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INTEGRATION OF FACE RECOGNITION TO ACCESS THE DOOR

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Abstract:
Today, security is a problem in every area. Consequently, to overcome these problems using modern technology. In this project, human photos are taken and compared with images from a database that has already been saved using the Face recognition module. The mechanism will employ a solenoid lock to unlock the door if it matches the authorised user. The demand for a facial recognition system that can identify intruders quickly and accurately, bar unauthorised users from sensitive locations, and reduce human error is always rising. In comparison to biometric pattern recognition techniques, which are utilized in a wide range of applications, face recognition is one of the most secure systems. The main issue that is thought to be present is the factor of time and precision. The primary issue that defines the performance of automatic face recognition in real-time environments is thought to be the time and accuracy component. Multicore systems have been suggested as a means of various solutions. This offers the full architectural design and suggests an analysis for a real-time facial recognition system while taking into account the current challenge. The goal of this project is to use facial detection and recognition to assist users in enhancing the door security of critical places. Face detection, face recognition, and automatic door access control make up the bulk of this project. When the known individual uses the orders, the door will open on its own.

Keywords—Face Recognition, Face Detection, Arduino.

1. INTRODUCTION:

Humans are capable of performing the task of face recognition effortlessly and consistently in daily life. In addition to the fundamental difficulties presented by the recognition problem, several real-world applications that need human identification also serve as motivation for facial recognition research. Due to the quick development of technology, such as digital cameras, the internet, and mobile devices, as well as rising security concerns, face recognition has become one of the most essential biometric technologies. We will quickly review the earlier key work in creating user-centered face recognition models. They offer an approach that uses neural networks to identify frontal views of faces in grayscale photos in [1].The algorithms and training techniques are broad and can be used with different facial angles. The algorithms and training techniques are broad and can be used for challenges involving the recognition of similar objects and patterns as well as alternative views of faces. [2] Multimodal biometric authentication is the main goal. Behavioral characteristics are used by biometric systems for identification. Three separate traits are utilised in the

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biometrics. Everyone uses a different way, like a face, fingerprint, or signature. Noise, inaccuracy, and assaults can readily disrupt a unimodal biometric system. For the purpose of matching each biometric with the testing database, a training set of databases is collected. Each stage uses a different algorithm to choose the input image from the database.[3] Before calculating distance and ratio factors in relation to a common reference point, the early face recognition algorithms needed human assistance to identify characteristics like eyes, ears, noses, and mouth on the photograph image. Similar to other biometrics like fingerprint or iris recognition systems, face recognition is frequently utilised in security systems. The subfields of pattern recognition research and technology include facial recognition research and fingerprint recognition technology (FRT). Utilizing statistical approaches, pattern recognition technology identifies and extracts patterns from data in

order to compare them to patterns stored in a database.

2. PROPOSED METHODOLOGY:

The objective is to investigate whether a PC-based face recognition system can be implemented utilising traditional face detection and recognition. This project intends to advance face recognition technology to the point where it can take the role of RFID cards and passwords for entry into high-security systems and buildings.

The following steps are the primary categories for this system's functionality.

a. Using the PC's webcam to register and recognise faces.

b. For the LCD to show the match status.

c. To use Python to programme for the same. A few modules are imported by the code to enable features like face recognition and GPIO modules.

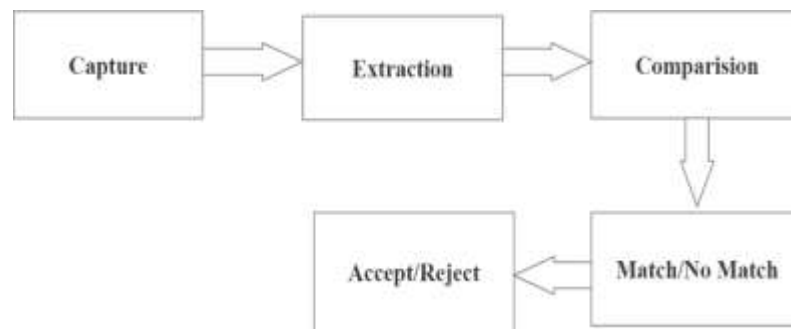The four stages used by the identification and authentication technologies are as follows:

Fig.1: Operating Stages

a. Capture: The system collects a physical or behavioral sample during enrollment as well as during the identification or verification process.

b. Extraction: From the sample, unique data is extracted and a template is created.

c. Comparison: The template is then compared to a previously created sample.

d. Match/non match: The system determines whether the features extracted from the new samples are a match or a non match and accepts/rejects accordingly
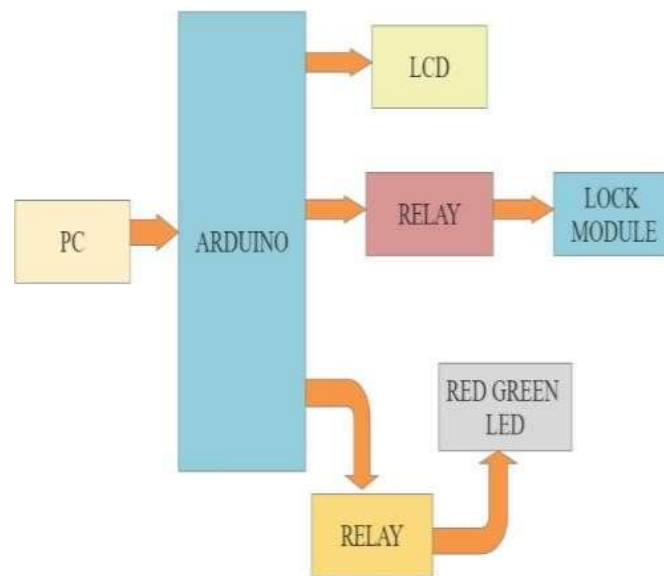
Fig.2: Proposed block diagram

The Arduino is connected to the input and output modules. The input component, PC, is used to store the necessary data base and to capture the image when a person is positioned in front of the webcam. Arduino can read analogue or digital input signals from various sensors and convert them into outputs such as activating a motor, turning on/off LEDs, connecting to the cloud, and many other actions. It controls all actions before being interfaced to the LCD to display the information. A 2-Module is then interfaced with both the Lock module and the red green LED to display the desired output.

3. SYSTEM DESIGN:

Hardware Design: It includes Arduino, LCD, Relay, Lock module, Red andGreen LED.

Arduino: Arduino is a prototype platform (open-source) based on an easy-to-use hardware and software. It consists of a circuit board, which can be programmed (referred to as a microcontroller) and a ready- made software called Arduino IDE (Integrated Development Environment), which is used to write and upload the computer code to the physical board.Arduino boards are able to read analog or digital input signals from different sensors and turnit into an output such as activating a motor, turning LED on/off, connect to the cloud and many other actions.

LCD:

An LCD or a liquid crystal display consists of liquid crystals between electrodes. The arrangement consists of polarization filters which are aligned perpendicular to each other. This arrangement doesn't allow any visible light if there was no liquid crystal between the filters. This arrangement is aligned in between transparent conductors.

Relay:

Relay interface board, it can be controlled directly by a wide range of microcontrollers such as Arduino, AVR, PIC, ARM and so on. It uses a low level triggered controlsignal (3.3-5VDC) to control the relay.

Solenoid lock:

The solenoid lock denotes a latch for electrical locking and unlocking. It is available in unlocking in the power- on mode type and locking and keeping in the power-on mode type, which can be used selectively for situations. The power-on unlocking type enables unlocking only while the solenoid is powered on.

Red and Green LED:

The Bi-color LED is a handy little component that allows two colors (red and green) in a single LED while only having two pins (cathode and anode). The color of the LED depends on the polarity of the connection only allowing one color at a

time. Similar LED's that providetwo or even three colors usually have three or four pins allowing for a wide range of mixed colors. One would think having two pins is a disadvantage; not so. This LED can easily be applied to a circuit to visually indicate polarity direction.

Software Design:

To code for the Hardware setup, python language is used.Python is an interpreted, general-purpose programming language. Guido van Rossum created Python, which wasfirst made accessible in 1991. Its design philosophy makes excellent use of significant whitespace and lays a heavy emphasis on code readability. Its object-

oriented methodology and language elements are made to help programmers write clear, understandable code for both small and large projects. Python has dynamic typing and garbage collection. Functional, object-oriented, and structured (particularly procedural) programming paradigms are among the ones it supports.

4. FINAL RESULT: To recognize the correct face, it must match the database.If the known person is detected, the system checks whether the given database matches the current captured image. If it matches, the door will automatically open and the message "Access Granted" will be displayed onthe LCD.
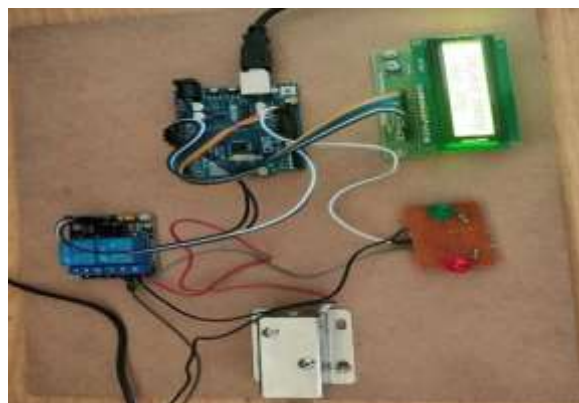

Fig.3: Identified person

Fig.4: Experimental test for an identified person

5. CONCLUSION:

The proposed system featured an Arduino uno-based lock system. It is the system that provides users with secure door locks,

comfort, and connivance security. The proposed system is made up of a PC-webcam, an Arduino, a relay, and a door

lock.For recognising people, the proposed system employs face recognition technology. The proposed system captures the image of the person in front of the door using a PC webcam. For several face recognition packages, it employs cmake and visual studio.In the event of an unknown person, the door cannot be opened and remains shut. If the known person is detected, the system checks whether the given database matches the current captured image. If it matches, the door will open. If it matches, the door will automatically open with the message "**Access Granted**" displayed.This system has a high success rate in recognising face images of people infront of doors. Because it employs face recognition, this automated lock system is extremely secure. This system is suitable for both residential and commercial applications.

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