Smart Facial Door Unlock

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Abstract

Face Recognition and detection is like an ocean of research and innovation wish the applications of image analysis and algorithm- based understanding which can be called as computer vision. Security is a right which no one can deny and justify this right lots of works and researches are taking place in this world. With the development of for home security has been developed in recent years with different advancements. We have, Face Recognition as our project. Facial recognition involves the detection and identification of the image. It uses an image capturing technique in the system. The camera catches the facial picture and compares it with the image which is stored in the database. If the picture is matched with the database the gate will open or else a notification will be sent. The recognition algorithms will be from the Open CV library. A day-to-day home security level grown up to provide security to our house IOT based face recognition can be implemented. A standard web camera to capture the image to identify the visitor. It's a method that identifies the visitor. If the face recognizes visitor, it will greet them by name and the door will be unlocked name opened. If they are not identified door will unlocked. The system will perform detection and recognition rapidly in real time when face in front of camera. This project basic utilizes the camera, and then internet connection to create a door unlocks itself by facial recognition. If the user at the door is recognized, door will be unlocked! This project is mainly for future features: safety, monitoring, security and control to home automation. Firstly, the system needs a face authentication for the visitor to be able to enter the home (lock/unlocked). When an unauthenticated try to log into system, this face will be capturing the image of visitor and it will be sent to Gmail address to an admin person. The system should also support the password unlocked system.

Keywords: Face Recognition, Image Processing, Internet of Things, Open CV, Image Capturing

INTRODUCTION

This project is to increase the security measures for the personal use and to go one step above the conventional door locking. It will not just increase the security feature it R. also free the User from worrying about forgetting the password or the key of the door. The Data Set image will be provided to the system. which mill act as a key to access and get inside of the door. The Data Set image will be provided to the system. which mill act as a key to access and get inside. This Face Recognition Technique can also have its application in the Vault door to keep all the precious assets safe and secure from any unauthorized access. our model is extracting the face from real time video then compare with given faces and if face is match with one of the databases faces, then our Api (we use Twilio's APIs to send OTP) send OTP to matched user .user have three chance to enter the OTP in our system. If user enter correct OTP, then system open the door and user enter in the room.

Simulation

1) Classical Face Recognition Technique:

The basic face recognition technique for our system includes-

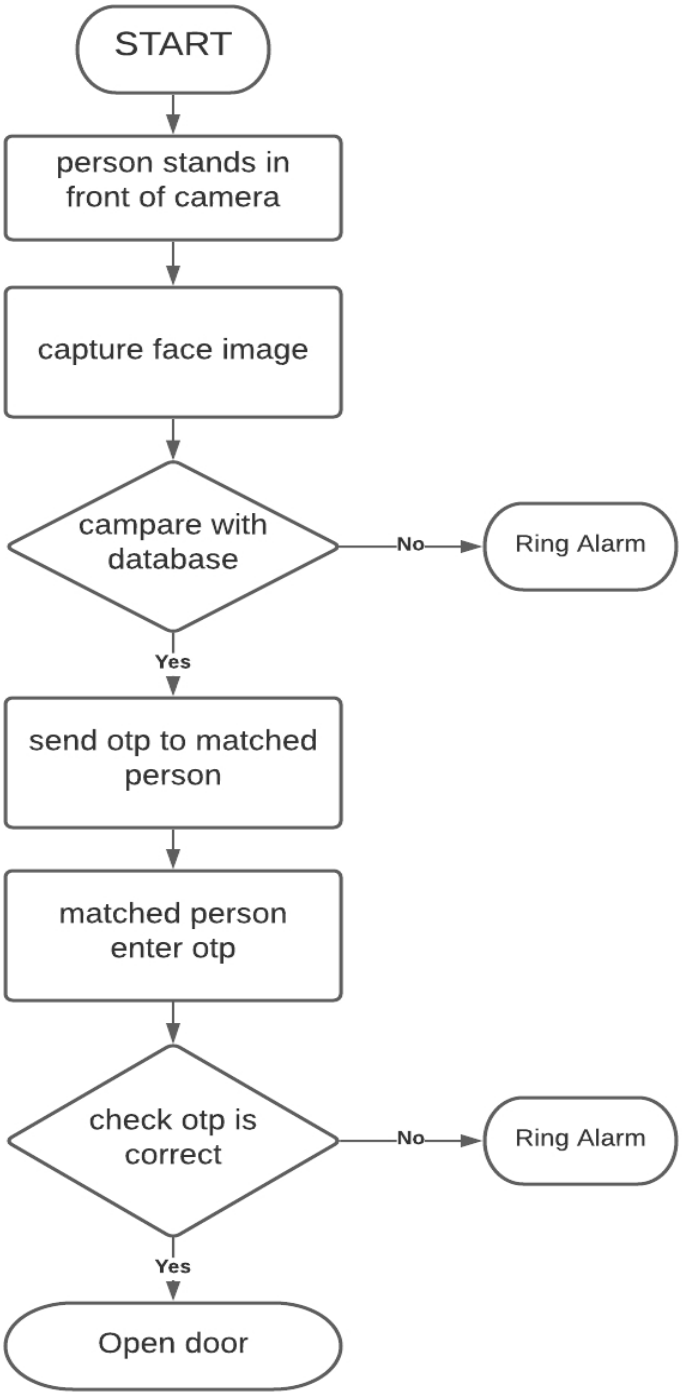
a) Phase Pre-processing: Pre-processing of the image refers to the gathering of the image data from the camera module. But we do not need to save whole image in the dataset. We trill only need a part of the face from whole captured image. For this, we have to detect the area of the face in the image. A Mort code for face detection is developed. This code is also useful for other modules in the system. This detected part of that be cropped and saved in the data folder. Also, care has to be taken to align the images if they are Mot from a different angle.

b) Phase 2: Feature Extraction we have got the images for training, we can use the image algorithm to team on this dataset. Depending on the size of that samples, the accuracy of the classifier will vary. In this phase, we will generate local binary patters as we thud earlier in the paper, we applied the LBP method on image pixels by threshold the 3 neighborhoods of each pixel with the center value and considering the result as a binary number. Finally, we applied the histogram method to concatenate the new cells description and obtain a new representation for each training image, which helps to reduce the computation time.

c) Phase 3: Classification: This phase is nothing but the testing of our face recognizer. We will do a real time video check to verify the correctness of the retained model. Whenever a new face is as an input to our model, it Will first extract its features and generate binary patterns same as we did for the training images After its completion, the input is given to the trained recognizer to classify the image according to its training.

2) The Process Flowchart:

There are several processes that take place from the start till the validation to provide the access or a denial can be presented through a flow diagram involving various stages and that takes place internally and externally in the system i.e, Face detection or the opening and closing the door.



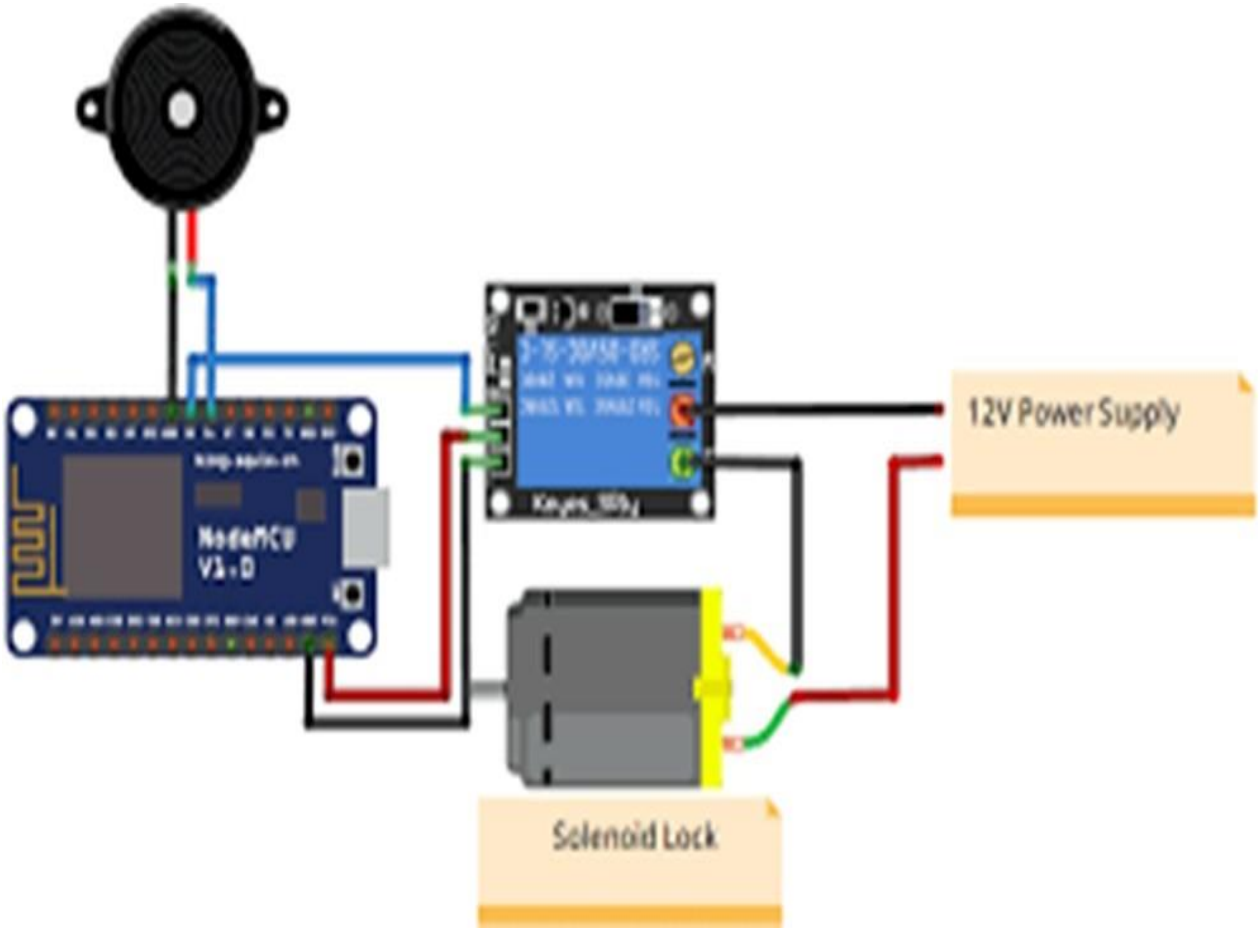
3) The Proposed face Recognition Algorithm:

The face detection algorithm will detect and segment the face from the overall image. Then, it does the necessary aligning and further cropping and conversion from color to grayscale. The eigen faces feature vector will be extracted from this process. After that, the classification algorithm will do an analysis to compare the input feature vector with the database, in which it will decide whether the input face image is similar with the registered face image. If it is recognized, then the system will turn on the servo motor to unlock the door. If it is recognized, then the system will turn on the servo motor to unlock the door.

4) One time password (OTP):

This is the one-time password which add the extra security to our proposed security system. When the system recognizes the face then it will send a OTP to the person registered phone number. And that person has only 3 chances if he/she failed to enter the OTP 3 times then the system will block him/her entry and alert the center authority about this failure.

5) Circuit diagram of Smart facial door unlock system :



Tools and Technology:

- Python
- OpenCV
- Serial
- Firmeta
- Face Recognition
- Py serial

Hardwares/Components:

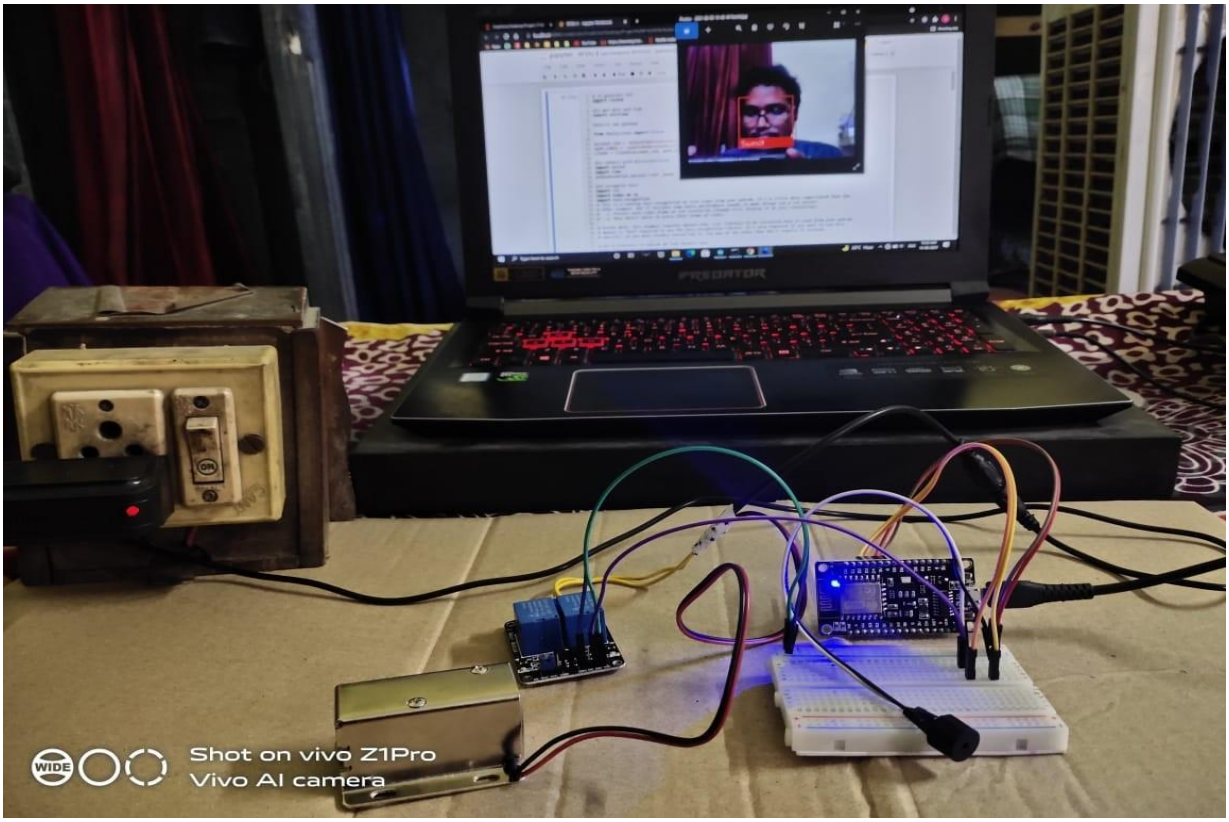
- Solenoid Lock
- NodeMcu
- Relay
- Buzzer
- 12 Volt Adaptor
- Jumper Wires

Some related work:

There are many resembling projects like ours project and many people also worked on the smart facial door unlock but our team did much better than those people, we overcome almost all the fault or issues in our new system we make the system which is much more fast and more secure than the existing system. we enhance the level of security with the most secure security protocol i.e., one time password (OTP), we add the SMS type OTP layer for more security, there is no such type of security layer in the existing system, our project recognizes the face and send the OTP in real time and alert the central community is a unauthorized person trying to get access this makes our system fast and very much secure and reliable then the existing system, also one of the most important factors which affect the project i.e., total cost of the project , since our team is focused on making the low cost but highly effective system , if we account the price of facial door system in market then it cost average 12000 INR which is quite

high and they only have one security layer i.e., facial recognition but our team successfully added another second layer for security and our team successfully reduce the price up to 88.75 % without compromising the efficiency of the system. our system price is almost nothing in front if existing system. we made the system which is highly efficient in real time at low cost.

Complete Smart face door unlock system



CONCLUSIONS

In this system we have implemented the Smart Facial Door Unlock system using Face Recognition (Image Processing) NodeMCU, Solenoid Lock, Relay, Python, Open CV and Twilio Api (For OTP). The system in able to accurately detect and recognize the face and after that user get OTP, if the user put correct OTP and matched with system the door is unlock otherwise user will unable to enter in the room/office and the system will give alert and beep the buzzer. User will get three chances to put correct OTP if the user fails system will give alert and beep the buzzer. The Implemented system is moderated cost, so that it is an affordable to the everyone.

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