Vivekanand College, Kolhapur (Autonomous) Department of Electronics Students Project List 2019-20		
Sr. No.	**Name of Student**	**Project Name**
1	GHADAGE KUNAL GUNDOPANT	Earthquake Detector Using Arduino
2	GIRIDHAR NANDKUMAR GANESH	
3	NIGAVEKAR AKASH PRAKASH	
4	JADHAV HRISHIKGH	Robotic Car
5	MANER AJIM RAFIK	
6	DESAI ASIF FIROZ	
7	MATRI TANVI SACHIN	Body Mass Index
8	RANDIVE PRAJJVALI SHAHAJI	Arduino Based Fingerprint Vehicle Starter
9	KAMBLE BHAGYASHRI MACHINDRA	
10	CHOUGULE TANUJA ASHOK	
11	MORE ANIKET ASHOK	Line Follower Robo
12	BUNE HARSHVARDHAN CHANDARKANT	
13	THORAT MANISH AMAR	
14	KAMBALE PRANAV BALASAHAB	Water Level Controller
15	KAMBALE SANGRAM DNYANDEV	
16	PATIL ARJUN SHIVAJI	
17	MITHARI VINAY SUDHAKAR	Air Quality Monitoring
18	MORBALE MANISH DHANAJI	

VIVEKANAND COLLEGE ESTD. JUNE 1964 KOLHAPUR-416 003

(Mr. D. M. Panhalkar)

Head
Department of Electronics
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"EDUCATION FOR PROPAGATION OF KNOWLEDGE, ACHIEVEMENT AND CULTURE"

SHREE SWAMI VIVEKANAND SHIKSHAN SANSTHA'S

VIVEKANAND COLLEGE, KOLHAPUR

PROJECT WORK

Entitled

"EARTHQUAKE DETECTOR USING ARDUINO"

Submitted to

DEPARTMENT OF ELECTRONICS

VIVEKANAND COLLEGE, KOLHAPUR(Autonomous)

By

Nandkumar G. Giridhar

Akash P. Nigavekar

Kunal G. Ghadage

PROJECT GUIDE

Ms. P. S. Jadhav

Department of Electronics

VivekanandCollege, Kolhapur (Autonomous)

2019-2020

DEPARTMENT OF ELECTRONICS

CERTIFICATE

This is to certify that **Akash P. Nigavekar**And**Nandkumar G. Giridhar, Kunal G. Ghadage**of the Class **B.Sc.III** has satisfactorily completed the project work on the title **"EARTHQUAKE DETECTOR USING ARDUINO"**as a partial fulfillment of practical course for the award of B.Sc.degree in Electronics by ShivajiUniversity,Kolhapur.

Place: Kolhapur
Date: 28/2/2020

Ms. P. S. Jadhav
(Project Guide)

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(H.O.D)

Head
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Vivekanand College, Kolhapur.

Examiner

VIVEKANAND COLLEGE ESTD. 1964 KOLHAPUR-416 003

DECLARATION

It is hereby declared that the work reported in the project entitled "**EARTHQUAKE DETECTOR USING ARDUINO**"completed and written by us and has not been copied from anywhere.

Place : Kolhapur

Date: 28/2/2020

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VIVEKANAND COLLEGE ESTD. JUNE 1964 KOLHAPUR-416 003

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We wish to express my deep sense of gratitude towards our project guide **Ms. P. S. Jadhav** of Electronics Department, Vivekanand College, Kolhapur for her valuable guidance to complete this project within time.

It is our proud privilege to express sense of gratitude and sincere thanks to Principal**Dr.S.Y.Honagekar&Mr.D.M.Panhalkar,** Head of Department of Electronics, Vivekanand College, Kolhapur for providing all available facilities of college for completion of this project. We are also thankful to **Mr.P.R.Bagade, Mr.N.P.Mote, Mr.S.D. Jadhav, Mr. G. S. Nhivekar Mr.Dhamnekar**& non teaching staff for providing guidance for our project.

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3. Kunal Gundopant Ghadage	

VIVEKANAND COLLEGE ESTD. JUNE 1964 KOLHAPUR-416 003

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1. Introduction:-

An earthquake is an unpredictable natural disaster that causes damage to lives and property. It happens suddenly and we cannot stop it but we can be alerted from it. In today's time, there are many technologies which can be used to detect the small shakes and knocks, so that we can take precautions prior to some major vibrations in earth. Here we are using Accelerometer ADXL335 to detect the pre-earthquake vibrations. Accelerometer ADXL335 is highly sensitive to shakes and vibrations along with all the three axes. Here we are building an Arduino based Earthquake Detector using Accelerometer.

2. Block Diagram of an Arduino based Earthquake Detector using Accelerometer.

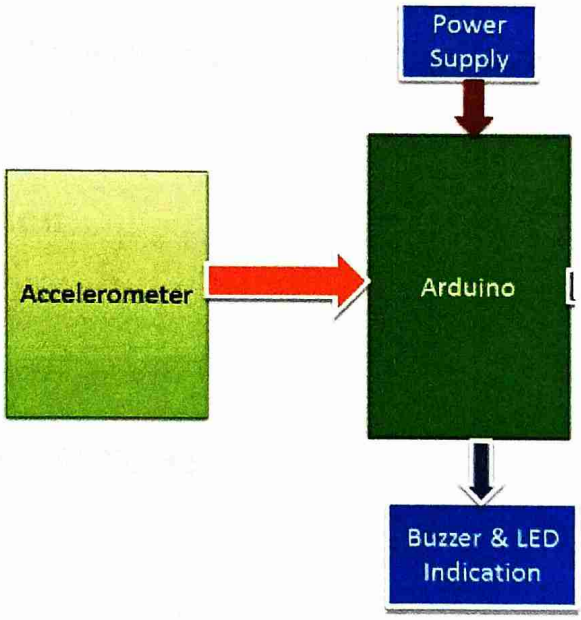


Fig. 1

We have used Accelerometer for detecting earthquake vibrations along any of the three axes so that whenever vibrations occur accelerometer senses that vibrations and convert them into equivalent ADC value.

Then these ADC values are read by Arduino and shown over the 16x2 LCD.

First we need to calibrate the Accelerometer by taking the samples of surrounding vibrations whenever Arduino Powers up. Then we need to subtract those sample values from the actual readings to get the real readings. This calibration is needed so that it will not show alerts with respect to its normal surrounding vibrations. After finding real readings, Arduino compares these values with predefined max and min values. If Arduino finds any changes values are more then or less then the predefined values of any axis in both direction (negative and positive) then Arduino trigger the buzzer and shows the status of alert over the 16x2 LCD and a LED also turned on as well. We can adjust the sensitivity of Earthquake detector by changing the Predefined values in Arduino code.

3. Implementation

Components Required:-

- Arduino UNO
- Accelerometer ADXL335
- 16x2 LCD
- Buzzer
- BC547 transistor
- 1k Resistors
- 10K POT
- LED
- Power Supply 9v/12v
- Berg sticks male/female

A. Arduino Uno:-

Arduino is an open source computer hardware and software company, project, and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world.The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler tool chains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project.

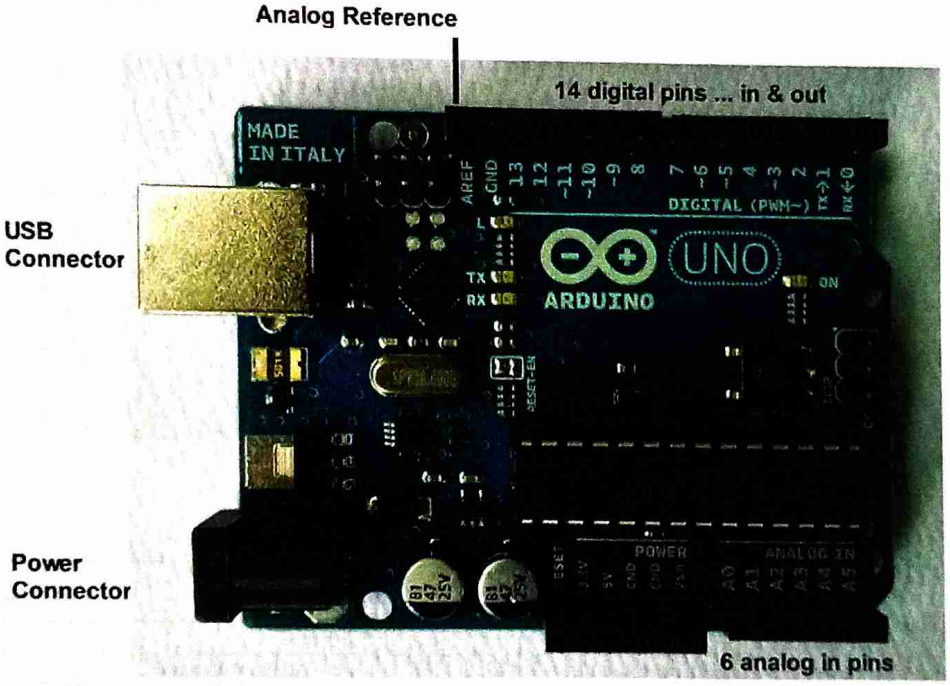


Fig.2

B. 16X2 LCD Panel:-

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in color or monochrome.[1] LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as preset words, digits, and seven-segment displays.

➢ Pin description:-

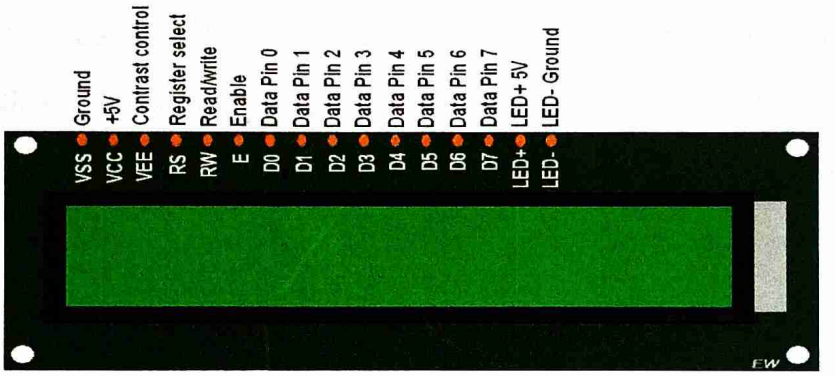


Fig.3

Pin No	Function	Name
1	Ground (0V)	Ground
2	Supply voltage; 5V (4.7V – 5.3V)	Vcc
3	Contrast adjustment; through a variable resistor	V_{EE}
4	Selects command register when low; and data register when high	Register Select
5	Low to write to the register; High to read from the register	Read/write
6	Sends data to data pins when a high to low pulse is given	Enable
7	8-bit data pins	DB0
8		DB1
9		DB2
10		DB3
11		DB4
12		DB5
13		DB6
14		DB7
15	Backlight Vcc (5V)	Led+
16	Backlight Ground (0V)	Led-

C. Accelerometer ADXL 335 :-

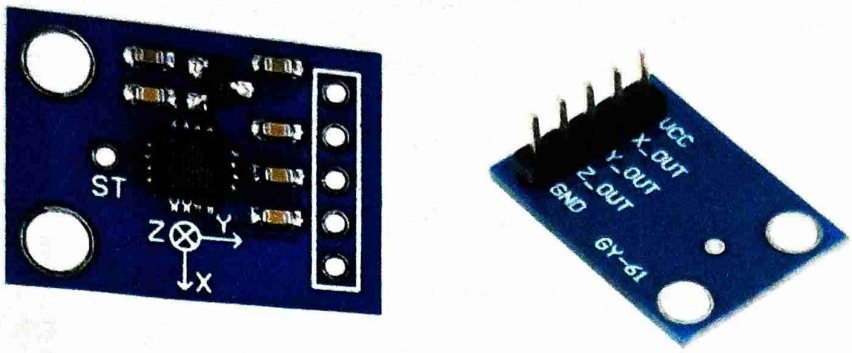


Fig.4

The ADXL335 is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. The product measures acceleration with a minimum full-scale range of ±3 g. It can measure the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration.

Pin Description of accelerometer:-

1. Vcc 5 volt supply should connect at this pin.
2. X-OUT This pin gives an Analog output in x direction
3. Y-OUT This pin give an Analog Output in y direction
4. Z-OUT This pin gives an Analog Output in z direction
5. GND Ground
6. ST This pin used for set sensitivity of sensor

D. Buzzer :-

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or keystroke. Buzzer is an integrated structure of electronic transducers, DC power supply, widely used in computers, printers, copiers, alarms, electronic toys, automotive electronic equipment, telephones, timers and other electronic products for sound devices. Active buzzer 5V Rated power can be directly connected to a continuous sound, this section dedicated sensor expansion module and the board in combination, can complete a simple circuit design, to "plug and play."

Fig.5

➢ Circuit Diagram &Connections :-

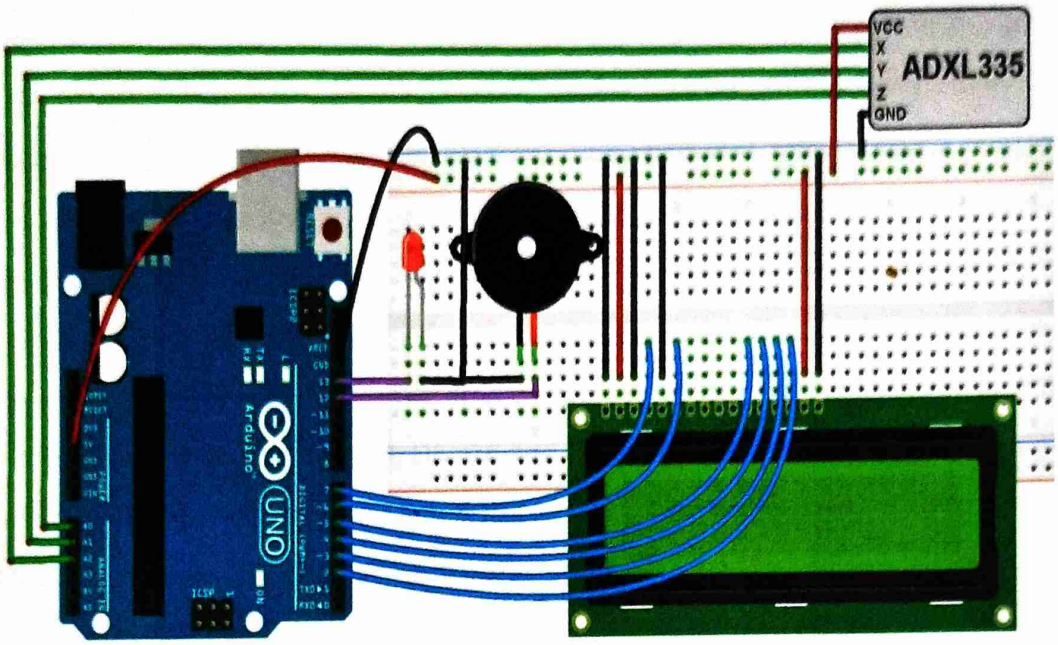
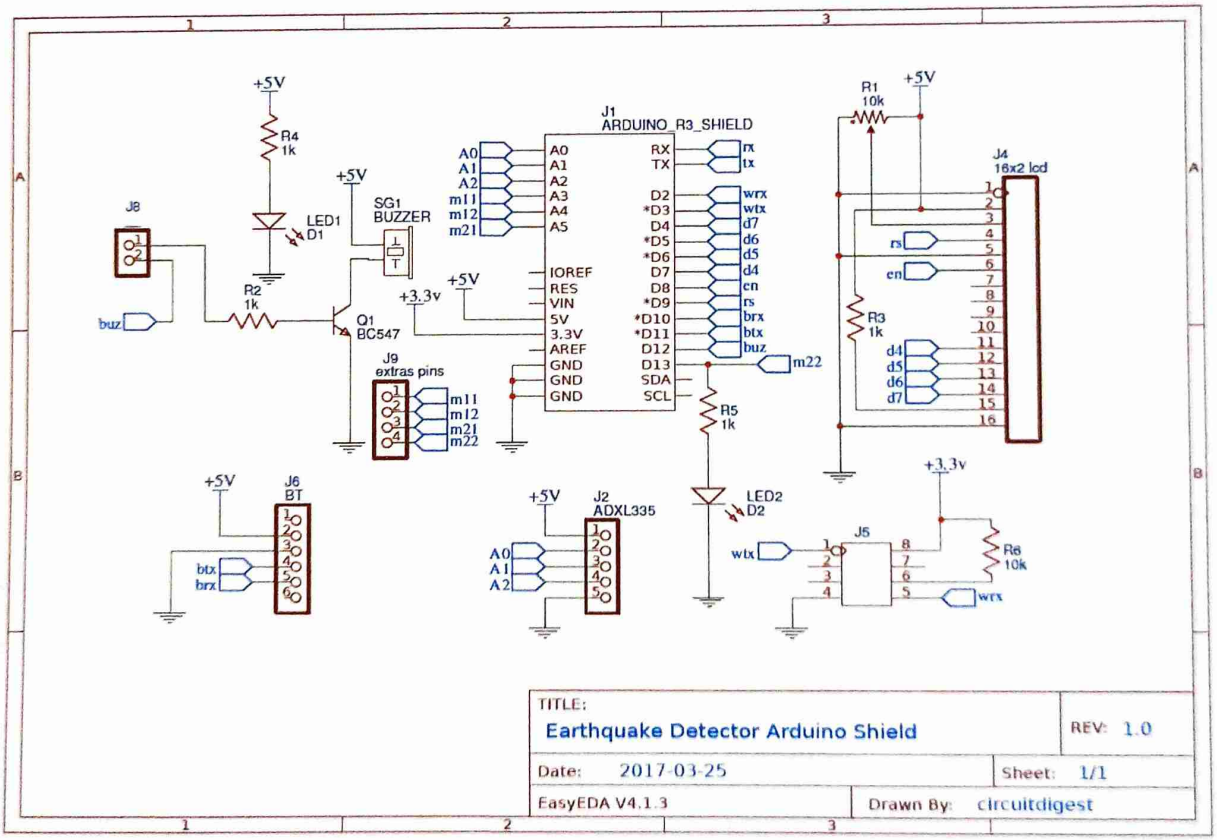


Fig.6



➢ Circuit Explanation:-

Circuit of this Earthquake detector Arduino Shield PCB is also simple. In this project, we have used Arduino that reads accelerometer's analog voltage and convert them into the digital values. Arduino also drives the buzzer, LED, 16x2 LCD and calculate and compare values and take appropriate action. Next part is Accelerometer which detects vibration of earth and generates analog voltages in 3 axes (X, Y, and Z). LCD is used for showing X, Y and Z axis's change in values and also showing alert message over it. This LCD is attached to Arduino in 4-bit mode. RS, GND, and EN pins are directly connected to 9, GND and 8 pins of Arduino and rest of 4 data pins of LCD namely D4, D5, D6 and D7 are directly connected to digital pin 7, 6, 5 and 4 of Arduino. The buzzer is connected to pin 12 of Arduino through an NPN BC547 transistor. A 10k pot is also used for controlling the brightness of the LCD.

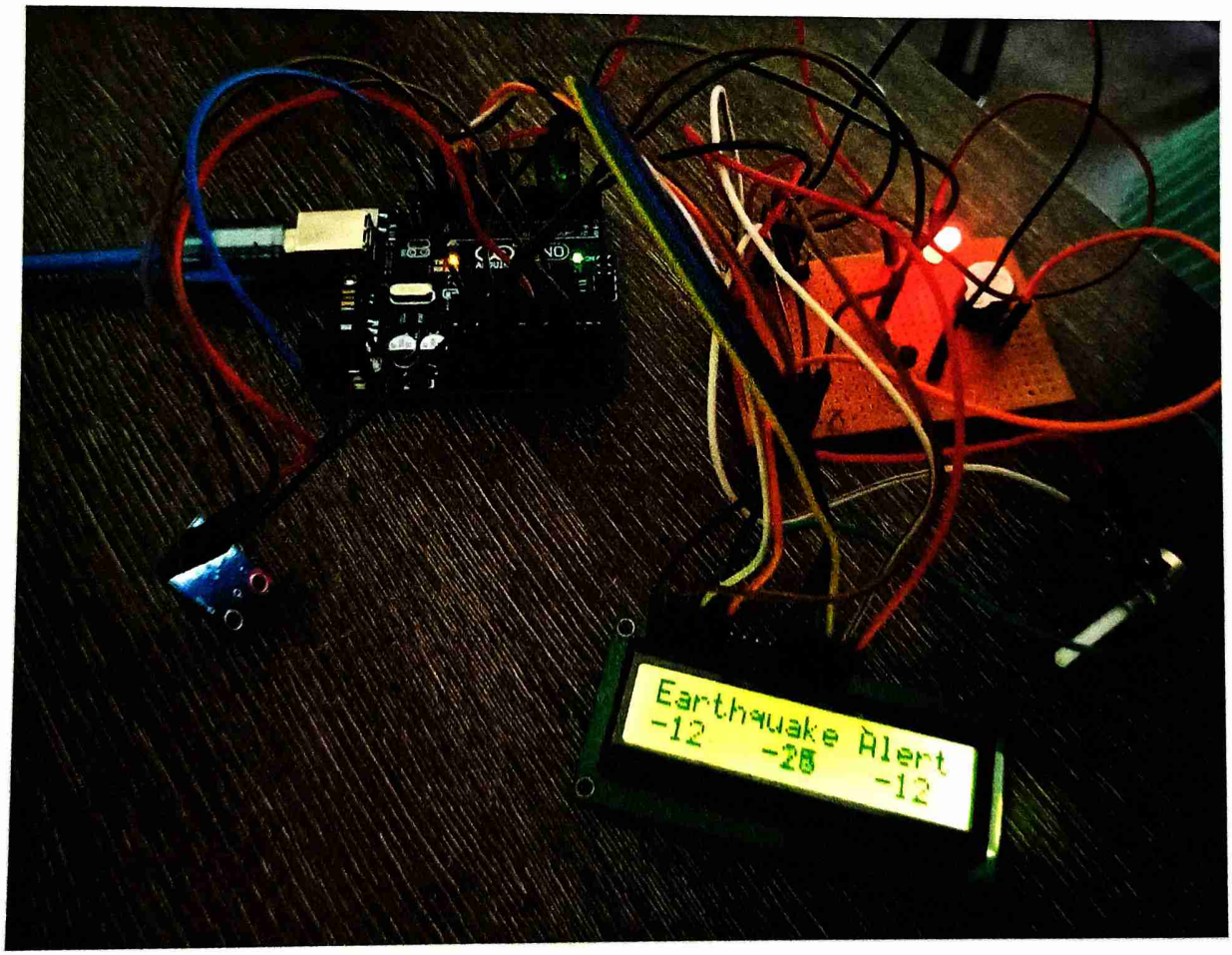


Fig.7

➢ Programming Explanation:-

In this Earthquake Detector Arduino Shield, we have made two codes: one for Arduino to detect an earthquake and another for Processing IDE to plot the earthquake vibrations over the graph on Computer. We will learn about both the codes one by one:

➢ Arduinocode:-

First of all, we calibrate the accelerometer with respect to its placing surface, so that it will not show alerts with respect to its normal surrounding vibrations. In this calibration, we take some samples and then take an average of them and stores in a variable.

```
#include<LiquidCrystal.h>      // lcd Header

LiquidCrystallcd(12,11,5,4,3,2);   // pins for LCD Connection

#define buzzer 9 // buzzer pin

#define led 8  //led pin

#define x=A0  // x_out pin of Accelerometer

#define y=A1  // y_out pin of Accelerometer

#define z =A2  // z_out pin of Accelerometer

/*variables*/

intxsample=0;

intysample=0;

intzsample=0;
```

```
long start;
intbuz=0;
/*Macros*/
#define samples 50
#define maxVal 20   // max change limit
#define minVal -20    // min change limit
#define buzTime5000  // buzzer on time
void setup()
{
lcd.begin(16,2);  //initializing lcd
Serial.begin(9600); // initializing serial
delay(1000);
lcd.print("EarthQuake ");
lcd.setCursor(0,1);
lcd.print("Detector    ");
delay(2000);
lcd.clear();
lcd.print("Circuit Digest ");
lcd.setCursor(0,1);
```

```
``

  lcd.print("NA   ");

  delay(2000);

  lcd.clear();

  lcd.print("Calibrating.....");

  lcd.setCursor(0,1);

  lcd.print("Please wait...");

  pinMode(buzzer, OUTPUT);

  pinMode(led, OUTPUT);

  buz=0;

  digitalWrite(buzzer, buz);

  digitalWrite(led, buz);

  for(int i=0;i<samples;i++)      // taking samples for calibration

   {

 xsample+=analogRead(x);

 ysample+=analogRead(y);

 zsample+=analogRead(z);

  }

xsample/=samples;   // taking avg for x

ysample/=samples;     // taking avg for y
```

```
zsample/=samples;  // taking avg for z
delay(3000);
lcd.clear();
lcd.print("Calibrated");
delay(1000);
lcd.clear();
lcd.print("Device Ready");
delay(1000);
lcd.clear();
lcd.print(" X    Y    Z  ");
}
void loop()
{
int value1=analogRead(x);  // reading x out
int value2=analogRead(y);  //reading y out
int value3=analogRead(z);  //reading z out
intxValue=xsample-value1;   // finding change in x
intyValue=ysample-value2;   // finding change in y
intzValue=zsample-value3;   // finding change in z
```

```
/*displying change in x,y and z axis values over lcd*/
lcd.setCursor(0,1);
lcd.print(zValue);
lcd.setCursor(6,1);
lcd.print(yValue);
lcd.setCursor(12,1);
lcd.print(zValue);
delay(100);

  /* comparing change with predefined limits*/
if(xValue<minVal || xValue>maxVal  || yValue<minVal || yValue>maxVal  ||
zValue<minVal || zValue>maxVal)
  {
if(buz == 0)
start=millis();   // timer start
buz=1;      // buzzer / led flag activated
  }
else if(buz == 1)       // buzzer flag activated then alerting earthquake
  {
lcd.setCursor(0,0);
```

```
``

lcd.print("Earthquake Alert   ");

if(millis()>= start+buzTime)

buz=0;

  }

else

  {

lcd.clear();

lcd.print(" X    Y    Z  ");

  }

digitalWrite(buzzer, buz);    // buzzer on and off command

digitalWrite(led, buz);   // led on and off command

 /*sending values to processing for plot over the graph*/

Serial.print("x=");

Serial.println(xValue);

Serial.print("y=");

Serial.println(yValue);

Serial.print("z=");

Serial.println(zValue);

Serial.println(" $");

}
```

➢ Impact Analysis:-

- Every year more than 100,000 people lose their lives due to Earthquakes. Now imagine if every city and town had an earthquake detector and it would alert the people before an earthquake by detecting the foreshocks we could save so many lives.
- If every town had an earthquake detector we can alert a lot of people to move to safer places whenever there is a possibility of a massive earthquake.

➢ Future Scope :-

We can further improvise this activity to help every citizen of the city by adding a GSMmodule (sim card) which will send alert SMS to all everyone whenever the monitoringdevices detects chances of an Earthquake.

➢ Referrence :-

https://www.google.com/search?q=earthquake+detector+using+arduino+uno&rlz=1C1CHBF_enIN890IN890&oq=earthquake+detector+using+arduino&aqs=chrome.6.69i59l2j0l6.68855j0j7&sourceid=chrome&ie=UTF-8

https://www.google.com/search?q=earthquake+detector+using+arduino+project+report&rlz=1C1CHBF_enIN890IN890&oq=earthquake++detector+using+arduino&aqs=chrome.4.69i59l3j0l5.19223j0j7&sourceid=chrome&ie=UTF-8

"EDUCATION FOR PROPAGATION OF KNOWLEDGE, ACHIEVEMENT AND CULTURE"

SHREE SWAMI VIVEKANAND SHIKSHAN SANSTHA'S

VIVEKANAND COLLEGE ,KOLHAPUR

PROJECT WORK

Entitled

" ARDUINO BASED FINGERPRINT VEHICLE STARTER "

Submitted to

DEPARTMENT OF ELECTRONICS

VIVEKANAND COLLEGE, KOLHAPUR(Autonomous)

By

PRAJJVALI SHAHAJI RANDIVE

BHAGYASHRI MACHINDRA KAMBALE

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PROJECT GUIDE

Dr. G. S. Nhivekar

Department of Electronics
VivekanandCollege,
Kolhapur. (Autonomous)

2019-2020

DEPARTMENT OF ELECTRONICS

CERTIFICATE

This is to certify that Prajjvali Shahaji Randive of the Class **B.Sc. III** has satisfactorily completed the project work on the title "**Fingerprint Based Biometric Ignition System**" as a partial fulfillment of practical course for the award of B.Sc. degree in Electronics by Shivaji University, Kolhapur.

Place: Kolhapur
Date: 28/02/2020

Dr. G. S. Nivhekar	Mr. D. M. Panhalkar	Examiner
(Project Guide)	**(H.O.D)**	

Head
Department of Electronics
Vivekanand College, Kolhapur.

VIVEKANAND COLLEGE ESTD. JUNE 1964 KOLHAPUR

DECLARATION

It is hereby declared that the work reported in the project entitled ""completed and written by us and has not been copied from anywhere.

Place : Kolhapur

Date: 28/02/2020

Sr.No.	Name	Roll No.
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3.	Tanuja Ashok Chougule	8359

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We wish to express my deep sense of gratitude towards Assistant Professor Department Of Electronics ,Vivekanand College, Kolhapur for his valuable guidance to complete this project within time.

It is our proud privilege to expressense of gratitude and sincere thanks to Principal Dr.S.Y.Honagekar & Mr. D.M.Panhalkar, Head of Department of Electronics ,Vivekanand College , Kolhapur for providing all available facilities of college for completion of this project . We are also thankful to Mr.P.R.Bagade,Mr. N.P.Mote, Mr.S.D . Jadhav ,Mr.Dhamnekar& non teaching staff for providing guidance for our project

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3.Tanuja Ashok Chougule	Chougule

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INTRODUCTION

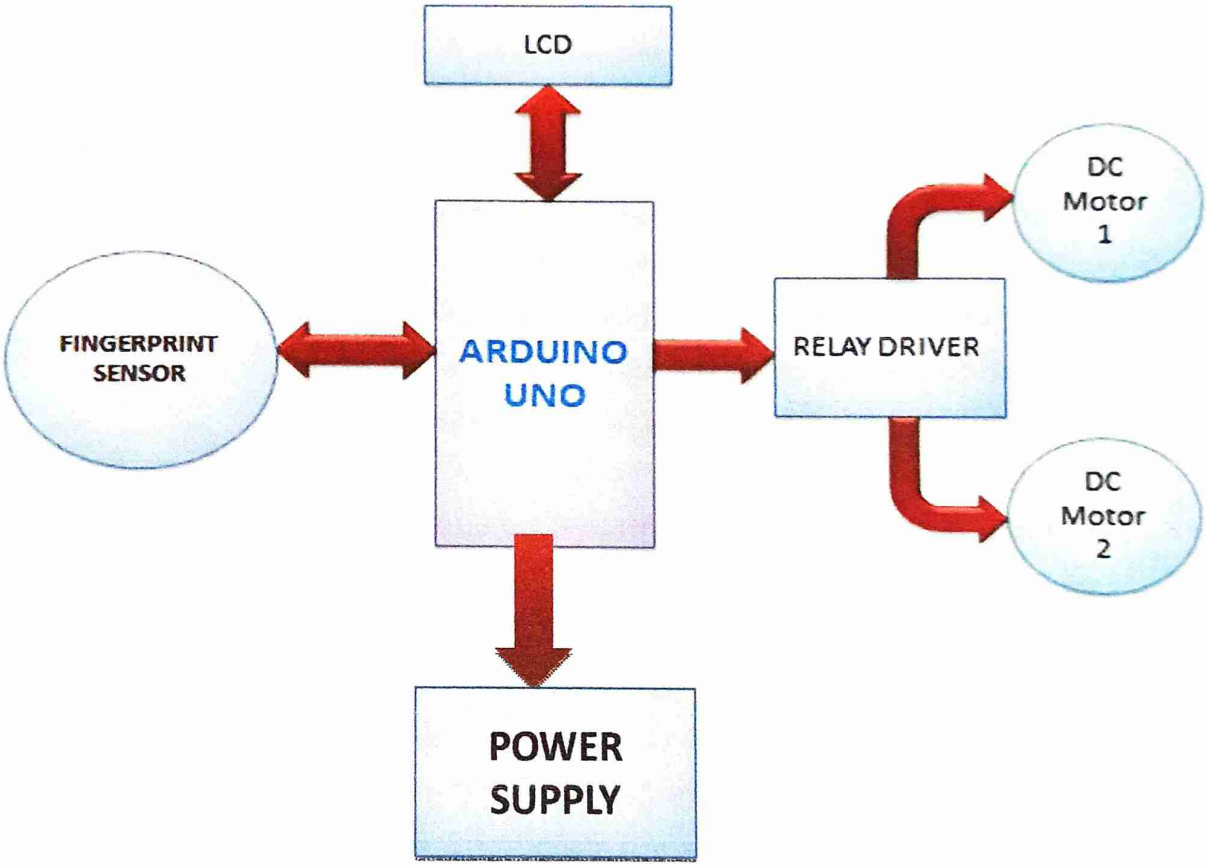
Vehicle security is an important issue these days due to the rising number of vehicle thefts. Also one more issue with vehicles is handling its keys. Keys need to be carried and misplacing keys or loosing them will cause a serious issue. Here we propose a solution to this problem by using a fingerprint authenticated vehicle starter system. The system provides a secure and hassle free way to start/stop vehicle engine.
User just needs to scan finger to start the car, no need to carry any key. The system only allows authorized users to start the vehicle. Users can first register into the system by scanning fingerprints. The system allows multiple users to register as authorized users. When into monitoring mode, the system checks for users to scan. On scanning, the system checks if user is authorized user and starts vehicle for authorized users only. Here we use an atmega 32 microcontroller. The fingerprint sensor is connected to the microcontroller and also we have an LCD display along with push buttons and starter motor. The motor is used to demonstrate as vehicle starter. This system automates as well as vehicle security using fingerprint based system.

Fingerprint recognition technology allows access to only those whose fingerprints that are pre stored in the memory. Stored fingerprints are retained even in the event of complete power failure or battery drain. These eliminates the need for keeping track of keys or remembering a combination password, or PIN. It can only be opened when an authorized user is present, since there are no keys or combinations to be copied or stolen, or locks that can be picked. The fingerprint based lock therefore provides a wonderful solution to conventionally encountered inconveniences. This report focuses on the use of fingerprints to unlock locks, as opposed to the established method of using keys [1].In order to prevent unauthorized access to these devices, passwords and other pattern based authentication method are being used in recent time. However, password-based authentication has an intrinsic weakness in password leakage. While the patterns are easy to steal and reproduce. In this paper, we introduce an implicit authentication approach that enhanced the password pattern with additional security layer .Biometric systems have overtime served as robust security mechanisms in various domains. Fingerprints are the oldest and most widely used form of biometric identification. A critical step in exploring its advantages is to adopt it for

``

use as a form of security in already existing systems, such as vehicles .Vehicle security system has been a topic of great interest over the years due to the increasing vehicle theft cases reported all over the world. Most of the advanced vehicle security systems best suit the four wheelers. As of the security system for two wheelers is concerned, the systems available in market are of no match to the well-equipped thieves. When under attack, these systems can only immobilize the engine and sound a loud alarm. The proposed reliable and robust design of Two Wheeler Vehicle Security System (TWVSS) with features enhancing the security of the vehicle and ensuring the safety of the rider .Fingerprint matching techniques are of two types: graph based and minutiae based.

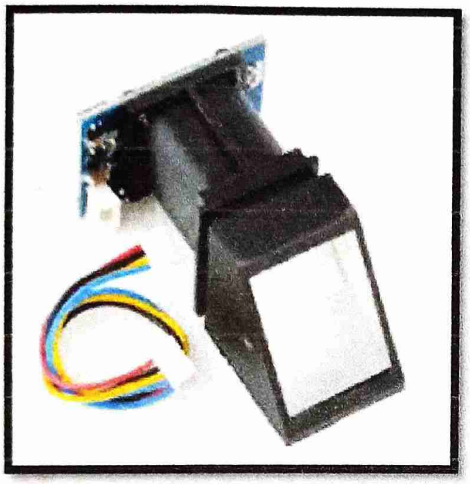
- **Block Diagram**



Working

❖ FINGER PRINT SENSOR

FingerPrint Sensor Secure with biometrics - this all-in-one optical fingerprint sensor will make adding fingerprint detection and verification super simple.



These modules are typically used in safes - there's a high powered DSP chip that does the image rendering, calculation, feature finding and searching. Connect to any International Journal of Pure and Applied Mathematics Special Issue 1755 microcontroller or system with TTL serial, and send packets of data to take photos, detect prints, hash and search. You can also enroll new fingers directly up to 162 finger prints can be stored in the onboard FLASH memory. There's a red LED in the lens that lights up during a photo so you know it's working as shown in fig.2. Figure 3: Hardware Setup for proposed system Fingerprint processing includes two parts: fingerprint enrollment and fingerprint matching (the matching can be 1:1 or 1:N) as shown in fig.3. When enrolling, user needs to enter the finger two times. The system will process the two time finger images, generate a template of the finger based on processing results and store the template. When matching, user enters the finger through optical sensor and system will generate a template of the finger and compare it with templates of the finger library. For 1:1 matching, system will compare the live finger with specifc template designated in the Module; for 1: N matching, or searching, system will search the whole finger library for the matching finger. In both circumstances, system will return the matching result, success or failure. 3. Algorithm of Fingerprint based Vehicle starting system : 1.Start 2. Place a finger and press enter button (top button) to start engine. 3. If finger already stored in the scanner module, start the engine. 4. If not, go back to number 1 and give no output. 5. Press ENTER button (bottom button)

to enter passcode. 6. If passcode matches with saved code in chip's EPROM. Open user admin, activate module to receive finger image data and store it and go to number 7. 7. If passcode entered does not correlate with chip's value in the EPROM, signify wrong passcode and go back to number 4. 8. Navigate through options in user admin to edit passcode and exit interface. 9. Stop

❖ ARDUINO

Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform.

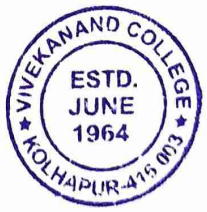
❖ RELAY DRIVER

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solidstate relays. Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations. A type of relay that can handle the high power required to directly control an electric motor or other loads is called a contactor. Solid-state relays control power circuits with no moving parts, instead using a semiconductor device to perform switching. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults; in modern electric power systems these functions are performed by digital instruments still called "protective relays". Magnetic latching relays require one pulse of coil power to move their contacts in one direction, and another, redirected pulse to move them back. Repeated pulses from the same input have no effect. Magnetic latching relays are useful in applications where interrupted power should not be able to transition the contacts. Magnetic latching relays can have either single or dual coils. On a single coil device, the relay will operate in one direction when power is applied with one polarity, and will reset when the polarity is reversed. On a dual coil device, when polarized voltage is applied to the reset coil the contacts will transition. AC controlled magnetic latch relays have single coils that employ steering diodes to differentiate between operate and reset commands. It was used in

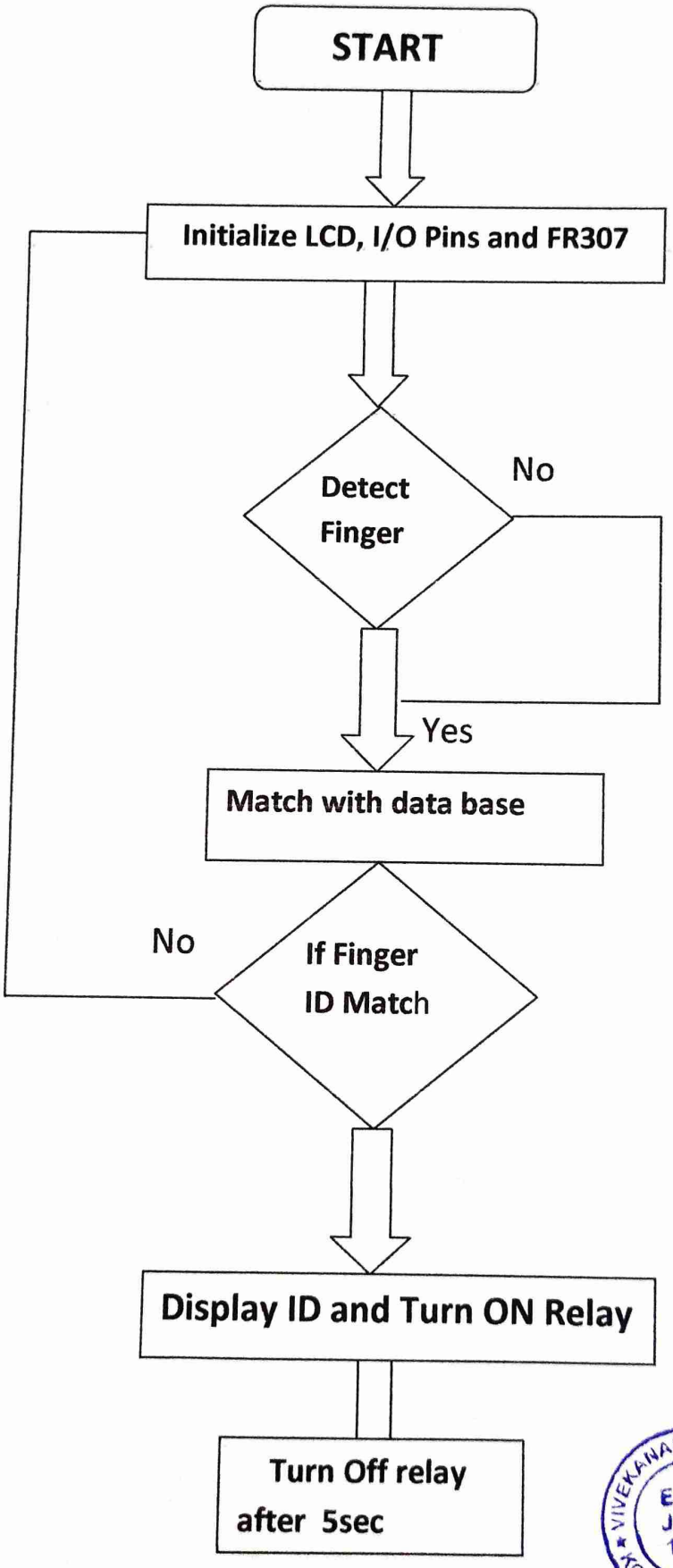
long distance telegraph circuits, repeating the signal coming in from one circuit and re-transmitting it to another.

❖ DC MOTOR

- A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current in part of the motor.
- DC motors were the first form of motor widely used, as they could be powered from existing direct-current lighting power distribution systems.



FLOW CHART



❖ SOFTWARE / Code

```
#include <LiquidCrystal.h>


// initialize the library with the numbers of the interface pins
LiquidCrystal lcd(12, 11, 7, 6, 5, 4);


#include <Adafruit_Fingerprint.h>
#include <SoftwareSerial.h>


int getFingerprintIDez();
SoftwareSerial mySerial(2, 3);// tx, rx



Adafruit_Fingerprint finger = Adafruit_Fingerprint(&mySerial);



void doorOpen()
{
 lcd.clear();
 lcd.print("WELOME");
 if(finger.fingerID==1)
 {
 Serial.println("Welcome DR");//i enroled ID no 1 as Nidhi'sfingerprint, so used this line to display corresponding name


 lcd.setCursor(0, 1);
 lcd.print("DR");
 digitalWrite(8,HIGH);
 delay(3000);
 lcd.clear();
```

```
}
if(finger.fingerID==3)
{
  Serial.println("Welcome Tanuja");// i enroled ID no 1 as Cinla's fingerprint, so used this line to display corresponding name
   lcd.setCursor(0, 1);
 lcd.print("Tanuja");
 digitalWrite(8,HIGH);
 delay(3000);
 lcd.clear();
                    // more number of user can be add hear
 }
  if(finger.fingerID==5)
 {
   Serial.println("Welcome Bhagyashri");// i enroled ID no 1 as Cinla's fingerprint, so used this line to display corresponding name

 lcd.setCursor(0, 1);
 lcd.print("Bhagyashri");
 digitalWrite(8,HIGH);
 delay(3000);
 lcd.clear();
                    // more number of user can be add hear
 }
    if(finger.fingerID==6)
 {
   Serial.println("Welcome Prajvali");// i enroled ID no 1 as Cinla's fingerprint, so used this line to display corresponding name

 lcd.setCursor(0, 1);
 lcd.print("Prajvali");
 digitalWrite(8,HIGH);
```

```
``

  delay(3000);
  lcd.clear();
                    // more number of user can be add hear
  }
}


void doorClose()
{
  digitalWrite(8,LOW);
  lcd.print("No valid finger");
  lcd.setCursor(0, 1);
  lcd.print("on the sensor");
  lcd.clear();

}




void setup()
{

 int  lcdc = 9;   // potentiometer connected to analog pin 3
 pinMode(lcdc, OUTPUT);  // sets the pin as output
 analogWrite(lcdc, 50);
lcd.begin(16, 2);
Serial.begin(9600);
Serial.println("fingertest");
finger.begin(57600);
```

```
  pinMode(8,OUTPUT);//Pin connectet to relay

  if (finger.verifyPassword())
  {
    Serial.println("Found fingerprint sensor!");
    lcd.print("Found Sensor");
    lcd.clear();
  } else {
    Serial.println("Did not find fingerprint sensor :(");
    lcd.print("Sensor not Found");
    lcd.clear();
    while (1);
  }
  Serial.println("No valid finger found,waiting for valid finger...");
  lcd.print("No valid finger");
  lcd.setCursor(0, 1);
  lcd.print("on the sensor");
  lcd.clear();
  }


 void loop()                    // run over and over again
{

 if(getFingerprintIDez()>=0)
 {
     doorOpen();
     delay(5000);
     doorClose();
```

```
``

  }
  else
  { uint8_t p = finger.getImage();
   switch (p)
  {

    case FINGERPRINT_NOFINGER:
      Serial.println("No finger detected");
      lcd.clear();
      lcd.setCursor(0, 1);
       lcd.print("No finger detected");

      return p;
    }
     p = finger.fingerFastSearch();
  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");
   lcd.clear();
    lcd.setCursor(0, 0);
     lcd.print(" No Match ");

  return p;
 } else {
  Serial.println("Unknown error");
```

```
`
    return p;
  }
  }

}
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;
}

// OK converted!
p = finger.fingerFastSearch();
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");
    lcd.setCursor(0, 1);
      lcd.print(" No Matach ");
      //lcd.clear();
    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);
}

// 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;
}
```

❖ ADVANTAGES

- ❖ Easy to use
- ❖ Less Memory Space
- ❖ Economical biometric technology Processing speed is fast
- ❖ Highly secure than other security systems.
- ❖ Highly reliable

❖ FUTURE SCOPE

1. We can use this type of Access control system in many area such as bank locker system, car ignition, punch card system, electronic safe for vehicles, to secure some important section in company
2. This project has many of the future scopes for developing very high security systems.) & also in government office, etc.
3. It also includes the security of the entries and also backup its.) As an output of this system we can access the attendance of the workers/students in easy manner)

❖ OUTCOMES

➢ _ Other system are more cumbersome while our project has an additional feature that it has non-volatile memory, it will have all data secured so we does not required to enter whole data again .When an unauthorized person tries to clock in more times then it will not block the whole system but rather it will be off for some time .