistant professor, Department of Electronics and Communication Engineering,  
ACE Engineering College, Hyderabad, Telangana, India.

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### ABSTRACT

Today we are facing security issues in every aspect. So to resolve these issues by using updated technology. In this project, the Face recognition module is used to capture human images and to compare with stored database images. If it matches with the authorized user then the system will unlock the door by an solenoid lock. The need for a facial recognition system that is fast and accurate that continuously increases which can detect intruders and restricts all unauthorized users from highly secured areas and aids in minimizing human error. Face recognition is one of the most Secured System than biometric pattern recognition techniques which is used in a large spectrum of applications. The time and accuracy factor is considered about the major problem which specifies the performance of automatic face recognition in real-time environments. Various solutions have been proposed using multicore systems. By considering the present challenge, this provides the complete architectural design and proposes an analysis for a real-time face recognition system with OpenCV and CNN Algorithm.

**Keywords:** Raspberry, Open CV, Face Detection, Face Recognition, CNN.

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### I. INTRODUCTION

Now a days, there is a growing interest in the smart home system using the Internet of Things. Security deft has suggested various preferred approaches like biometric and password to enhance security. But the Technology is developed, and the trends shifted towards face recognition systems. The basic idea behind the project is to use a Raspberry PI micro-controller board for system development, a pi camera module for face recognition and a programmable stepper motor to open the door lock. In this install an appropriate linux based Raspberry pi operating system on raspberry pi micro-controller board. For the door unlocking system, place a stepper motor at the door latch. This motor will be programmed in such a way that when the system authenticates the person in front of the camera, the motor will rotate to open latch, use image processing technology to authenticate the person to enter home. For image processing, use the pi camera module. Pi camera module is attached to Raspberry pi, and it aids to store various faces in the databases. When someone wants to enter home, he should stand in front of the camera. Camera will recognize the face and compare it with the faces stored in the LFW database. If the face matches, the door will be automatically unlocked, otherwise a warning alert msg will be sent to the owner of the house.

### II. METHODOLOGY

In figure 1 show the basic block diagram of the Raspberry pi based face recognition system for door unlocking. Our project system can be operated in two different sections, i.e. one for capturing and creating a data base and the other section is to capture the image and which is used for identifying or comparing the images in the database. Here in the second section we use Eigen faces methodology of face recognition for finding the matches.

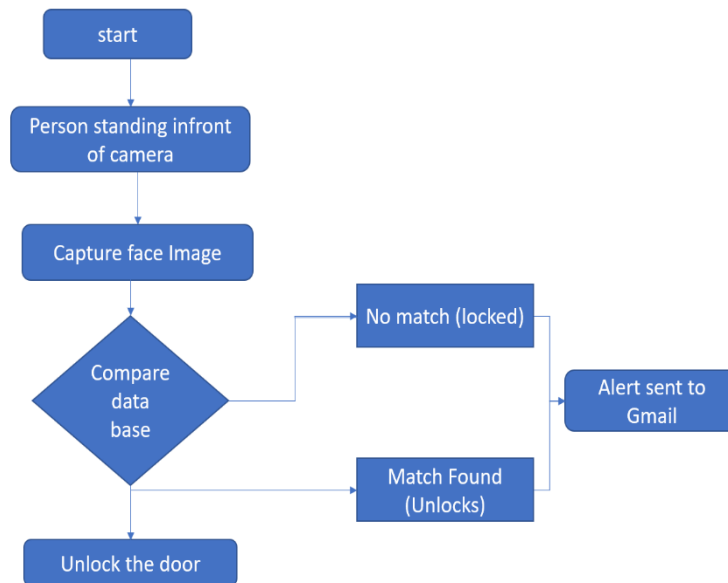


Figure 1: Block Representation

In fig 1, the flow chart is shown which describes all the processes in the proposed system. In this system, the camera takes the frame when IR detects something and compares it with the database where all the trained data is present which is done previously by the admin. If the image captured matches any stored database image then according to the coding in raspberry pi, it will open the door otherwise sent an alert message to the admin and further required steps can be taken by the admin.

### III. MODELING AND ANALYSIS

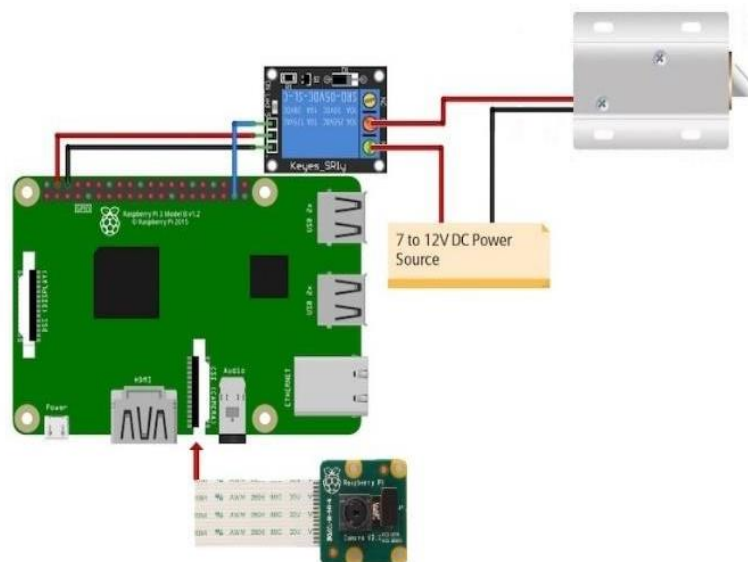


Figure 2: Circuit Diagram

This paper mainly consists Data Gathering, Training the Recognizer, and Face Recognition. In the first phase, the authorized data of face samples will be collected. For this, we have to take a frame and detect faces. For detecting images, we are using open cv and dlib with Raspberry Pi. After detecting the faces, we will extract the face along with resizing the image. Then, the extracted image will be saved in the database. In the second phase, the training of recognizers will be done for the saved face samples. for this process, we will take each image from the database and encode that particular face. Finally, the facial encodings of each person will be saved in binary files with the names of the persons. Now, these encodings will be used in the recognition process to identify the owner and the intruder. In the last phase, the real-time face recognition will be done using trained data. For this process, a real-time frame will be taken and the face will be detected. To capture images, we are

using a camera module with Raspberry Pi. Now the face sample is preprocessed and analyzed. After analysis, the data will be stored in the database. Now the process of comparison of all the stored samples with the newly obtained sample will be carried out. It will search out for the best matching person id. If the match is found, then the person standing outside is authorized hence the lock will get unlocked otherwise a security alert will be sent to the authorized person through email along with the image of the intruder.

#### IV. RESULTS AND DISCUSSION

The Result of this project is showed in below photos: If raspberry pi recognizes a face, it will open the door lock and send an email alert.. Here, a solenoid lock and a Pi camera will be used with Raspberry Pi to build this face recognition-based door lock system using Raspberry pi.



Fig 3: Complete project.

#### Advantages:

- Maximizing home security.
- Remote control of home functions.
- Increased energy efficiency.
- Consumes less power.
- Home management insights.

#### Disadvantages:

- Reliable internet connection is crucial.

#### V. CONCLUSION

In this paper, we presented a lock system based on Raspberry Pi. We have used face recognition technology for recognizing people. The proposed system uses a webcam for capturing the image of the person in front of the door. It uses open CV and dlib for face recognition. In the case of an unknown person, it sends the security alert to the admin. The success rate of this system in recognizing face images of the person in front of the door is high. This automated lock system is highly secure as it uses face recognition. This system can be used for residential as well as commercial purposes.

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