FACE RECOGNITION BASED DOOR LOCKING SYSTEM

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Abstract - *Security describes protection of life and property. The main purpose of this system is to provide better security by using face recognition technique. Eigen face algorithm is a basis for face recognition that provides high accuracy and moderate sensitivity to variations in the intensity of light. It is one of the fastest way to identify faces. This project works in two modes: offline and online. Firstly, the PIR sensor senses the person standing outside the door. Then camera receives instruction to capture image of person standing in front of the door. This captured image is compared to the images stored in the database. The person standing in front of the door will be granted access, if his/her image is recognized. If it's not the authorized person gets a notification via GSM. If the authorized person grants permission, only then the door will open. Or else it will remain closed for further action. This project makes use of Laptop as a processing unit. It uses MATLAB software to carry out the face recognition procedure. The system takes input image by capturing a real time image for online process. For offline process the input image is given manually.*

***Key Words**: Security, face recognition, PIR sensor, Eigen face algorithm, MATLAB etc.*

1. INTRODUCTION

The security sector is experiencing diversification. This has brought about the need to review the reliability of already existing systems and look into the possibility of creating better systems that are smarter and more secure. The old door security systems made use of keys, locks and chains. However, the locks can be easily broken and keys can get stolen or can be duplicated. In order to overcome this drawback, mechanical locking system was introduced, that is, latches were used. Latches had better security than the locks. Although, latches cannot be broken as easily as the locks, they make the use of keys, which are not so reliable and can get stolen. Further, to avoid these drawbacks, password based system was introduced. This system used numeric combination to permit entrance to user. But security is entirely based on confidentiality and the strength of the password. Modification was made in the password from numeric to alpha-numeric. This not only included numbers in the password, but also alphabets. In order to increase the strength of passwords, special characters were also introduced further Password locks cannot ensure proper security, since passwords can be guessed or hacked and this can lead to theft. Further modification in the system

moved to biometric security system to ensure better security. Biometric security system includes fingerprint based system was the first biometric locking system. Using the fingerprints of a person for unlocking the door is main parameter for this system. However, like any other systems, they also have drawbacks. Fingerprints of a person can be duplicated. This can lead to opening of the door for unauthorized person. Finally research moved to image processing system. This system provides high security. When a person wants to access his locker, initially at the main door of locker and PIR sensor will be placed. This sensor will sense the body temperature of a person, standing near the door. And then, his/her image will be captured by the camera installed at the main gate. This image will be given to the PC where the MATLAB software will compare this image with the authentic images stored in the PC. If authentic, then only the door will open otherwise it will remain closed and the alarm will buzz for further action.
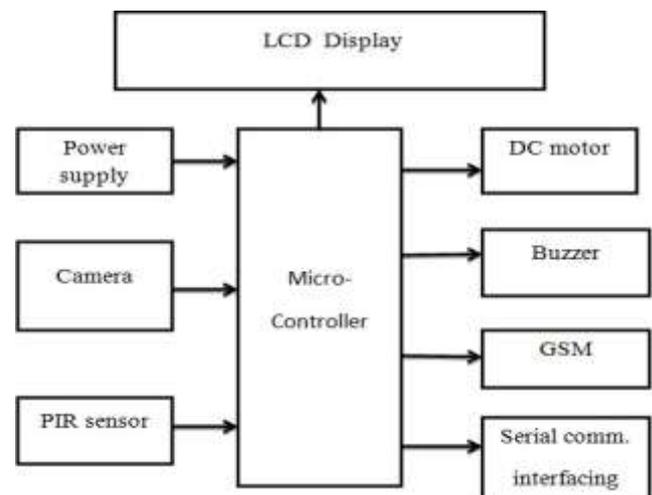
2. METHODOLOGY

2.1 System Design

Fig -1: System Block Diagram

According to above block diagram shown above, first motion is detected by PIR sensor then the image is captured by camera which is input to the microcontroller, Microcontroller checks whether given input is saved within the database. If so the door will open, which is mechanical function done by DC motor. If input image does not match

with the database then door will remain closed and Buzzer will start beeping .The result will be displayed on the LCD. This project uses GSM system to send notification of an unauthorized person and also to connect hardware with PC it uses serial communication interfacing.

2.2 Hardware components

The hardware components are the physical parts of the system. This system is made of Power Supply, Processing Unit, GSM, PIR sensor, DC motor.

Power Supply:

The AC power supply of 230 volts, at 50Hz is converted to 5 volts DC and is regulated for the internal working of the microcontroller by this unit.

Processing Unit:

The processing unit that is the laptop interfaced with the other components is included in the processing unit. Its specifications are Intel® Core™i3-5005U CPU with 2GHz processing frequency, 4GB and 64-bit operating system.

Microcontroller:

A 40 pins PIC18f4520 microcontroller has been used. A microcontroller is a programmable devices that carries out various tasks assigned to it.

GSM:

GSM that is, Global System for Mobile communication is a cellular network that is used by mobile phones. This system uses GSM SIM 900 to notify the authorized person of the possible thefts or unrecognized person standing in front of the door.

PIR Sensor:

A Passive Infrared Sensor senses the infrared radiations emitted by the human beings. This helps the system to detect the presence of the person standing in front of the door and carry out the further process. The detecting angle is 120 degrees and detecting distance is 8m.

DC Motor:

A 12V, 1200 rpm DC motor is used for opening and closing the sliding door.
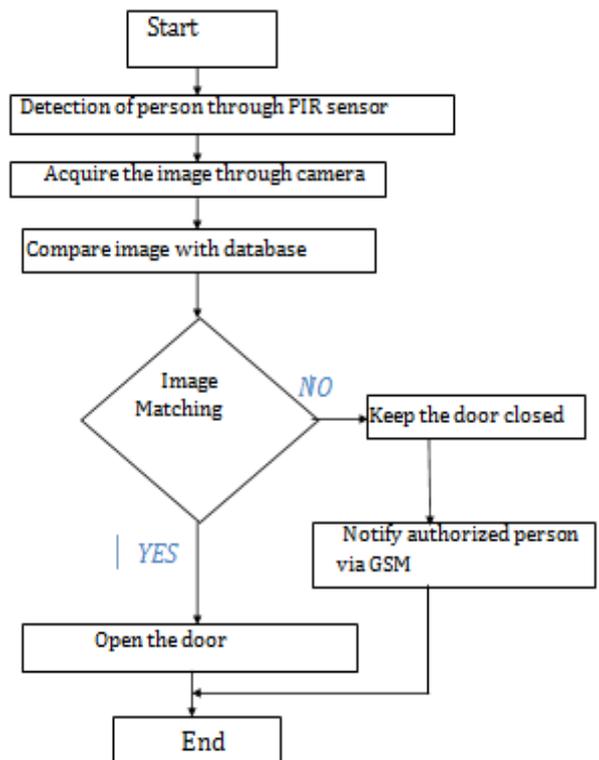
2.3 Software Specifications

Fig -2: System Block Diagram
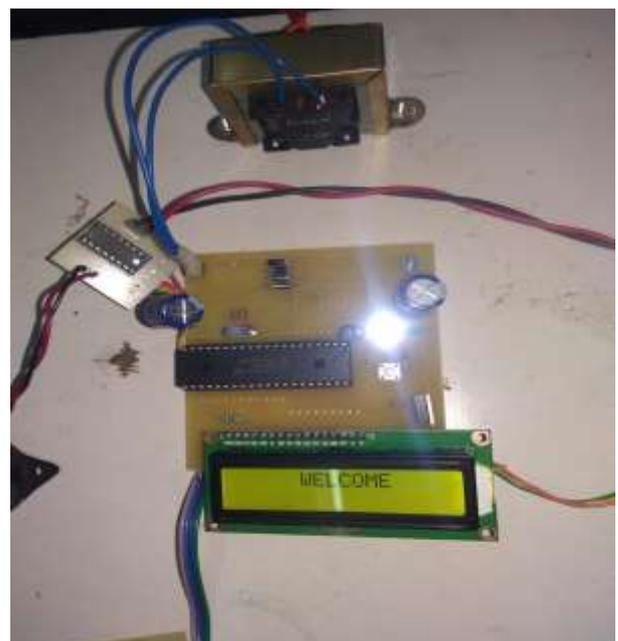
3. RESULTS

3.1 Project Setup

Fig -3: System Hardware
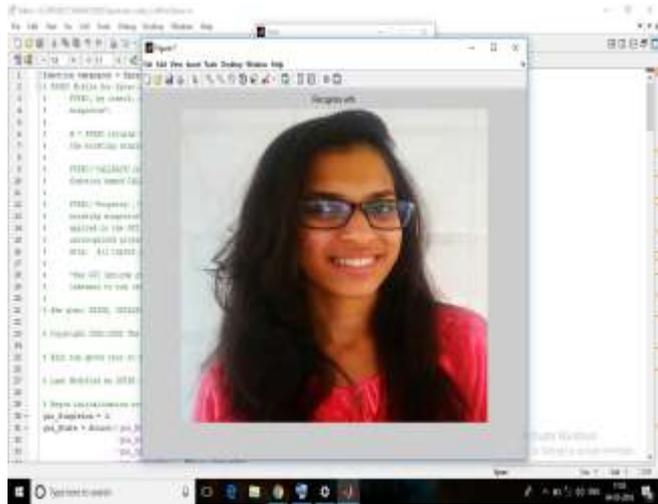
3.2 Recognized Image

Fig -4: Recognized image

The input image is first converted from RGB to gray to create eigen vector. Then Eigen vector and mean image is created and then it is compared with stored database. If the image is recognized then the door opens, else it remains closed.

4. CONCLUSION

Face recognition based door locking has been developed to provide better security. It is user friendly system. The use of Eigen face recognition technique makes system more secure. This system can be used in several places where high security is required where confidential information and equipment is kept. For example, research institutes, banks, forensic Laboratories. This system can also be used for domestic purposes. This project helps to reduce problem of thefts and frauds. In case of unauthorized person's entry, system alerts authorized person with SMS and at the same time the buzzer beeps to alert people. This is a cost efficient and reliable door locking system.

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