



## FACE RECOGNITION DOOR LOCK SYSTEM USING RASPBERRY PI

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### ABSTRACT

The home security system has become vital for every house. Previously, most doors can be open by using traditional ways, such as keys, security cards, password or pattern. However, incidents such as a key loss have led to much worrying cases such as robbery and identity fraud. This has become a significant issue. To overcome this problem, face recognition technique was introduced, and Internet of Thing (IOT) also been used to perform efficient door access control system. Raspberry Pi is a programmable small computer board and used as the main controller for face recognition, youth system and locking system. The camera is used to capture images of the person in front of the door. If the face is not registered it will raise an alarm. IOT system enables the user to control the door access.

**Key words:** Facial recognition, Raseberry Pi , Internet of things (IOT) ,Home security system

### 1. INTRODUCTION

The most important of feature of any home security control system is to detect the people who enter or leave the house. Instead of monitoring that through passwords or pins unique faces can be made use of as they are one's biometric trait. These are innate and cannot be modified or stolen easily. The level of security can be raised by using face detection. Thus, a new hardware system for human face detection using Raspberry Pi has been developed. The Raspberry Pi is a series of small single board computers. It is like a fully functional CPU and its functionality is similar to a desktop computer. The flow of the face recognition system is that first an image is captured by camera. The snippet code detects the features of an individual. After the detection, using Raspberry pi the captured image is checked against the images in the database. Then it is decided if the faces match or not. It raises an alarm if an intruder tries to enter the premises. The equipment used is easily available and used in a wide sense. ("Python programming

language has been used for the algorithm which works on a LINUX operating system"). Access is given only to the members of that family whose faces would be stored in the database. In case of guests (unrecognized face, not specifically an intruder) an alarm is raised and authentication is provided by them. The system which was proposed has been designed to eliminate the drawbacks of the previously mentioned security system and to improve the security, flexibility, efficiency of the forth coming system. The security camera system may sometimes be impossible due to the exhaustive costs incurred during installation. The other implementations of this system are in banks, attendance, authentication networks. The system is improved from time to time. Some images of authorizing user are used as the data base of system and the system will train the face recognition automatically. Thus, the accuracy is increased. Home security is an example of Internet of Things (IOT) applications. IOT refers to the network of associated physical objects that can interact



and trade information among them-selves without the need of any human intervening. IOT is a futuristic technology where devices and internet is interconnected. It is different from the internet due to internet exceed connectivity by allowing any embedded circuit to communicate with each other using the current internet infrastructure.

## **2. LITERATURE SURVEY**

### **2.1 Face recognition technology**

Currently, the number of thefts and identity fraud has frequently been reported and has become significant issues. Traditional ways for personal identification requires external element, such as key, security password, RFID card, and ID card to have access into a private asset or entering public space. Many processes such as drawing out money from banks requires password. Other such parking in private space would also need parking ticket. For some houses, the house key is very important. However, all this method also has several disadvantages such as losing key and forgetting password. When this happens, it can be hassle to recover back. This method is slowly taken over by biometric methods as it is the possible way to solve those problems. This technique required using the special hardware such as fingerprint scanner, palming print scanner, DNA analyzer to gather information for the vast majority of the biometric applications and the target objects have to touch with the hardware to acquire information. As biometric is a technique that distinguishing physical highlights of people accordingly it has an extensive variety of utilization in security frameworks and it is viewed as one of the most secure methods. Basically, biometrics can be classified in two categories which are physical and behavioral. Recently, the face recognition technology has engaged an overwhelming number of researchers and it is gradually

supplanting other biometric security frameworks. Face recognition is also known as image matching. It is a rapidly growing field where it is heading in a direction such that it will replace the traditional method. Face recognition is more stable among others biometric identification method as it is using the human face that results in high accuracy, lowest false recognition rate and it does not change in people's life. Thus, this method is much practical for a lot of usage, including face recognition for the unlocking house door.

## **3. PROPOSED SYSTEM**

Now-a-days we are moving to new technical world. Thefts and identity fraud has become a serious issue. To overcome this problem, we introduced the face recognition and detection using raspberry pi. The scope of this project is to develop a security access control application based on face recognition. In these we use components as shown in block diagram. If a person enters into your area and accessing to open the door, As we see on block diagram the camera record its face and send it to the data base in the raspberry pi and it check the face is recognized in date base it unlock the door. If the face is note in the data base it raise an alarm and alert someone is trying to enter in your house or secured area. It may uses in office, colleges, houses, and for secured area. By these we can reduce the problems arise from theft and unidentified members.

### **4. Method used for face recognition**

In this new era, face recognition plays an important role in security and observation. Consequently, there is a requirement for a proficient and cost-effective system. Face recognition is a technique that is able to identify and verify peoples. According to, face recognition, define as steps to identify, distinguish and processed face is compared with the images that stored in the database to

verify who the person is. This face recognition has become a significant technique for user identification. There are many techniques that can be used for face recognition but the Principal Component Analysis (PCA) is one of the most popular techniques used for face recognition. This method involves a mathematical procedure to transform a number of possibly correlated variables into a number of uncorrelated variables known as principal component. Generally, the PCA technique for face recognition will utilize the use of Eigen faces. It is the effective and efficient ways to represent pictures into Eigen faces component as it can reduce the size of the database of the test image. Numerous method is developed and deployed in order to improve the performance of face recognition technology.

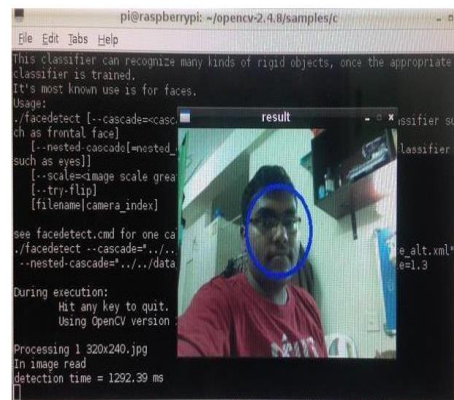
**Table 1 Image Resolution versus Processing Time**

Image Resolution	Processing Time (ms)
1920x1080	109945
1280x960	25081
640x480	5695
320x240	1451

#### 4.1 Face recognition in raspberry pi

The first research on face recognition goes way back in 1950 in the field of psychology. The actual work of automatic machine recognition of faces really started in 1970. From all the research done, there two types of face recognition method which are the image- based face recognition and video-based recognition. Video-based face recognition is the process of finding 3D images from its 2D while the image-based recognition method, is the process by which human train the machine using a camera by

showing the camera sets of still images. A Face Recognition System is a framework which consequently recognizes and additionally checks the identity of a person from digital images or a video outline from a video source. Many researchers choose to use embedded device called as Raspberry Pi for training and identification purpose the fundamental reasons why they have picked this particular component because it has high handling limit, low cost, and its capacity adjusts in various programming modes. By using Raspberry Pi, it helps to resolve the limitation of PC such as its weight, size and high-power consumption. Raspberry Pi is a device that can divide the software part into three parts which are recording images, training and face recognition. According to and as they deployed the used of Raspberry Pi for image capturing system, the system becomes littler, lighter and has lower power utilization. So it is more convenient compared to PC-based face recognition system.

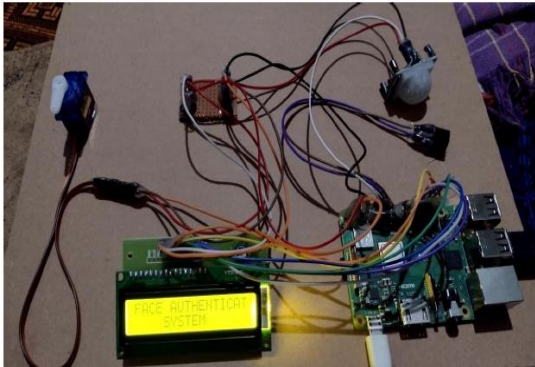


#### 4.2 IOT in face recognition

IOT has been applied in face recognition in many applications such as unmanned Aerial vehicle, smart classroom, home security system, smart house, smart surveillance and many more applications. The previous implementation of IOT in face recognition are using conventional method such local

binary pattern, neural network, support vector machine, and k nearest neighbor.

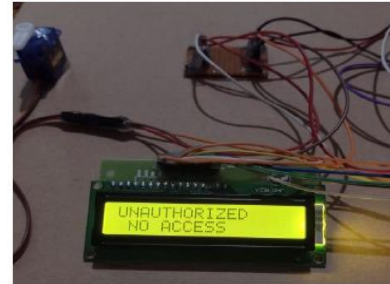
### 5. RESULT



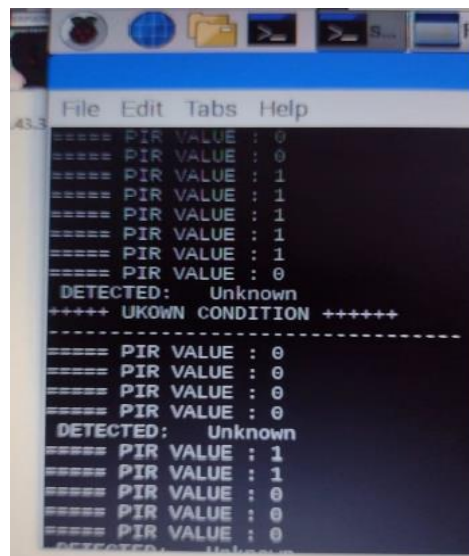
*Fig 5.1 Final report on Face recognition using raspberry pi*

The working model of the proposed face recognition using raspberry pi was successfully designed and implemented. The performance of the circuit was analyzed for different ways. The circuit was able to find the faces within the data base without interfering in human activity. Circuit was tested for different faces which are in data base and not in the data base. It has a fast response, the motion sensor module working good. It responds to the motion and face recognition accordingly. By using IOT we were able to reduce the cost and increase efficiency. This implementation has been a major component in the circuits of major fast consuming technology.

When an un authorized candidate is dedicated in camera it checks the face that which is present in data base if matches with the recognize face then it opens the door if an unauthorized it gives an beep sound and display un authorized access as shown.



*Fig 5.2 shows unauthorized access*



*Fig 5.3 DETECTED UNKNOWN FACES*

### 6. PROBLEM STATEMENT

In the world of emerging technology, security became an essential component in day-to-day life. Information theft, lack of security and violation of privacy etc. are the essential components which are needed to be protected. Using smart secure systems for door lock and unlocking became popular nowadays. This is system is being adapted by many countries and first grade countries such as USA, Japan etc. already makes use of this system. This system provides either a facial recognition security feature or a keypad is provided to enter the pass code to unlock the door. Although it provides



security to the doors, it also has its own drawbacks: Firstly, if the system mainly uses a facial recognition module, there might be a slight chance that sometimes the face may not be detected and hence the door cannot be unlocked. Secondly, if the system uses a keypad to enter the pass code to unlock the door, there might be a chance that the key maybe is recorded or can be observed by others without user's consent. Hence, two-step verification is developed which makes use of facial recognition as the first step and pass code as its following step. But the same issues pertain in the newly developed system. Thus, a new model which rectifies all the above issues is developed.

## 7. CONCLUSION

The design of the face recognition system using Raspberry pi can make the smaller, lighter and with lower power consumption, so it is more convenient than the PC-based face recognition system. Because of the open-source code, it is freer to do software development on Linux. We use HOG+SVM algorithm for the face recognition and detection process. Also send a security alert message to the authorized person. A face detection system using Raspberry Pi was developed. The system was programmed using Python programming language. Both Real time face detection and face detection from specific images, i.e. object recognition, was carried out. The efficiency of the system was analyzed in terms of face detection rate. The analysis revealed that the present system shows excellent performance efficiency and can be used for face detection even from poor quality images.

## 8. FUTURE SCOPE

Using raspberry pi the current project can be modified by an Infrared camera interfacing it can be used in Smart Surveillance

Monitoring security system which any type of public security is using Living body detection or spying, Also it can be used in Attendance system of the class, Also some profound applications can be implemented using interfacing of Raspberry pi and Arduino UNO board like sensor application of smartcard swapping, finger detection, alcohol detection, agriculture humidity sensing, Temperature sensing using web server, and many more. New studies are being made to allow images to be processed on the GPU of the Raspberry Pi, achieving better results with the use of specific libraries.

## REFERENCE

- [1] Tudor Barbu "Gabor Filter –Based Face Recognition Technique, "Processing of the Domain Academy, Series A, Vol 11, No 31 2010, PP.277-283.
- [2] Paul Viola, Michael J. Jones Robust Real-Time Face Detection, International Journal of Computer Vision 57, 2004.
- [3] Kanza Gulzar "Automobile security based on detection & recognition of human face", Conference Paper, June 2017.
- [4] Gopal Krishnan, K., Sathish Kumar V. 2014 Embedded Image Capturing System Using Raspberry Pi System.
- [5] Raspberry Pi Face Recognition Treasure Box Created by Tony Di Cola.
- [6] Kuldeep Soni developed a system with an advanced surveillance camera capable of face detection and at the same time recognizing the face.
- [7] Anoop Mishra "Embedded Image Capturing & Digital Converting Process using Raspberry pi System interfacing and Comparison of Generation 2 verses Generation 1 models in Raspberry pi" et al, /(IJCSIT) International Journal of



Computer Science and Information Technologies, Vol. 6 (2), 2015, 1798-1801.

[8] Kandla Arora proposed that real time application of Face Recognition concept by generating a MATLAB code.

[9] Chowdhury, M Nooman S. 2013. Access Control of Door and Home Security by Raspberry Pi through Internet.

[10] M Sajjad, M Nasir, K Muhammad, S Khan, Z Jan, AK Sangaiah, M Elhoseny, SW Baik. Raspberry Pi assisted face recognition framework for enhanced law-enforcement services in smart cities. Future Generation Computer Systems. 2017.

[11] S McManus, M Cook. Raspberry Pi for dummies. John Wiley & Sons. 2017.

[12] TS Gunawan, IRH Yaldi, M Kartiwi, N Ismail, NF Za'bah, H Mansor, AN Nordin. Prototype Design of Smart Home System using Internet of Things. Indonesian Journal of Electrical Engineering and Computer Science. 2017; 7: 107-115.

[13] E Upton, G Halfacree. Meet the Raspberry Pi. John Wiley & Sons. 2012.