Gate Bolt

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Abstract. At current scenario, welfare and safety of children is one of the vital thing all need to be engrossed as many parents are leaving their child unaided in home in order to look their professions. The situation makes the intruders to get touch with unassisted child, this make many unwelcomed problems. To make over the above situation, this project would upkeep state of affairs to assist the parents who are in apprehension about child’s safety. A parent deeply impacts his child's safety. This gets very tricky when both the parents are working. It reduces the amount of attention that your child gets, thereby affecting his psychological as well as behavioural aspects. An everyday home security level improved the security to our home with the help of AI based face recognition system. To create the door, unlock system by facial recognition uses the basic of camera facility and the network connection (internet). The doors be opened only when the face recognised by the system. This project helped to further improves the safety, security, automation control especially in the home. This system will restrict the entry of unauthenticated person and if so the new persons image captured by the system and the intimation sent to the admin person. The framework ought to likewise uphold the secret phrase opened framework.

Keywords- openCV, Haar Cascade Classifier algorithm, Raspberry Pi, Dataset

INTRODUCTION

The development of smart devices plays a vital role in today’s world. We cannot trust all people blindly including relatives to ensure the safety/security of the child we modernize this project. In this paper, Using the fields of Image processing and deep learning we are developing this project. Most door lock system services uses Raspberry pi [6][8], It is connected with a pi camera to detect the real time faces. Pi camera takes and recognizes the image of the face and classified as known or well-known or unknown[3] and produces instruction to control the door. The algorithm use here is HAAR CASCADE CLASSIFIER.

RELATED WORK

This research is done prior to taking up the project and understanding the various methods that were used previously. This study helped to identify the benefits and drawbacks of the existing system.

A. Rajat Bhise, Nikilesh Phadnis, Rahul Bari, Vijay Dhage presented a study of ”Door lock and unlock system using IoT with face recognition”[5]. The purpose of study is to develop a system that can recognize the faces that captures visitors image and the intimation send to admin through gmail. The accuracy of mail passing lies between 79.35% to 80.2%.

B. Nevon Projects in “Face Recognition Door Lock System Using Raspberry Pi” [6]. This paper proposes an idea to develop a system that can recognize face. Rather than checking that through passwords or pins interesting appearances can be utilized as they are one's biometric characteristic. At
whatever point the individual comes before the door entry, it perceives the face and in the event that it is enrolled, it opens the entryway, if the face isn’t enlisted it will raise an alarm/ caution. The efficiency of the system was analysed using face recognition rate.

C. Amritha Nag.J. N. Nikhilendra, Mrutyunjay Kalmath in explained Face recognition system with IoT [4]. Telegram android application can be accessed from anywhere at any time with internet. This is used in door lock system. The picture captured from the pi camera will be directed to authorized individual through email for security purposes. This system has achieved to create a minimal human intervention.

D. Vinil Kumar.V, Divya.N, Mr. K.S.Vairavel in developed Car smart door lock opening sytem using face recognition[7]. This paper proposed to develop the use of Biometric such as face recognition in automobiles such as cars. In recent, cars used keys, REFIId and fingerprint to lock/unlock the system. Sometimes, the usage of key not work as efficient and maybe it used by wrong and authorized persons. Hence this paper proposed system, unlock the doors in cars uses face recognition. This system provides an effective ways to unlock the car then the traditional system. For the storing and processing the data raspberry pi. If the RFID card missed then even the owner also can’t open the door.

SYSTEM ANALYSIS

To detect the persons image latest camera used, once the image captured that image sent to the database. Comparison starts with captured image and stored images in the database. If it matches, the door locked/unlocked otherwise the acknowledgement message like UNKNOWN PERSON IS HERE sent via FAST2SMS [9]

To unlock the door system pass code column used, which takes values from the keypad to unlock the door[1].The project is implemented using Haar Cascade Classifier algorithm.

Haar Cascade Algorithm

We are using HaarCascade Classifier face recognizer to recognize the face of the person for both positive and negative. The stages of the algorithm are,

1. Haar Feature Selection,
2. Creating Integral Images,
3. Adaboost Training
4. Cascading Classifiers.

In this first stage, all the pixel intensities are summed up in each region and the difference calculates between the sums. In the second stage, it removes the irrelevant calculated images. In the third stages it converts the set of weak classifier into a strong classifier. At last, all the stages collected every stage The final stage, consists of a collection of stages, where each stage is an group of weak learners.
Figure 1. Overview of Haar Cascade Classifier

The System undergoes three main process namely,

1. Training the dataset
2. Intruder Detection
3. Intimation to the parents

1. Training the dataset

In this stage we capture the face of the known person using camera, the image which was captured should be in all different direction of the known person. At first create a folder with the name of each known person and the images captured stored in that folder and enter the secret key for each folder. Then all the images are converted into matrix based on the pixel size. The default .xml file of haar cascade classifier to classify the face of the person based on the width and height of eye etc[3].

Figure 2. Overview of Training the data

2. Intruder Detection
The face recognition task has been implemented using Haar cascade classifier algorithm. Using Pi-Camera the intruder’s face is captured[3] and the secret key entered it will be processed and sent as an input to Haar Cascade Classifier to detect the person and classify the person and if the face is matched to the data of images which user proceeds.

3. Intimation to the parents
After the process, the intimation is send to parent[2] whether the door open or not, if the person’s face match the already recorded images, it intimates to open the door .If face is not found then it shows a message to the owner of the system stating that some intruder has been entered into your home. If intruder try to open the door then the alert message sends to the owner of the system [9].
EXPERIMENTAL RESULTS AND DISCUSSION

Raspberry Pi was modified effectively utilizing python with opencv and google collab programming to accomplish face acknowledgment door opening framework [6][8]. The authorized person to access the door he/she has to stand in front of the camera to capture and it compares with stored database images.
Figure 4.1 Identification of the registered person

When an unknown person stands in front of the camera, it will identify the intruder and send a message to the owner of the house.

Figure 5. Capturing the Intruder image

Figure 5.1 Detect the Intruder
The system was developed by python programming Language. The door will not be opened when the wrong pin entered by the person. The system efficiency was analysed. There is high precision in perceiving parent face appearances and it could understand sending the matched picture to another Raspberry Pi on schedule and gives a better output.

**Table 1.** Accuracy of the Project

| LABELS           | ACCURACY  |
|------------------|-----------|
| Image Capturing  | 96.3%     |
| Face recognition | 95.12%    |
| Intruder Detection | 92.67%  |
| Alert Message    | 90.2%     |

**CONCLUSION**

The project is a good illustration of using Raspberry pi, pi camera with open CV. The presented proposed door access framework system using image (face) recognition and it send the alter message also for wrong person entry. This system especially designed and used for accessing the home door lock based on face recognition method by verifying the facial images in the databases. The intimation sent to the authorized person about the entry of the wrong person through alert messages along with required details. Face recognition method is popular for recognizing people. Several other methods also used for the same purpose. The most common is eigen faces and PCA. New techniques are available to implement to produce better performance. The used Haar Cascades algorithm is one such algorithm for good performance. As we seen above, the Haar Cascade classifiers has better performance and accuracy.

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