DOOR UNLOCK SYSTEM USING FACE RECOGNITION AND BIOMETRIC DEVICE

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Abstract
Automation is a necessity in the current times as it makes processes more economical and affordable in the long run. Once a process is automated the only check that is to be performed is whether it is turned on or not. Automated processes are not prone to errors and even if an error is identified rectification is easy and can be applied system-wide without any delay. In this project- Door Unlocking System is proposed that uses facial recognition and biometric based IoT technology to automate the entire system. Today we are facing security threats in every aspect. One of the problems we face in daily life is unauthorized persons entry which causes many security issues. So we can resolve our home or workplace entry level security issues by allow only authenticated or authorized people in without any manual checking by using "Face Recognition and biometric based door unlock system" that uses Raspberry pi. The Face recognition module to capture Human images and to compare with stored database, if it matches with the authorized user then the system will unlock the door by an electric door lock. Biometric device is used to capture the biometrics and to compare with stored database; if it matches with the authorized user then the system will unlock the door using an Electric Door Lock.

Introduction

The most important feature of any home security system is to detect the people who enter the house. The major drawbacks in a common door lock are that anyone can open a conventional door lock by duplicating or stealing the key that's why we are using smart lock. This door unlock system is used face recognition and biometric. The camera is used to capture the image and biometric device is used to scans biometrics and compare with the database. If the credentials were matched then provide the authentication.

The automated Door Unlocking system implemented with face recognition using image processing with combination of IoT technology will overcome the disadvantages of other proposed technologies.

This explains how automated Door Unlocking system implemented with face recognition and biometric devise works:

(1) All the hardware will be kept inside home.
(2) The hardware except raspberry pi could be put in the box.
(3) When a person enters in front of main door, the face recognition will start.
(4) If it fails to identify the face in cases like face damage or masking, finger print scanner also set to recognize the authorized persons.

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The proposed Face Recognition and Biometric Door Unlock System has been developed to prevent robbery in highly secure areas like home environment with lesser power consumption and more reliable standalone security device for door security. This system is powered by Raspberry Pi circuit.

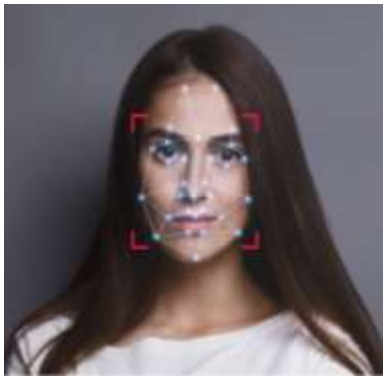
ADVANTAGES:

- High reliability.
- It provides enough flexibility to suit the requirements.
- More secure due to face detection.

Face Recognition is a computer application for automatically identifying or verifying a function from a digital image or a video frame from a video source.

How Face detection works:

- Every face has at least 80 distinguishable parts called nodal points.
- Here are few nodal points below
- Distance between the eyes.
- Width of eyes.
- Depth of eye sockets.
- Structure of the cheek bone.
- Length of jaw line



Source: RecFaces.com

Image acquisition:

1. Face Training: Train the system using trained dataset. The dataset contain number of pictures of different persons with different poses.

2. Image Capturing: In this phase, using the camera, we run the program to start the camera that captures the images from the students.

3. Face Detection: The face detection phase identifies the face part from human bodies.

4. Face Recognition: In this phase it matches faces with the trained dataset. If any face is matched to the trained data that displays the roll number. Otherwise it displays the unknown. Even more than once it recognizes the same faces of the persons, it considers only one time per day.

5. Database Development: The recognized faces can be stored in the database.

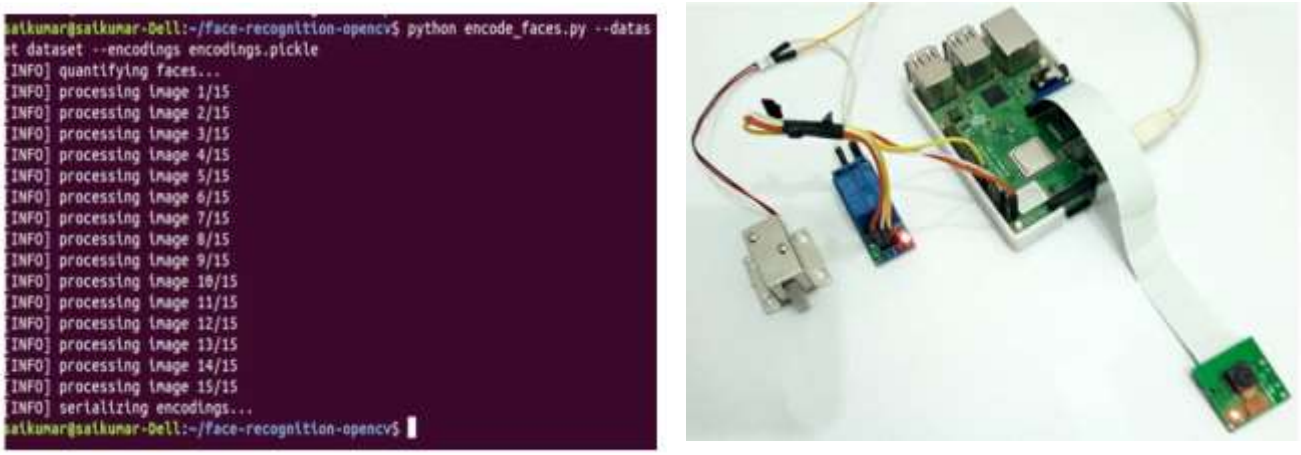


Fig 1: Train the images in the dataset

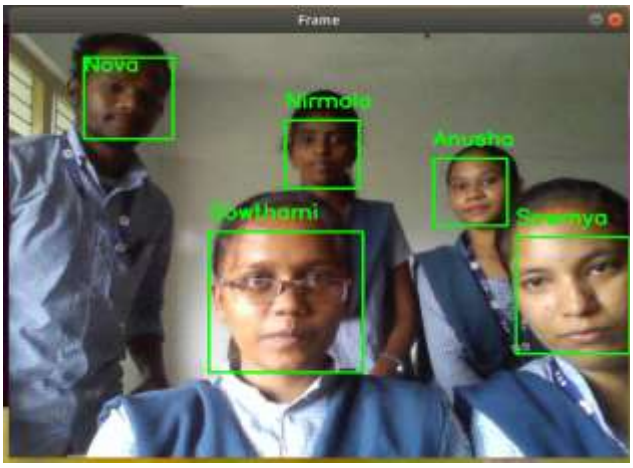


Fig 2: Test the images in the dataset

Fig 3: Identified faces storing in the database

Results:

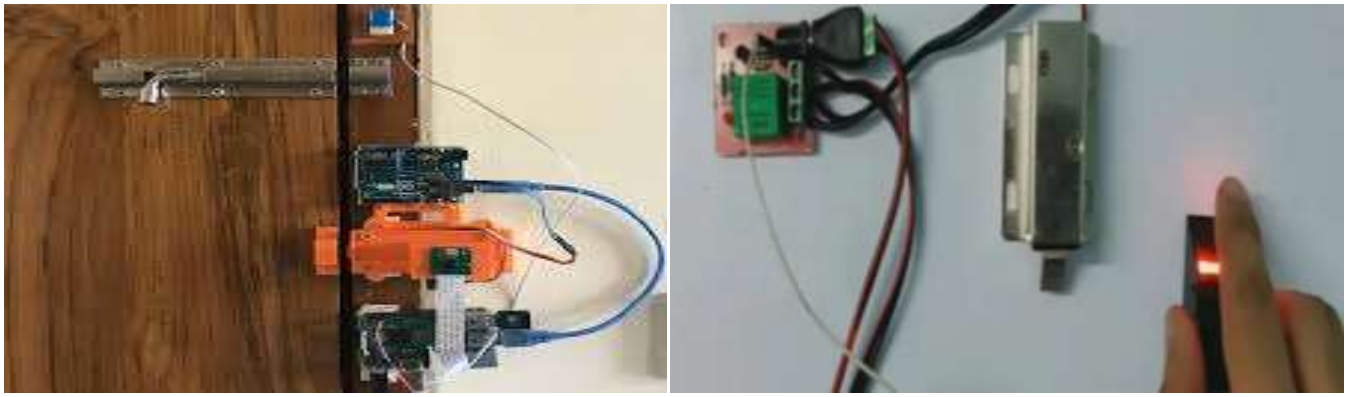


Fig 4: Door Unlocking based on face recognition and fingerprint scanner.

Feature work

Since the development time for this project is very limited, the designed system only consists of the minimum function required for it to work.

- Improve the face recognition algorithm.
- Provide better search functions in the webpage.
- Expand the storage of the raspberry pi.
- Develop a fingerprint recognition mechanism to enhance the recognition system.

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