Fingerprint Based Door Look System Using Arduino

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Abstract- *The main aim of FINGER PRINT BASED SECURITY SYSTEM project is develop a security lock system based on fingerprint scanning. In this project we are using microcontroller for opening and closing lock based on fingerprint which is stored in microcontroller itself so that only authorized person will access the security lock.*

In this Paper we are trying to solve the problems which occurs related to the security in homes, shops and offices. These issues can be fixed by using traditional locks but here a possibility is may occurred of some unknown person will open the lock without breaking it by using duplicate keys. Using these locks also make problems if we lost keys of lock and we have to carry those keys with us. Again, using these patterns in the locks can improve security but again it can open and cracked if somehow someone guesses the passwords or patterns are known.

I. LITERATURE REVIEW

Arduino Based Smart Fingerprint Authentication System."- In today's world Home, offices, shops, banks need excessive security measure for safety motive. To supply security for these area, smart lock system is initiated. There are numerous innovational smart door locks are created to lock and unlock the system. It is very easy and simple to understand.

In "Advanced Door Lock Security System using the Palmtop Recognition System",KawserWazedNafi, lecturer at Stamford University talks about the separation of the security system interface. According to him, a security system that uses a fingerprint interface can be categorized into the following modules:

Biometrics literature research - especially with regard to the analysis of fingerprints. A study of the basics of image processing algorithms to compare images with a different view of fingerprints. In the research paper "Finger print system based on fingerprints", Ajinkya Kawale (May, 2013) states that fingerprints are patterns of holes and holes in the surface of the finger. Like all other elements in the human body, these layers make up a combination of genes and nature

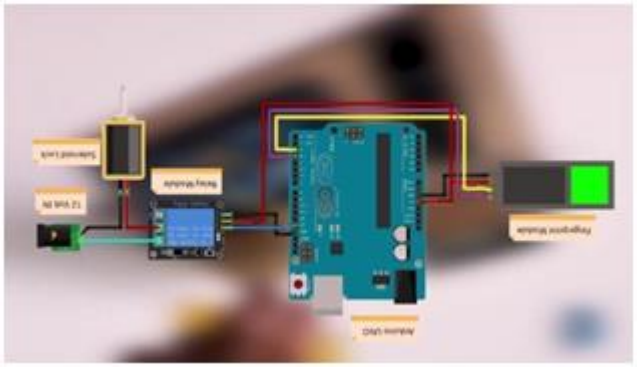
GSM module's path. If the owner needs to modify off the alarm, he sends an indication to the GSM module. The GSM module can send the signal to the Arduino board. The Arduino board converts this signal into the sensing element comprehendible format and sends it to the sensors. The sensors

The genetic code in DNA gives general instructions about how the skin should be formed in a developing embryo, but the specific way it is formed is the result of random events. With the help of assemblies, fingerprints can be used to create secure and inaccessible door locks and several locking systems.

"A smart door access system using finger print biometric system."- In this paper a survey is done to provide high security for such high end security applications. The aim of this study is to design a smart door access system using finger print module. Both hardware and software technology are used to design it.

CONSTRUCTION:

I'm going to show you how to build a door lock that uses a fingerprint sensor and an Arduino UNO. This door lock will only open the door when the user scans the right fingerprint that is recorded on the system, but the door will remained close upon entering the wrong fingerprint.



1.1 Arduino Uno

The Arduino UNO is a standard board of Arduino. Here UNO means 'one' in Italian. It was named as UNO to label the first release of Arduino Software. It was also the first USB board released by Arduino. It is considered as the powerful board used in various projects. Arduino.cc developed the Arduino UNO board.

Arduino UNO is based onan ATmega328P microcontroller. It is easy to use compared to other boards, such as the Arduino Mega board, etc. The board consists of digital and analog Input/Output pins (I/O), shields, and other circuits.

The Arduino UNO includes 6 analog pin inputs, 14 digital pins, a USB connector, a power jack, and an ICSP (In-Circuit Serial Programming) header. It is programmed based on IDE, which stands for Integrated Development Environment. It can run on both online and offline platforms

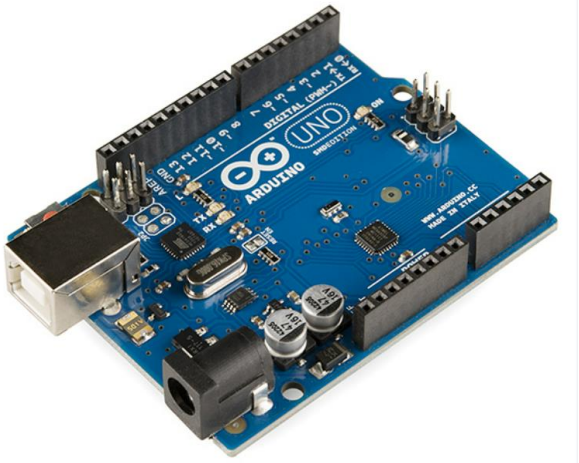


Figure 1.1: Arduino Uno

1.2Fingerprint Sensor:

Image result for fingerprint based door lock system components relay Fingerprint sensor module is used as a way to verify identity. It is widely applied to computers, mobile phones, electronic door locks, access control systems, security safes, etc.

Figure 1.2: Fingerprint Sensor

1.3 Solonoid Lock:

The C5-273-B-1 is a 3VDC/3W size C5 Open C Frame Solenoid with coil enclosed on one side, 0.025-inch square pin coil termination, pull operation, continuous duty cycle and2.88Ω coil resistance. The C frame solenoid features less efficient and cost less. Tapped mounting holes are used for easy installation and interchange ability.

Figure 1.3:Solonoid Lock

1.4DC Adapter/ 12V 5A AC:

This 12V 5A AC/DC adapter is the perfect solution for powering your DigilentNetFPGA-1G-CML board. With the PCIe output connector, you can use this power supply with other devices that use PCI e power connectors**.**

Figure 1.4: 12V 5A AC/DC Adapter

1.5 Jumper Wires:

A jump wire (also known as jumper, jumper wire, DuPont wire) is an electrical wire, or group of them in a cable, with a connector or pin a teach end (or sometimes without them–simply "tinned"), which is normally used to interconnect the components of a bread board or other prototype or test circuit, internally or with other equipment or components, without soldering.

Figure 1.5: Jumper Wires

1.6 Relay:

The relay module is an electrically operated switch that can be turned on or off deciding to let current flow through or not. They are designed to be controlled with low voltages like 3.3V like the ESP32, ESP8266, etc or 5V likey our Arduino

1.6 USB Cable:

Use it to connect Arduino Uno, Arduino Mega 2560, Arduino 101 or any board with the USB female A port of your computer. Cable length is approximately 100cm. Cable color and shape may vary slightly from image as our stock rotates. Universal Serial Bus (USB) is an industry standard that establishes specifications for cables, connectors and protocols for connection, communication and power supply (interfacing) between computers, peripherals and other computers.

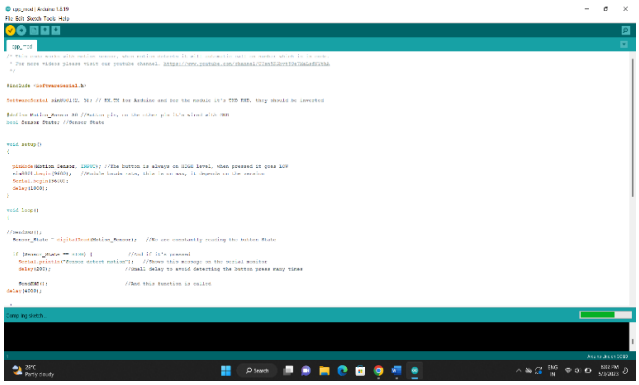
A broad variety of USB hardware exists, including 14 different connector types, of which USB-C is the most recent and the only one not currently deprecated since the release of USB 3.2.Firstreleasedin1996,theUSBstandardsare maintained by the USB Implementers Forum(USB-IF). The four generations of USB are: USB 1.x,USB2.0, USB 3.x,andUSB4.

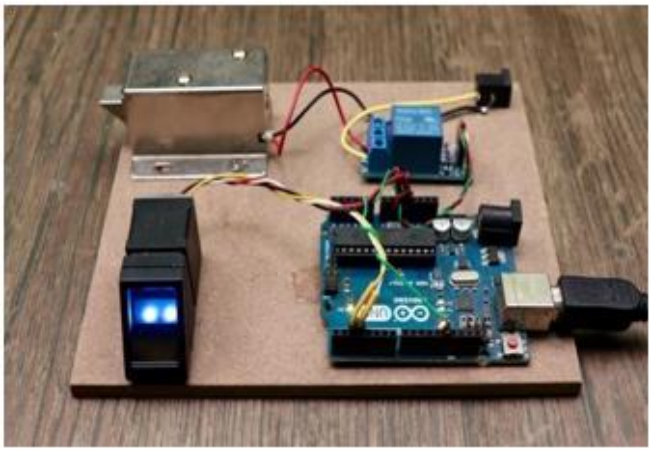
SOURCE CODE:

```
#include <Adafruit_Fingerprint.h>
#if (defined( AVR ) || defined(ESP8266)) && !defined( AVR_ATmega2560 ) Software Serial my Serial(2, 3);
#else
// On Leonardo/M0/etc, others with hardware serial, use hardware serial!
// #0 is green wire, #1 is white #define mySerial Serial1
#endif
Adafruit_Fingerprint finger = Adafruit_Fingerprint(&mySerial);
void setup()
{
Serial.begin(9600);
while (!Serial); // For Yun/Leo/Micro/Zero/...
delay(100);
Serial.println("\n\nAdafruit finger detect test");
finger.begin(57600);
delay(5);
if (finger.verifyPassword())
{
Serial.println("Found fingerprint sensor!");
}
else
{
Serial.println("Did not find fingerprint sensor :(");
while (1)
{
delay(1);
}
}
Serial.println(F("Reading sensor parameters"));
finger.getParameters();
Serial.print(F("Status: 0x")); Serial.println(finger.status_reg, HEX);
```

```
Serial.print(F("Sys ID: 0x")); Serial.println(finger.system_id, HEX);
Serial.print(F("Capacity: ")); Serial.println(finger.capacity);
Serial.print(F("Security level: "));
Serial.println(finger.security_level);
Serial.print(F("Device address: "));
Serial.println(finger.device_addr, HEX);
Serial.print(F("Packet len: "));
Serial.println(finger.packet_len);
Serial.print(F("Baud rate: ")); Serial.println(finger.baud_rate);
finger.getTemplateCount();
if (finger.templateCount == 0) {
Serial.print("Sensor doesn't contain any fingerprint data. Please run the
'enroll' example.");
}
else {
Serial.println("Waiting for valid finger...");
Serial.print("Sensor contains ");
Serial.print(finger.templateCount);
Serial.println(" templates");
}
}
void loop()
{
getFingerprintID();
delay(50); }
uint8_t getFingerprintID() {
uint8_t p = finger.getImage();

switch (p) {
case FINGERPRINT_OK:
Serial.println("Image taken");
break;
case FINGERPRINT_NOFINGER:
Serial.println("No finger detected");
return p;
case FINGERPRINT_PACKETRECIEVEERR:
Serial.println("Communication error");
return p;
case FINGERPRINT_IMAGEFAIL:
Serial.println("Imaging error");
return p;
default:
Serial.println("Unknown error");
return p;
}
// OK success!
p = finger.image2Tz();
switch (p)
{
case FINGERPRINT_OK:
Serial.println("Image converted");
break;
case FINGERPRINT_IMAGEMESS:
Serial.println("Image too messy");
return p;
case FINGERPRINT_PACKETRECIEVEERR:
Serial.println("Communication error");
return p;
case FINGERPRINT_FEATUREFAIL:
Serial.println("Could not find fingerprint features");
return p;
case FINGERPRINT_INVALIDIMAGE:
Serial.println("Could not find fingerprint features");
return p;
default:
Serial.println("Unknown error");
return p;
}
p = finger.fingerSearch();
if (p == FINGERPRINT_OK) {
Serial.println("Found a print match!");
} else if (p == FINGERPRINT_PACKETRECIEVEERR) {
Serial.println("Communication error");
return p;
} else if (p == FINGERPRINT_NOTFOUND) {
Serial.println("Did not find a match");
return p;
} else {
Serial.println("Unknown error");
return p;
}
// found a match!
Serial.print("Found ID #"); Serial.print(finger.fingerID);
Serial.print(" with confidence of ");
Serial.println(finger.confidence);
return finger.fingerID;
}
// returns -1 if failed, otherwise returns ID #
int getFingerprintIDez()
{
uint8_t p = finger.getImage();
if (p != FINGERPRINT_OK) return -1;
p = finger.image2Tz();
if (p != FINGERPRINT_OK) return -1;
p = finger.fingerFastSearch();
if (p != FINGERPRINT_OK) return -1;
// found a match!
Serial.print("Found ID #"); Serial.print(finger.fingerID);
Serial.print(" with confidence of ");
Serial.println(finger.confidence);
return finger.fingerID;
}
```





II. RESULT, CONCLUSION AND FUTURE SCOPE

1. Result

[1] Improved Security: it is very useful model for our home security As well As offices, lockers, etc
[2] Security And Privacy :It is less Noisy.
[3] Skill Required: It has not required skilled person.
[4] Energy efficiency: The system can be designed to operate at specific times of the day or when the home owner goes outside from the house then active this system

2. Conclusion

Fortheconclusion,wehadconcludethatthereareadvantagesanddisadvantagesof this project. We really hope that the advantages we achieve from this product can provide benefits and convenience to the community. Next to the shortage, we also will improve and been looking for more research on this project so that it will had reached its maximum capabilty.

More testing and analysis should be done so that the product will be more accountable in the future. This product is not only meant for the usage in pandemic and in other field as well. As we can change the inputs (the distance) in Arduino code it is used to measure even a very long-distance.

Using this proposed system we can sence the Finger. This product I Not only meant for the usage in pandemic and in other field as well. As we can change the inputs (finger) in Arduino code it issued to sence even a very wrong finger or even a correct finger . As WHO prescribed to maintaincorrectFinger,wehavegivenithastheinput.WecanmodifytheFingersensoratanytime.

3 Future Scope

- In the future, there could be many more applications like fingerprint based driving licences, bank accounts operation and so on.
- This is simple fingerprint door unlock project using Arduino can be very useful for door security, forensics, crime investigation, personal identification, attendance system and much more

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