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FINGERPRINT BASED DOOR LOCK SYSTEM

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❖ Abstract :-

For this, we use a microcontroller to enable the door opening or closing if the matching between scanned data and the already existing data is correct. Comparison is done inside the fingerprint module itself and its output is given to microcontroller. Result is displayed in an LCD display whether the user is authorized or not. LCD also helps to make troubleshooting easier. Alarming option is provided turn about an unauthorized usage. Microcontroller used is PIC16F877. For this, we use a microcontroller to enable the door opening or closing if the matching between scanned data and the already existing data is correct. Comparison is done inside the fingerprint module itself and its output is given to microcontroller. Result is displayed in an LCD display whether the user is authorized or not. LCD also helps to make troubleshooting easier. Alarming option is provided turn about an unauthorized usage. Microcontroller Used Is PIC16F877.

❖ Project Objectives :-

Our project “Finger print-based door lock system” provides freedom from mental and physical stress faced by individual while moving away from their home. Stored fingerprints are retained even in the event of complete power failure or battery drain. With biometric door locks, your fingerprint is the key. They replace keyed locking mechanisms with a fingerprint sensor that actually recognizes who is and who is not authorized to enter. If the fingerprint matches, the door will be opened automatically otherwise the buzzer connected to an audio amplifier will be activated so that the people near the surroundings will get an alert. This system is built with open-source hardware.

❖ Introduction :-

The project mainly aims in designing a completely automated security access system for domestic and industrial applications. Security is the bigger concern for an individual or a firm. Recognizing the need of security, we developed an automated security access system with user friendly access using finger print sensor module. The sensor is a solid-state fingerprint sensor that reliably captures fingerprint information. It is designed to integrate into devices for improved security and convenience. The sensor provides a reliable, quick and user-friendly alternative to passwords, PIN's and other forms of user authentication. We make use of this device to construct an automatic security door access control system. The decisions like locking or unlocking the door are taken by an onboard computer PIC Microcontroller to which the finger print module is interfaced. The doors of the house/industry form the output module and are interfaced to the same onboard computer. Here we use DC motor for door accessing system. The system also provides both visual and audible alerts in case of wrong finger print was detected. This onboard computer consists of number of input and output ports. The onboard computer is commonly termed as micro controller. The input and output port of the micro controller are interfaced with different input and output modules depending on the requirements. In other words, micro controller acts as a communication medium for all the modules involved in the project.

❖ Literature Review :-

Any Research groundwork is depending on literature investigation. Based on the studies carried out by several researchers and their contribution to research field motivates for future scopes of research. In this chapter review of several research papers by various authors and technical reports has been discussed such as about fingerprint-based door lock system for security.

1. **R. Vivek (et.al), (August 2021) ”A Detailed Review on Fingerprint Door Lock System”.**
   The fingerprint module scans the fingerprint and send the microcontroller and verifies the scanned fingerprint with stored fingerprint. When the fingerprint gets matched the solenoid lock gets unlocked. The performed research allows to draw a conclusion about the finger print door lock and thus following conclusions are concluded by studying the review papers
2. **Malabika Sarma (et.al), (August 2020) ” Fingerprint Based Door Access System Using Arduino”.**
   In this paper, we have tried to solve the security matter in door by bringing the concept of biometrics along with the door lock. So, for that purpose we are using finger prints as unique key to implement a device so as to lock or unlock a door. We have discussed about the different components using Arduino we would require to implement our project i.e.; we have given the hardware and software requirements in the project. We have gone through different research papers and then given a brief about the papers

and after studying the papers we have come with an algorithm as to how our system will work. We have also given a project description diagram and also a cost structure so as to get to a price if it is sold as a product. We have shown a block diagram and a probable connected diagram of the components and also given the future possibilities in our project.

3. **M. I. Efunbote (et.al), (September 2018) " Development and Experimentation of a Security Door Lock System Using Biometric Fingerprint Architecture".**

   There are various existing door locks using biometric fingerprint technology and most of them combined the fingerprint device into the door lock itself. The expected results were obtained from the integration of the fingerprint reader and a microcontroller using USB as its main connection. This design also proved that it could improve the level of security of establishments using the mechanical door locks through each person's fingerprint. The testing process showed that the system could correctly identify and compare fingerprint templates at a high rate whether it was to enroll a new fingerprint template or just verify if the captured template was in the memory or already enrolled. By means of this design, people will have an easier way of having a comfortable, secured, and authorized entrance in a certain building or establishment as there would be no keys, passwords or cards will be used. Users would register trusted fingerprints that could enter its premises. With this system, it could activate door locks and help people especially security guards, administrators and owners to secure its premises.

4. **Sujina. K (et.al), (April 2017) " Fingerprint Based Automatic Door Lock System".**

   Fingerprint identification enhances the security of a vehicle and makes it possible only for some selected people to use the car. Thus, by implementing this relatively cheap and easily available system on a car, one can ensure much greater security and exclusivity than that offered by a conventional lock and key. It can be deduced that the use of biometric security systems offers a much better and foolproof means of restricting the use of vehicles by unauthorized users. The developed prototype serves as an impetus to drive future research, geared towards developing a more robust and embedded real-time fingerprint based automatic door lock system sin vehicles.

❖ **Problem Statement :-**

- There is no reaction in low temperature environment. Under the influence of low temperature and harsh environment, fingerprint lock screen may be unable to wake up, fingerprint unlocking does not respond, finger surface temperature is low, fingerprint door lock acquisition window cannot sense the living fingerprint, so you can have a few more attempts.
- Fingerprint lock fails in humid environment. Fingerprint lock is an electronic door lock. Wet weather may affect the operation of the circuit. This is a small probability event, and more importantly, it affects the fingerprint acquisition process. The wet acquisition screen cannot normally sense fingerprint images, so it is necessary to wipe the door lock.
- The fingerprints of the elderly and children cannot be identified. Due to the deformation and flattening of the fingerprint of the elderly, the ordinary low-end fingerprint lock may not be able to obtain a clear fingerprint image normally, and the child's fingerprint has not been formed. Therefore, this situation is caused by the backward fingerprint lock identification technology. It is recommended to upgrade the fingerprint lock with higher quality when buying new electronic products instead of the old ones.
- Wrong finger recognition failed. Fingerprint lock needs to identify the designated finger, so some users may press the wrong finger when they forget to input the finger. Generally, fingerprint lock supports multiple fingerprint input. For careless users, it is recommended to input more fingerprints or try to unlock the lock multiple times.
- The acquisition window is blocked by stains. The fingerprint lock identification process requires that the acquisition window should be kept clean and clean. If there are stains or blurry conditions, it cannot be recognized normally. You can try after cleaning.
- Sensor failure. The sensor is often used, which plays a very important role in the process of fingerprint identification. If there is a fault, it cannot be identified and needs to be replaced after sales.
- Failure of lock body or electronic components. Some fingerprint lock equipment is too old, electronic components aging, reaching or exceeding the service life, unable to use normally, need timely maintenance or upgrading.

❖ Implementation Scheme, Proposed System Methodology, Block Diagram, Circuit Diagram :-

Implementation Scheme :-

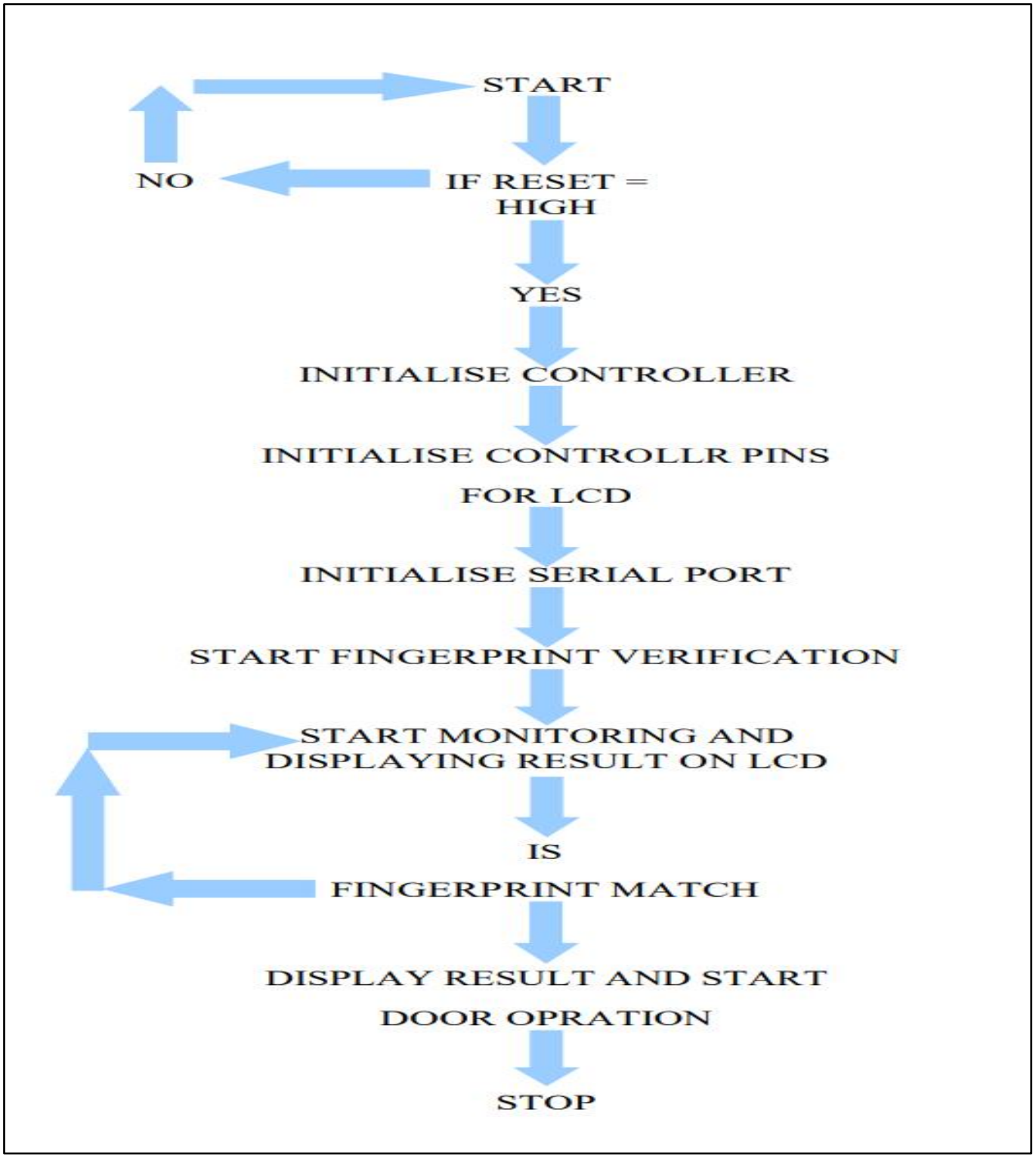

Fig :- Flow Chart of Finger Print Based Security Access Control System.

- **Proposed System Methodology :-**

- **Input Regulated power supply**

  230V,50HZ, Single Phase Ac Supply.

- VA = (NA / NP) x VP
- VB = (NB / NP) x VP
- V Total = VA + VB

➢ **Lcd Driver & Lcd**

DC 4.7 TO 5.3V

- 16×2=32

➢ **Dc Motor Driver & Motor**

Wide Supply-Voltage Range: 4.5 V To 36V.

- Output Current 1 A Per Channel (600 mA for L293D).
- Peak Output Current 2 A Per Channel (1.2 A for L293D).
- Output Clamp Diodes for Inductive Transient Suppression (L293D).

➢ **Crystal oscillator supply3V and 12V**

- Series Resonant Frequency

$$f_s = \frac{1}{2\pi\sqrt{L_s C_s}}$$

- Parallel Resonant frequency

$$f_p = \frac{1}{2\pi\sqrt{L_S \frac{C_P C_S}{C_P + C_S}}}$$

➢ **Buzzer DC 4V**

- Positive Identified by (+) symbol or longer terminal lead.
- Negative Identified by short terminal lead.
- Typically connected to the ground of the circuit.

- **Block Diagram** :-

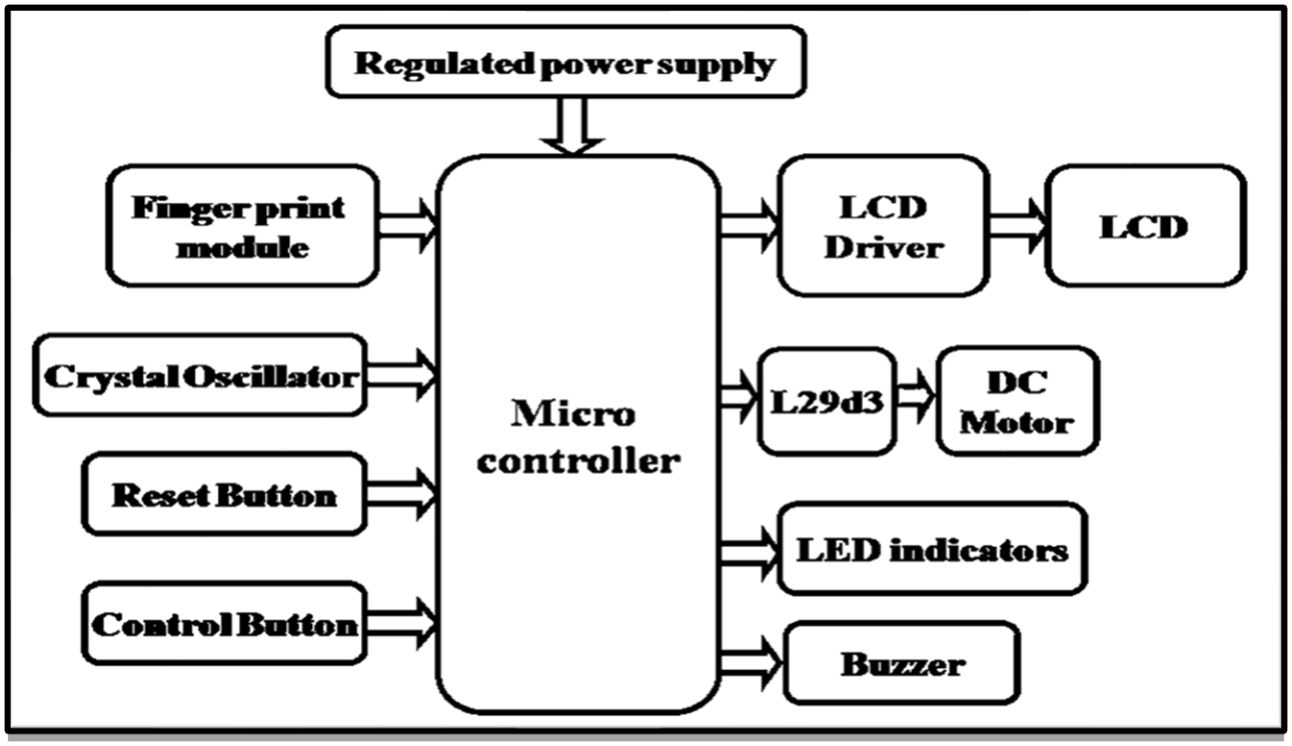

Fig:- Block Diagram of Finger Print Based door lock System.

- **Circuit Diagram :-**

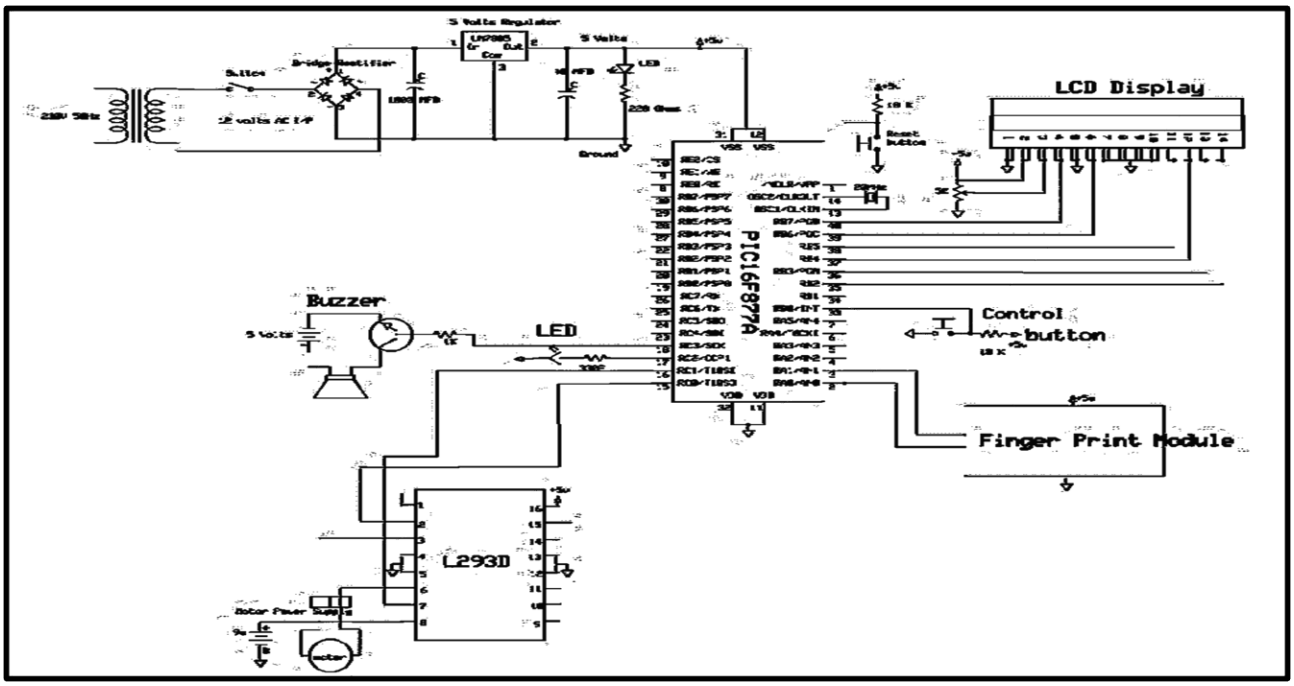

Fig :-Circuit Diagram Fingerprint Based Door lock System.

❖ **Outcomes** (Benefits to Societies) :-

Our Project "Finger Print-Based Door Lock System " Is Mainly Intended to Construct an Automatic Security Access Control System Through a Finger Print Module. This System Has a Solid-State Fingerprint Sensor That Reliably Captures Fingerprint Information Through Which the User Can Be Identified Which Will Be Fed as Input to The Micro Controller. The Micro Controller Is Programmed Such That the Finger Print Given by The User Is Registered or Not as Input Will Be Checked in The Program Whether the User Is Authorized or Not. If The User Is Registered Matches, Then It Operates the DC Motor Connected to The Door, Which Opens the Door and The Status Is Displayed On LCD. This Project Can Be Extended Using A GSM Module And 3G, 4G, 5G and so on Technology. GSM Intimates the Bank Authorities and The Owner of The Locker If the Password Is Entered Wrongly For 3 Times Continuously And 3G and So on Technology Is Used to Have a Photograph of The Person Who Entered Wrong Password, Which Helps a Lot in Security Issues.

❖ **List of Components with their Specifications :-**

Sr. No.	Name of Component	Specifications/Rating	Quantity
01	Regulated Power Supply	Charger 230v/50hz)	01
02	Micro-Controller	Pic16f877A	01
03	Finger Print Module	R305	01
04	Buzzer	4v	01
05	Crystal Oscillator	11.0592 MHz	01
06	Reset Button	-	01
07	Control Button	-	01
08	Dc Motor	9v	01
09	L29d3 (Controller Dc Motor)	9v	01
10	Battery (9 Volt)	Hi-Watt 9v Battery	01
11	Lcd	16*2	01
12	Capacitor	-	02
13	Led Indicators	-	02
14.	Resistor	-	03

Table :- List of Components with their Specifications

❖ **Advantages, Disadvantages, Applications :-**

- **Advantage :-**

- Real time authentication system using finger print module
- Automatic opening/closing of door and the status is displayed on LCD.
- Audible and visual alerts when unauthorized is recognized
- Efficient and low-cost design.
- Low power consumption.
- Easy to operate.
- Fast response.

Disadvantages :-

- No alarming system if the door is not closed.
- Interfacing finger print module to microcontroller is highly sensitive.
- Software is complex.

Applications :-

- In the industry for control rooms.
- In the bank for locker rooms.
- For homes, etc.

References :-

- http://www.crimtrac.gov.au/fingerprintanalysis.htm,"Fin reprint Analysis - The Basics"
- http://www.biometricinfo.org/fingerprintrecognition.htm,"Biometrics Information Resource"
- http://webfealb.feaaub.edu.lb/dsa/labs/projectv1.1.Pdf
- http://WWiv.Computer-.howstuffworks.com/fingerprintscanner.htm
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PHOTOGRAPH AND NAME

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