Fingerprint Recognition Access Microcontroller-Based Doors

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ABSTRACT:

Fingerprints are one of the few things that are absolutely unique to each person. It is possible to reduce the risk of trespassing into homes, shops, offices, and other locations by employing fingerprints as a key to door locks. Because an unauthorized visitor may be warned by SMS if the lock is unlocked by someone who is not authorized to be there, the Arduino and GSM slots provide an additional degree of security
Keywords: Arduino, Lock, Fingerprint and GSM

1. INTRODUCTION:

Arduino was built to address the security issue. Traditional locks may be used as a security precaution. The use of patterns in locksets to reinforce security is a possibility. If passwords or other security methods are compromised, they may be accessed. Patterns may be seen. In this project, create a biometric system. A variety of additional elements will enhance the lock's security.

2. LITERATURE REVIEW

A residential security system the role of the door locks is to lock and unlock the system. For these individuals, the lock may be opened using a fingerprint, RFID card, pin, password, or IoT. These are the individuals who use their mobile phones to get access to the system. In the current state of things, both hacking and unlocking are conceivable.

When working in remote areas, security is a key problem. Personal recognition is required to get access to one's own personal information. Passwords and ID cards are the most commonly used forms of security. Due to the danger of losing cards, these approaches are not recommended. Fingerprints have been conceived and deployed to their greatest potential.

3.SYSTEM OVERVIEW:

Biometric door access control units are network-connected devices that measure a person's unique physiological characteristics. They do not save a photograph of the fingerprint or face. For security and privacy, everything is encoded. These IP door reader controllers can all be powered by PoE (via a splitter) or 12 VDC.IEW
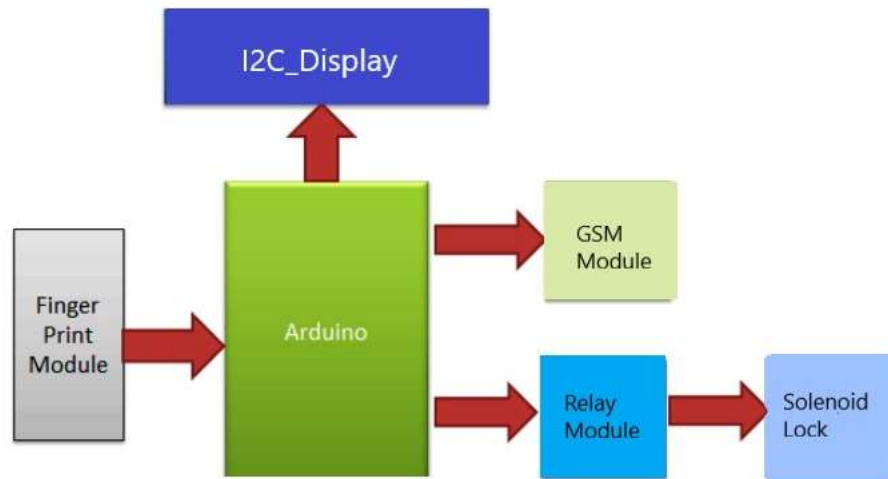
This block diagram is divided into six sections, which are as follows:
  A. Fingerprint module
  B. Arduino
  C. 12C_Display
  D. GSM module
  E. Relay module
  F. Solenoid lock

The R307 module has a optical fingerprint sensor as well as the high-speed DSP processor. In fig(1) a simple and reliable design incorporates fingerprint input, image processing, fingerprint matching, search, and other functions. It has a maximum capacity of 1000 entries. The R305 fingerprint sensor has been updated to work with the software.


Fig(1): Fingerprint module.

This board is powered by the ATmega328p microcontroller. The device contains 14 digital and 6 analogue I/O pins. The Arduino Uno R3 handles voltages ranging from 1.8 to 5.5 volts. The Arduino Uno is a low-cost microcontroller board ideal for beginners.

Fig(2): Arduino.

C.The Fig(3) display is simple to operate. Simplier production enables writers to focus on the content of their work. With only a few lines of code, Arduino's I2C LCD library can display complicated pictures and text. The PCF8574 converts serial I2C data to parallel data for LCD

display. Their I2C addresses are 0x27 or 0x3F. To determine the module's version, look at the black I2C adapter board.
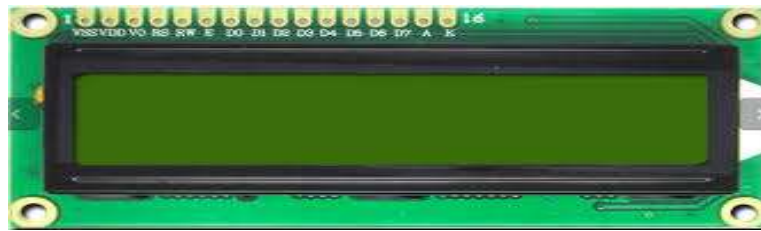
Fig(3): 12_C Display.

D.The ComSIM900A is the most affordable and smallest GPRS/GSM module. Arduino and microcontrollers are used in embedded programmes. The module connects to GPRS and GSM networks using a mobile sim card. It is capable of making and receiving calls on the 900 and 1800 MHz bands. The Fig(4) shows the structure of the GSM module.

Fig(4): GSM Module.

E. Relay module:
Fig(5) has the ability to allow or prohibit electricity flow. Low-voltage applications may use 3.3V (ESP32, ESP8266, etc.) or 5V (Arduino Uno) power supplies (Arduino). An electromagnet controls the relay module. An electromagnet is activated by a low-power microcontroller pulse. When activated, electromagnets open or shut circuits
.

Fig(5): Relay module.

F. SOLENOID LOCK:
Electrical current drives solenoid locks. In power-on mode, it may unlock or lock. Turn on the solenoid to unlock the power-on type. Solenoid door locks are secured by magnetic energy and an adjustable piston or plunger. DC power is provided by the system batteries. The electromagnet is activated by a control device or remote. Fig (5) gives the information regarding the solenoid lock.

Fig (6): Solenoid lock.

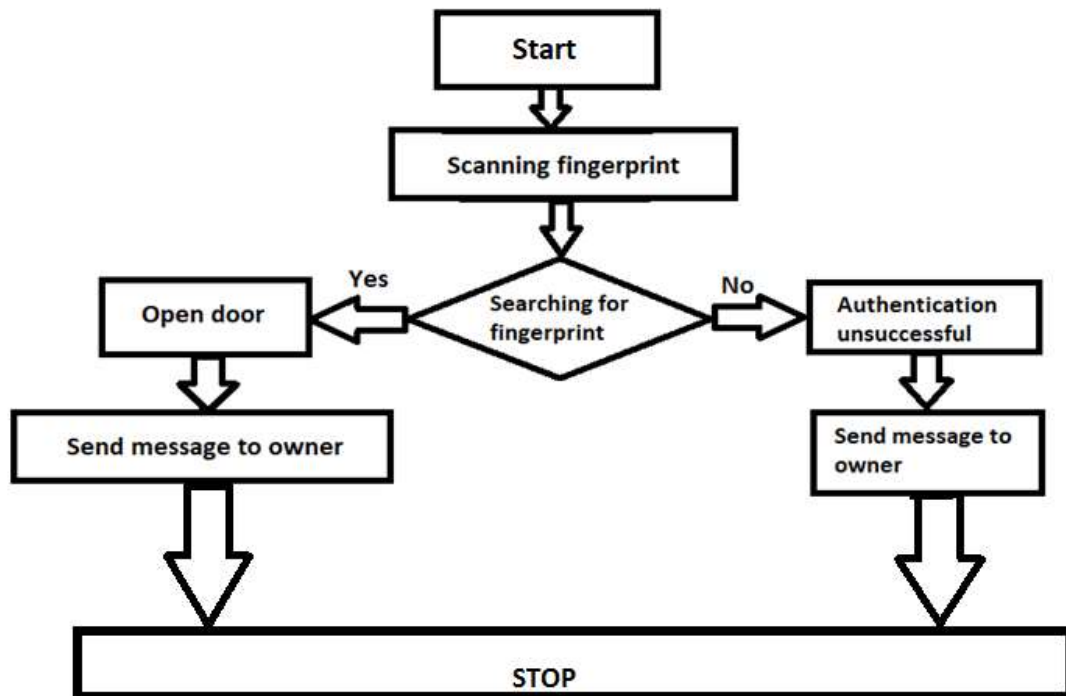## 4. FLOWCHART OF PROPOSED ALGORITHM

Fig (7): Flowchart for the proposed algorithm.

Step 1: Firstly, scan the fingerprint.

Step 2: The system checks for the fingerprint weather the match was found or not.
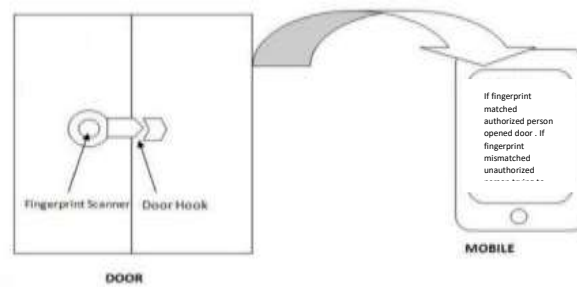
Step 3: If the match is found then the door opens.

Step 4: Then sends the message door is opened to the owner.

Step 5: If the fingerprint is not matched then an alert message is sent to the authorized person,

saying that someone is trying to open the door without permission.

Step 6: Finally after all these operations it stops.

5. METHODOLOGY:

Fig(8): Methodology

The above diagram depicts the basic concept behind our project. Let us go over the diagram step by step. The fingerprint is first scanned. The scanned fingerprint matches the door is unlocked using a fingerprint stored in the system secure, if the scanned fingerprint does not correspond to the fingerprint. If the information is stored in the system, the unauthorized person will be denied access. To participate a message will be sent to the owner informing him of the unauthorized access. After 3 seconds, the door locks automatically again.

So, in order to carry out the aforementioned functionalities, the basic devices will be required.
Fingerprint Scanner: This device scans the finger for fingerprints.

1. GSM Module- This module is used to send messages to the owner.
2. Adapter- A power source for the systems.
3. Jumper Wires- Used to connect all devices one another.
4. I2C display - Used to show messages.

CONCLUSION:

In this door lock, biometric technology was employed to overcome security difficulties in door locks. Because each person's fingerprint is unique, it would boost the door's security. As a result, we've made it into a key to unlock the door. We supplied the project's hardware and software specifications. We combed through a deluge of scholarly literature and constructed an algorithm to find out how our method works. Our project's components, as well as its future prospects, are shown in a block diagram and a portable connected diagram.

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