Face Recognition Door Locking System Using Raspberry PI

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Abstract **- In Today's world, security frames the most essential segment of our lives. Face Recognition is an important part of the purpose of the security and surveillance field. A small project which does face detection using OpenCV library on Raspberry Pi. Facial Recognition is a category of biometric software that identifies people by their faces. The face is captured by the digital camera and the system is trained and then it is capable of identifying the person. This paper focuses on the implementation of a face detection system for human identification based on the open-source computer vision library (OpenCV) with python. We also proposed a hierarchical image processing approach to reduce the training or testing time while improving recognition accuracy.**

Index Terms **- Face recognition Raspberry Pi ,Web camera.**

INTRODUCTION

This endeavor deals with the proposed system for sharp and astute doorway lock recognition structure which is genuinely for ID of human faces and for the most part for home security. this is every now and again consistently isolated into two sub structures. First is picture getting, then comes face disclosure and affirmation and eventually modified doorway access the board. Open CV is particularly used for Face Affirmation since it uses Eigen faces which examines the face pictures and conveys it without losing crucial face features, facial pictures of various individuals are becoming to be taken care of in data base.

METHODOLOGY

The working of door lock/ unlock system is done using open-source hardware components and software tools, which is available in the open market.

Fig 1. System Architecture

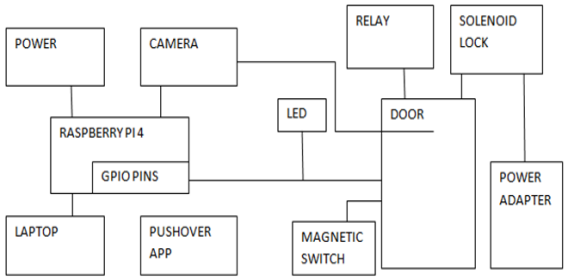
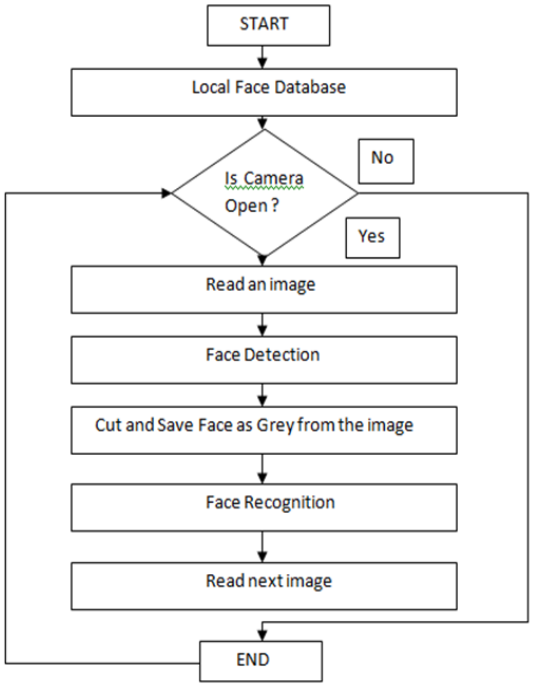


Figure 2: OpenCV algorithm



a. Connect the power adapter on Raspberry pi , Install and Open VNC viewer on laptop. To open it we have to give IP Address of the Raspberry pi.
b. Open CV is used for image processing. Open CV algorithm shown above in Figure 2.
Firstly, we create database (or we have to train the project by giving images in different angles) . When camera will open , it reads an image and after it detects. It will cut and save face as grey

from the image. After that it recognizes the face with their names, which we have stored while training. And then again it reads the next image. This process is repeating again and again.

c. And also Install a pushover app on our android phone to get notification.
d. We have created 4 programs Face dataset, Face detection, Face recognition and Face Trainer by using python language.
e. First given power to raspberry pi. Also power adapter gives power to activate the relay.
f. Open the VNC viewer to capture the person's face.
g. After that Raspberry pi sends a signal to relay, it fires the solenoid valve to open the door when face is detected. Here magnetic switch is used for sensing that door is open or closed.
h. If known face is there then face is detected. And door will automatically open.
i. .After that it sends a pushover notification on our android phone when known person is found.
j. And there is no action taken when unknown face is detected. And only notification is come on our android phone that unknown person is trying to unlock the door.

SYSTEM REQUIREMENTS (HARDWARE AND SOFTWARE REQUIREMENTS)

a)Raspberrypi-4

Raspberry pi 4 is a tiny, low-cost computer. Raspberry pi 4 Model B is the latest version of the low-cost Raspberry pi computer. Raspberry pi standard 40 pin GPIO header (fully backward compatible with previous board).

The Raspberry pi foundation aims to put computing tools in the hand of the people all over the world, using low-cost single board computers to make hardware and software accessible to as many as possible.

b)Web-Camera

A webcam could likewise be a camcorder that feeds or transfers a picture or video progressively to or through an organization , very much like the web . Webcams are commonly little cameras that sit on a work area, connect to a client's screen, or are incorporated into the equipment. Webcams are regularly utilized during a video visit meeting affecting at least two individuals, with discussions that incorporate live sound and video.

c) Solenoid Lock

A solenoid entryway lock might be a far off entryway locking component that hooks or opens through an electromagnetic solenoid. Such entryway secures are utilized widely distant security access and car entryways.

d) Relay

Relays are the switches which aim at closing and opening the circuits electronically as well as electromechanically. It controls the opening and closing of the circuit contacts of an electronic circuit. When the relay contact is open (NO), the relay isn't energize with open contact. However, when energy (electricity or charge) is supplied, the states are prone to change.

e) Pushover notification on android phone

Push notifications are clickable pop-up messages that appear on your users browsers irrespective of the device they are using or the broser they are on.

They serve as a quick communication channel enabling companies to convey messages, offers, or other information to the customers.

f)OpenCV

OpenCV, or the Open-Source Computer Vision Library, began as an Intel research project. In terms of the sheer amount of functions it contains, it is now the largest computer vision library.

More than 2500 algorithms are implemented in OpenCV! It can be used for both commercial and academic purposes. And it doesn't stop there! Multiple LAN interfaces are included in the library.

IV. RESULT

When the face detection button is clicked, its popup a real time web cam image through OpenCV technique

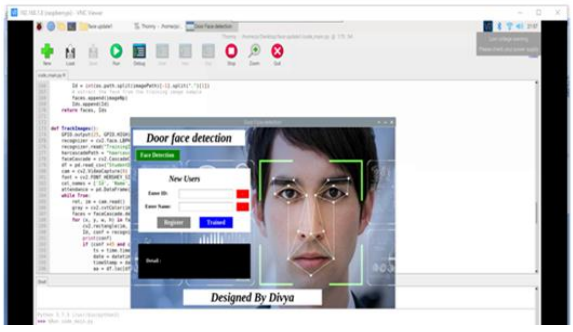
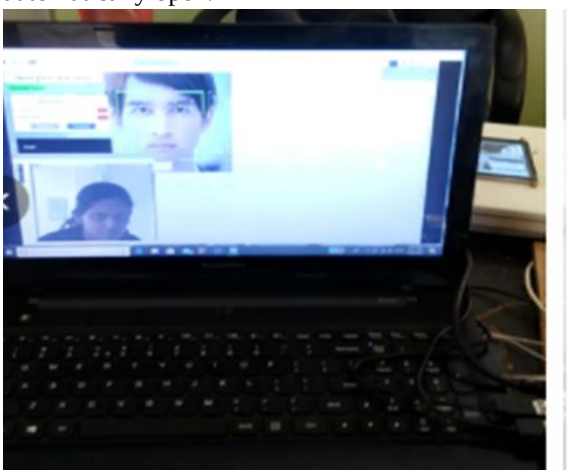


Fig: a)Face Detection Algorithm

Fig: b) System is ready to detect the face

1)When the known face is detected, the door will automatically open.



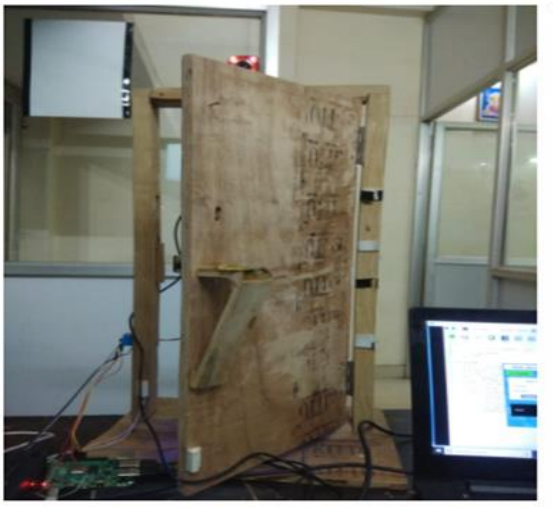


Fig: c)When known face is detected Door will open

After that it sends a pushover notification is founded on our android phone

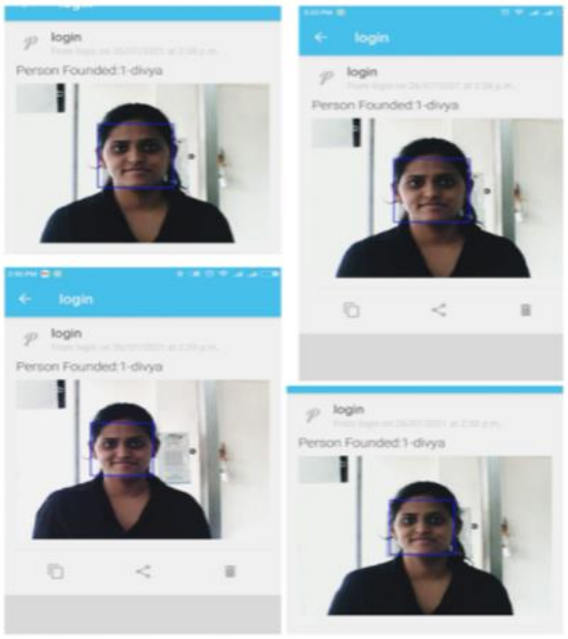


Fig : d)Popup message in android phone when known face is detected

2) And there is no action taken when unknown face is detected. And only notification is come on our android phone that unknown face is detected.

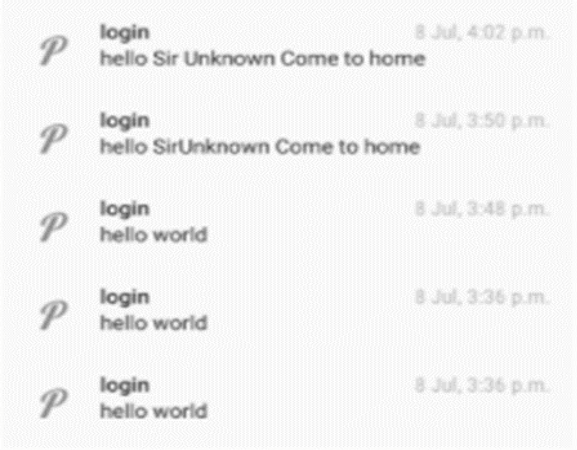


Fig: e)Popup Message in Android phone when unknown face is detected

Here we have taken approximate 60 images of one person in different angles. Before detecting the person firstly, we have to train the system by giving id and the person's name. After that taking the multiple images of that person. So that person can be identified easily.

CONCLUSION

The project is meant in such the way that has fast and efficient alert and monitoring system that may in used not just for door lock security system moreover as other applications also. This project is one of the best examples of Raspberry pi and pi camera with Open CV. The systems are programmed by Python language. We have used the technique that need very less computational time and greater accuracy in detection, recognizing of both Real times and from images, i.e. stored images

The efficiency of the system was analyzed in terms of face recognition rate. The analysis revealed that the present system shows excellent performance efficiency.

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