Pravesh: The Smart Door Unlock System Using Smartphone

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Abstract- *As we all know that the importance of facial recognition system in digital world, means facial recognition is implemented in major projects for increased security. So for that reason we have implemented a face recognition based door unlock system for adding more security, we didn't just added only facial recognition, we also added the functionality of recognizing eyes, smile, full body as well. a camera is established outside the door, if a person comes then his/her face is captured, then that captured image will be sent to owner of the house, and then owner can unlock the door for person who is standing outside the house, this system is applicable when house owner's are not available at home, but if you are the member of house then you don't need a key to unlock your home.*

Keywords- Python, Face Recognition System, Pravesh, OpenCV, Numpy, Smtp Mail Server, Haar-Cascade Classifier, LBPH Recognizer, Android App, Java, Android Studio, Raspberry Pi 3, Servo Motor

I. INTRODUCTION

Facial Recognition System is system which is used to process the images, based on the input images given to it. And it provides a accurate results many times, for facial recognition system we have used a opencv.

Opencv is an open source computer vision and machine learning software library. opencv was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in the commercial products. the library has more than 2500 optimized algorithms, which includes a comprehensive set of both classis and state-of-the-art computer vision and machine learning algorithms. This algorithms are used to identify the real time objects, real time people, real time face detection and many more.

In this project we have used lbph recognizer algorithm from opencv, for identifying the faces, smiles, eyes and full body.

Raspberry Pi is the system that we have used for coding, raspberry pi is credit card sized computer, and this raspberry pi will be fitted inside part of the door.and we have attached a external web camera to a raspberry pi and also attached a servo motor for working of a doorlock to lock and unlock, there is a 40 GPIO(General Purpose Input Output) pins for hardware handling. So servo motor is attached there with the help of a jumping wires.

SMTP mail server is created to send the captured the image of the person to owner of the house, when owner is not present at home, for that we have used smtplib library for sending a mail using python language. You don't need to install smtplib library just like other python libraries, smtplib is already available to you when you install python to your computer or laptop.

An android app is created using java and android studio, java is used to program the application and Android studio is the platform where awesome android apps are created. So we have used java and android studio to fulfil our requirements of controling the servo motor or we can say that to control the door lock and unlocking.

II. LITERATURE REVIEW

We got the inspiration of the project from some reallife incidents and we have also referred some research paper published in this field, but we found that there is some missing things to work on, so as a result we have created this project.

This Project is completely based on face recognition. For that python provides a very well support for creation of this kind of applications. Because python have so many pre-built libraries that we can use in our projects by installing them directly to your pc or laptop.

Raspberry pi is also playing a main role in this project, we have referred about raspberry pi on google, how to program a raspberry pi using python, how to attach a hardware to a GPIO (General Purpose Input Output) pins, and raspberry

pi is used widely in this kind of project, because of it's size and working power.

There is so many projects we have seen that they have created a database to store images of the house owners, but from that we have found that we can do it by just saving a dataset of images of house owner or authorised person's images offline to a raspberry pi only, and this is working well, and we think this will reduce the complexity of a project.

III. STUDY FINDINGS

A. In the existing projects we have found that in some projects there is only a face recognition system based door unlock system based door unlocking system. Like just by identifying the person door is unlocked.

B. For improvement of that systems we have implemented a facial recognition system but there is a mail server is also created to inform the owner of the house that someone is standing outside the door if you want to unlock the door for them or not.

C. If owner of the house want to unlock the door for person who is standing outside the door with the smartphone, again repeating that this can be done when owner of the property is not available at home.

D. Other things that we found is to store the images of authorised person there were so many database are created but we have stored images of authorised person's images in to a folder and named that folder images and stored that folder in a raspberry pi.

E. This can not only used in homes only, we can use it anywhere we want to use it. But mainly it can be used in to homes, just because of our habits of forgetting keys or misplacing of the keys.

F. For this project Raspberry pi is used because raspberry pi have built in wifi and Bluetooth feature, for controlling a servo motor using a android application. In some cases Arduino is also used but in Arduino we have to add a wifi and Bluetooth module externally as per our requirement.

IV. FUTURE ENHANCEMENTS

In future we can add some more functionalities in to this project and more work needs to be done, because this is not a complete system as we know, this project can give more accurate results by using object detection feature using tensor flow. And many more.

V. LIMITATIONS

- The software can be fooled by an image of a person.
- Low light conditions can hinder the recognition of the person.
- The quality of the camera also plays an important role in the face detection.
- It is a completely online system so lack of internet connectivity can lock you out.
- And raspberry pi needs a power supply to run if power supply goes then it will be hard to unlock.

VI. CONSCLUSION

Ending with the conclusion that this project will help users, if the users are the authorised person so they can easily enter in to house without keys, but some times it happens that we forgot out keys at some place or misplaced the keys at that we can unlock the door with the help of our smartphones. And we can also open the house for our home for our relatives by recognizing them with the help of captured image of them and we can verify them by a mail server.

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