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Survey on Face Recognition for Automation of Door Lock System

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Abstract: ***In recent years, it is important to own a reliable security system that can secure our assets as well as to protect our privacy. The traditional security system needs an individual to use a key, identification (ID) card or password to access an area such as home and workplace. However, the present security system has many weaknesses wherever it is simply cast and taken. Most doors are controlled by persons with the employment of keys, security cards, countersign or pattern to open the door. The aim of this paper is to assist users for improvement of the door security of sensitive locations by using face detection and recognition. The proposed system mainly consists of subsystems namely image capture, face detection and recognition, email notification and automatic door access management. Face Recognition supported openCV is brought up because it uses Eigen faces and reduces the scale of face images without losing vital features, facial images for many persons can be stored in the database. The door lock can also be accessed remotely from any part of the world by using Telegram android application. The captured image from pi camera will be sent to the authorized person through email for safety purposes.***
Keywords: OpenCV, Raspberry pi, Telegram application, Email

I. INTRODUCTION

Human beings are recognized by their distinctive facial characteristics. In the face recognition approach, a given face is compared with the faces stored in the database in order to identify the person. The aim is to search out a face in the database, which has the highest similarity with the given face. In the field of bio science, face recognition technology is one among the fastest growing fields. The need of face recognition in security systems is attributed to the rise of commercial interest and therefore the development of feasible technologies to support the development of face recognition. Major areas of commercial interest comprises of bio science, law enforcement and surveillance, human computer interaction, multimedia management (for example, automatic tagging of a particular individual within a collection of digital photographs) smart cards, passport check, Criminal investigations, access control management. However, face detection is more challenging because of some irregular characteristics, for example, glasses and beard will results in detecting effectiveness. Moreover, different sorts and angles of lighting will make detecting face generate uneven brightness on the face, which will have influence on the detection and recognition process. To overcome these issues, the system primarily used openCV based face recognition system using Haar classifiers for face. The main processing element is Raspberry pi. The pi camera is employed to capture the image and send it to the authorized person for security purposes. The authorized person can remotely control the lock and unlock mechanism of the door using Telegram android application which is freely available on Google play store. The entry log every person is captured using pi camera and picture is sent to the email address of the prescribed user.

II. LITERATURESURVEY

A. Deep Unified Model For Face Recognition Based On Convolution Neural Network And EDGE Computing

This system proposes a deep unified model for face recognition based on faster region convolution neural network. And design a group-based attendance system based on the proposed deep unified model with an accuracy of 97.9% under different conditions, edge computing have been utilized for processing the data at the edges of the node to reduce the data latency and increases the real time response. The drawback of this system is the challenges like detecting face with increase beard, sunglasses, tilted face, etc.[1]

B. Smart Home Automation using Machine Learning Algorithms

This system is connected to the existing home wireless networks that contain emotion recognition mode where the system will use the connected camera to detect the user facial expression and accordingly will automate the fan and light, here different sensors and devices are interfaced with input/output ports on the raspberry Pi. The drawback of this system is that increase in number of cases (expressions) the accuracy decrease [2].

C. IOT Based Door Access Control using Face Recognition

This model contains PIR sensors to detect human and Pi camera that captures image and send to remote users. It users haar algorithm on captured image using openCV in raspberry on bases of image saved in the system. If the captured face is recognized the door unlocks and in the other case the captured image is sent to the remote user. The user can allow or deny the access of door through online application. The main drawback of this design concept is the system doesn't know how to solve a conflict where more than one person stands in front of the door [3].

D. Face Recognition Door Bell

This system detects the face while motion using sensors and capture the image using background subtraction. The disadvantage of this system is that it has low image quality, face angle, processing and storage [4].

E. Palmtop Recognition

The proposed system contain the automatic controlled door circuit is useable in any position and condition because of its parts available and lower cost , the disadvantage of this system is that is has less resolution[5].

F. Face Recognition with GSM Technology and E-Mail Facility

This system contains features that capture Facial expressions and angles are varied along with lighting conditions during enrollment, the system goes inefficient with the person with less lighting conditions or mask encounter in front of camera [6].

G. IRIS Scanner Vein Detection Unique Code

This system contains the most accurate and secures technology in the field of biometrics and reliable but the only disadvantage is it has less memory [7].

H. Digital Code Lock

This system has highest security and it is more precise, but it has a major drawback of it can't change the password, during power failure system gets off [8].

I. Implementation of Image Processing On Raspberry Pi

This work was purely based on image processing with the help of a raspberry pi and pi camera.
The pi camera module used here returned dark and low separation images which caused difficulties to focus on a particular region of the obtained image [9].

J. A Secured Smart Home Switching System Based on Wireless Communication And Self-Energy Harvesting

The system reacts quickly to the changes caused by the voltage drops or the loads. Since the switches have been considered ideal, the efficiencies' close to unity, and the only losses present are due to the controller voltage dividers and the low leakage of the ultra capacitor [10].

K. Wireless Access Monitoring and Control System Based on Digital Door Lock

This system is composed of multiple modules such as the human detection module (HDM) which aims to detect the user at the door. This can be performed using the camera module in which the images or the video stream is being processed. Consequentially, the results of the two-mentioned module will go through the Zigbee module that would identify a verification tag for each user. Once the user got failure in terms of the Zigbee verification tag, a speaker phone will be provided with the owner of the property [11].

L. GSM Based Digital Door Lock Security System

This system was based on design of GSM digital door lock system using PIC platform. 5-digitpassword is used to lock/unlock the door. If the user submits an incorrect password the system notifies the owner [12].

M. Person Spotting: video Shot Retrieval FOR Face Sets

It first detects the faces from the frame by applying the Viola Jones face detector and then apply the sift algorithm to extract the

features of the detected faces which are further used for classification purpose. They have claimed to have achieved the accuracy of 86% on the testing data. However, the limitation of the sift features are that they do not perform well when there is illumination, rotation and blurriness in the image [13].

N. Real-Time Emotion Recognition FROM Facial Images Using Raspberry pi Ii

This paper aims to detect and identifies the face for different pose and illumination. Hence using face recognition for door access is a great way to ensure security. Variation in lighting, pose, facial expression, occlusion, ageing effects the accuracy and efficiency of face detection and recognition [14]

III. PROPOSED METHOD

The proposed system was built using a high performance processor i.e., Raspberry Pi model which runs on a Debian based Linux Operating system called Raspbian. Initially, the PIR sensor senses the presence of human at the door. As and when a human is detected, the Pi camera captures the image of the person and sends the image to the remote user through mail. Haar face recognition algorithm is run on the captured image using OpenCV in the Raspbian on the basis of the images saved in the system.

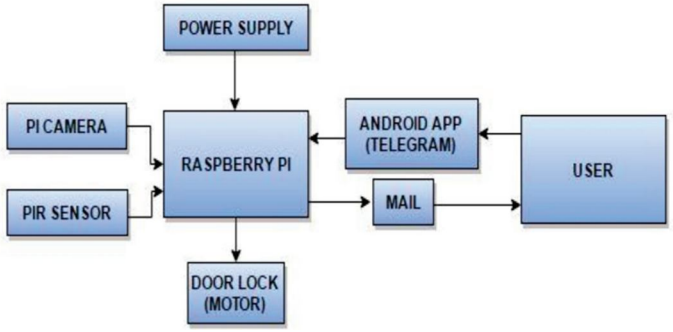

Fig. 1: Block Diagram

If the face is recognized it implies that an authorized person is trying for the door access and hence, the door lock is opened. If the face is not recognized, then the remote user can check the mail for the image of the person trying to access the door and allow or deny the access of the door through an android application- Telegram. If the user sends ”allow” from the Telegram app, the door is opened and if the user sends ”deny” from the Telegram app, the person trying to access the door is denied from accessing it.

IV. CONCLUSION

The result of our project is that recognition of stored images in the data base after recognizing the face the door lock will get open. If any other person comes to the home whose image is not stored in the data base that time the image of the person will get captured and sends the image to the authorized email. If the other person known to the owner then the owner will send a command like ”ON” through telegram app to unlock the door.

The project is good example of Raspberry pi and pi camera with Open CV.A face recognition system using Raspberry Pi was developed. The system was programmed by Python programming language. Both Real times face recognition from specific 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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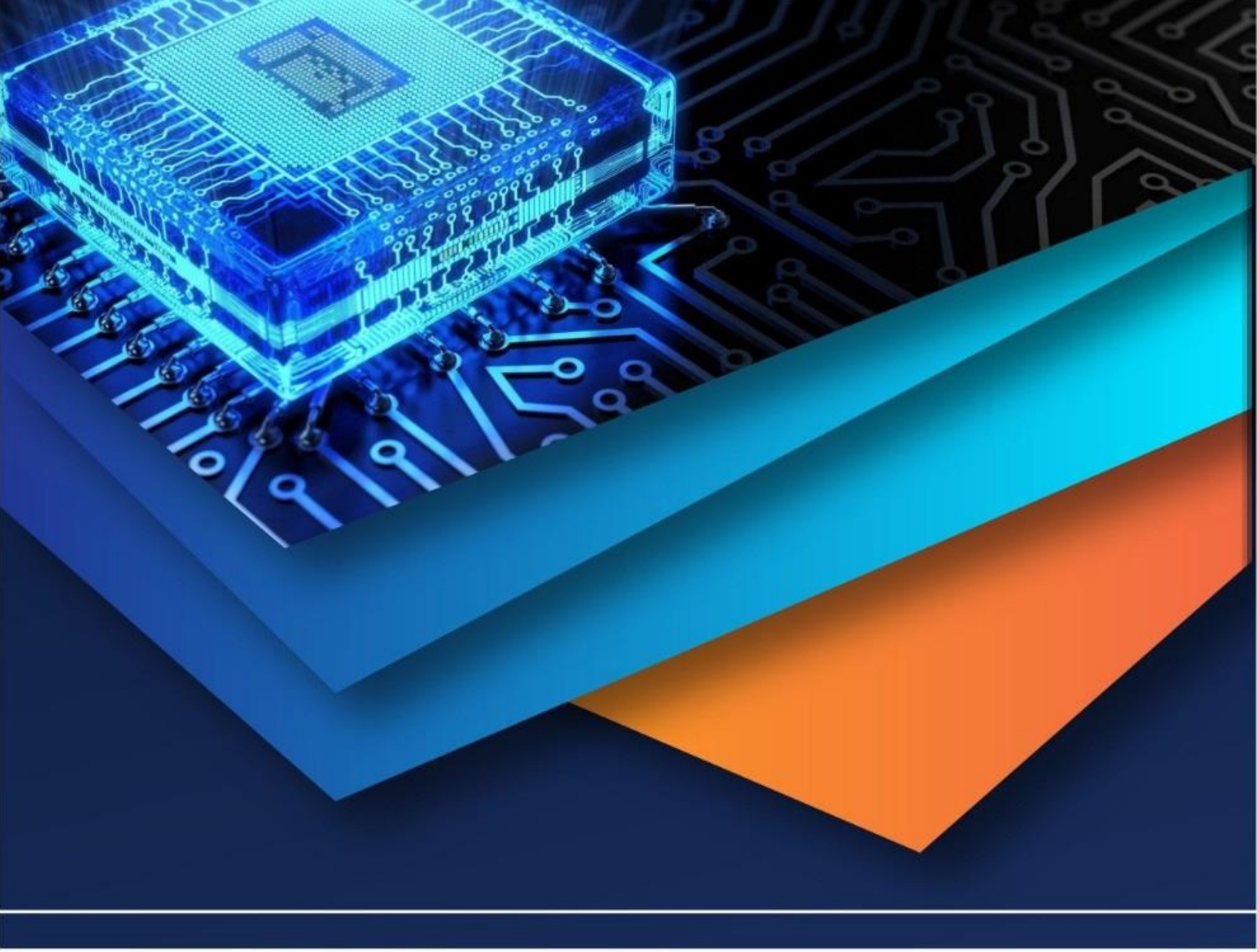

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