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A project Report

on

**“Modern door opening system using
Arduino UNO R3”**

Bachelor of Engineering

in

Electronics & Communication Engineering

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DEPARTMENT OF ELECTRONICS & COMMUNICATIONENGINEERING

(BE (E&C) Program Accredited by NBA, New Delhi, Validity 01.07.2017 to30.06.2020)

GSSS INSTITUTE OF ENGINEERING & TECHNOLOGY FOR WOMEN

(Affiliated to VTU, Belagavi, Approved by AICTE, New Delhi & Govt. of Karnataka)

K.R.S ROAD, METAGALLI, MYSURU-570016, KARNATAKA

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Geetha ShishuShikshanaSangha(R)

GSSS INSTITUTE OF ENGINEERING & TECHNOLOGY FOR WOMEN

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CERTIFICATE

Certified that the 5thSemester Project titled “**Modern door opening system using Arduino UNO R3**” is a bonafidework carried out by **Bhavyashree M (4GW18EC014), Dhanya Patel C G (4GW18EC025), Diya santhosh(4GW18EC026)** studentof **Bachelor of Engineering in Electronics & Communication Engineering** of the Visvesvaraya Technological University, Belagavi, during the year 2020-21.

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Signature of the Principal

(Dr. Shivakumar M)

ACKNOWLEDGEMENT

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**Bhavyashree M
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ABSTRACT

The need of safety can be achieved by making locks which can be electrical or mechanical with one or a few keys, but for locking into a big area many locks are required. Doors locked using conventional locks are not as safe as they used to be, anyone can break in by breaking these locks. Also everyone knows old fashioned locks are heavy weight and fragile also depending on the tools therefore electronic locks are given more value than those of mechanical locks. Nowadays every device's operation is based on digital technology. For example, technologybased identity devices are used for automatic door unlocking or locking. These locking systems are used to control the movement of door and are functional without requiring a key to lock or unlock the doorpassword based door locking system allows only approved persons to access in restricted area. These locking systems are controlled by a keypad and are installed at the side hedge of the door.

The system is fully controlled by Arduino. The main objective of this project is to give safety at every common places like home, public places. In this user would give a known password. The information will be stored in database. When the correct passcode will be entered, Arduino will give instruction to servo motor. Servo motor will perform the action on door unlocking. Thus, what we want is a digital technology to construct an integrated and well customized safety system at a price which is affordable.

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Chapter 1

INTRODUCTION

Password based door locking system provides security for homes through a security password which is confidential for the user alone. The user will need to enter a password to unlock the door. Password Based Door Lock System is designed using ARDUINO UNO where in once the correct code or password is entered, the door is opened and the concerned person is allowed access to the secured area. Password Based Door Lock System using Arduino UNO is a simple project where a secure password will act as a door unlocking system. Old fashioned lock systems use mechanical locking and these can be replaced by new advanced techniques of locking systems. These methods are a combination of mechanical and electronic devices and are highly intelligent. One of the distinct features of these intelligent lock systems is their simplicity and high efficiency. Such an automated lock system consists of electronic control assembly, which controls the output load through a password. The example of this output load can be a motor or a lamp or any other mechanical/electrical load. Here, we made an electronic code lock system using Arduino UNO, which provides control to the actuating the load. It is a simple embedded system with takes input from the keyboard and the output being actuated accordingly.

This system demonstrates a Password based Door Lock System using Arduino UNO, wherein once the correct code or password is entered, the door is opened and the concerned person is allowed access to the secured area. If another person arrives, it will ask to enter the password again. If the password is wrong, then door would remain locked, denying access to the person. Main idea behind this project is of a door-latch opening using a password entered through keypad. The main component in the circuit is Arduino UNO which is basically used to send a text message to owner of the house about the breach of security. 4*4 keypad is used to enter the password. The entered password is compared with the known password. If it is correct password, the system opens the door by servo motor and displays “ACCESS GRANTED WELCOME” the status of door on LCD. If the password is wrong then door remains closed and displays “CODE INCORRECT GET AWAY” on LCD.

Chapter 2

METHODOLOGY

DETAILS OF PROJECT

2.1 List of Components:

1. Arduino Uno R3
2. 16 x 3 LCD (Liquid Crystals Display)
3. 4 x 3 Matrix Keypad for Arduino
4. Servo motor
5. Additional components for power supply 1Amp 5 Volt and Ground
6. Proteus Design Suite

2.2 Code for Modern Door Opening system using Arduino

UNO R3

```
#include <LiquidCrystal.h>
#include <Servo.h>
#include <Keypad.h>

Servo myservo;
int pos=0; // position of servo motor
LiquidCrystal lcd(A4, A5, A3, A2, A1, A0);
const byte rows=4;
const byte cols=3;

char key[rows][cols]={
  {'1','2','3'},
  {'4','5','6'},
  {'7','8','9'},
  {'*','0','#'}
};

byte rowPins[rows]={0,1,2,3};
byte colPins[cols]={4,5,6};
Keypad keypad= Keypad(makeKeymap(key),rowPins,colPins,rows,cols);
char* password="0123";
int currentposition=0;

void setup()
{

  lcd.displayScreen();
  //Serial.begin(9600);
  myservo.attach(9); //Servo motor connection

  lcd.begin(16,2);

}
```

```
void loop()
{
  if( currentposition==0)
  {
    displayscreen();

  }
  int l ;
  char code=keypad.getKey();
  if(code!=NO_KEY)
  {
    lcd.clear();
    lcd.setCursor(0,0);
    lcd.print("PASSWORD:");
    lcd.setCursor(7,1);
    lcd.print(" ");
    lcd.setCursor(7,1);
    for(l=0;l<=currentposition;++l)
    {

      lcd.print("*");
      //keypress();
    }

    if (code==password[currentposition])
    {
      ++currentposition;
      if(currentposition==4)
      {

        unlockdoor();
        currentposition=0;

      }
    }
  }
}
```

```
}  
else  
{  
incorrect();  
currentposition=0;  
  
}  
}  
}  
  
//----- Function 1- OPEN THE DOOR-----//  
  
void unlockdoor()  
{  
delay(900);  
  
lcd.setCursor(0,0);  
lcd.println(" ");  
lcd.setCursor(1,0);  
lcd.print("Access Granted");  
lcd.setCursor(4,1);  
lcd.println("WELCOME!!");  
lcd.setCursor(15,1);  
lcd.println(" ");  
lcd.setCursor(16,1);  
lcd.println(" ");  
lcd.setCursor(14,1);  
lcd.println(" ");  
lcd.setCursor(13,1);  
lcd.println(" ");  
  
for(pos = 180; pos>=0; pos-=5) // open the door  
{  
myservo.write(pos);  
delay(5);
```

```
}delay(2000);

delay(1000);
counterbeep();

delay(1000);

for(pos = 0; pos <= 180; pos +=5) // close the door
{ // in steps of 1 degree
myservo.write(pos);
delay(15);

currentposition=0;

lcd.clear();
displayscreen();

}

}

//-----Function 2- Wrong code-----//

void incorrect()
{
delay(500);
lcd.clear();
lcd.setCursor(1,0);
lcd.print("CODE");
lcd.setCursor(6,0);
lcd.print("INCORRECT");
lcd.setCursor(15,1);
lcd.println(" ");
lcd.setCursor(4,1);
lcd.println("GET AWAY!!!");
```

```
lcd.setCursor(13,1);  
lcd.println(" ");  
Serial.println("CODE INCORRECT YOU ARE UNAUTHORIZED");
```

```
delay(3000);  
lcd.clear();  
displayscreen();  
}  
//-----Function 3 - CLEAR THE SCREEN-----/
```

```
void clearscreen()  
{  
  lcd.setCursor(0,0);  
  lcd.println(" ");  
  lcd.setCursor(0,1);  
  lcd.println(" ");  
  lcd.setCursor(0,2);  
  lcd.println(" ");  
  lcd.setCursor(0,3);  
  lcd.println(" ");  
}
```

```
//-----Function 4 - DISPLAY FUNCTION-----//
```

```
void displayscreen()  
{  
  
  lcd.setCursor(0,0);  
  lcd.println("*ENTER THE CODE*");  
  lcd.setCursor(1,1);  
  
  lcd.println("TO OPEN DOOR!!");  
}
```

```
//-----Function 5 - Count down-----//
```

```
void counterbeep()
```

```
{delay(1200);  
lcd.clear();  
lcd.setCursor(2,15);  
lcd.println(" ");  
  
lcd.setCursor(2,14);  
lcd.println(" ");  
lcd.setCursor(2,0);  
delay(200);  
lcd.println("GET IN WITHIN::");  
  
lcd.setCursor(4,1);  
lcd.print("5");  
delay(200);  
lcd.clear();  
lcd.setCursor(2,0);  
lcd.println("GET IN WITHIN:");  
delay(1000);  
lcd.setCursor(2,0);  
lcd.println("GET IN WITHIN:");  
lcd.setCursor(4,1); //2  
lcd.print("4");  
delay(100);  
lcd.clear();  
lcd.setCursor(2,0);  
lcd.println("GET IN WITHIN:");  
delay(1000);  
  
lcd.setCursor(2,0);  
lcd.println("GET IN WITHIN:");  
lcd.setCursor(4,1);  
lcd.print("3");  
delay(100);  
lcd.clear();  
lcd.setCursor(2,0);  
lcd.println("GET IN WITHIN:");
```

```
delay(1000);
lcd.setCursor(2,0);
lcd.println("GET IN WITHIN:");
lcd.setCursor(4,1);
lcd.print("2");
delay(100);
lcd.clear();
lcd.setCursor(2,0);
lcd.println("GET IN WITHIN:");
delay(1000);
lcd.setCursor(4,1);
lcd.print("1");
delay(100);
lcd.clear();
lcd.setCursor(2,0);
lcd.println("GET IN WITHIN::");
delay(1000);
delay(40);
lcd.clear();
lcd.setCursor(2,0);
lcd.print("RE-LOCKING");
delay(500);
lcd.setCursor(12,0);
lcd.print(".");
delay(500);
lcd.setCursor(13,0);
lcd.print(".");
delay(500);
lcd.setCursor(14,0);
lcd.print(".");
delay(400);
lcd.clear();
lcd.setCursor(4,0);
lcd.print("LOCKED!");
delay(440);
}
```

Chapter 3

CIRCUIT DIAGRAM

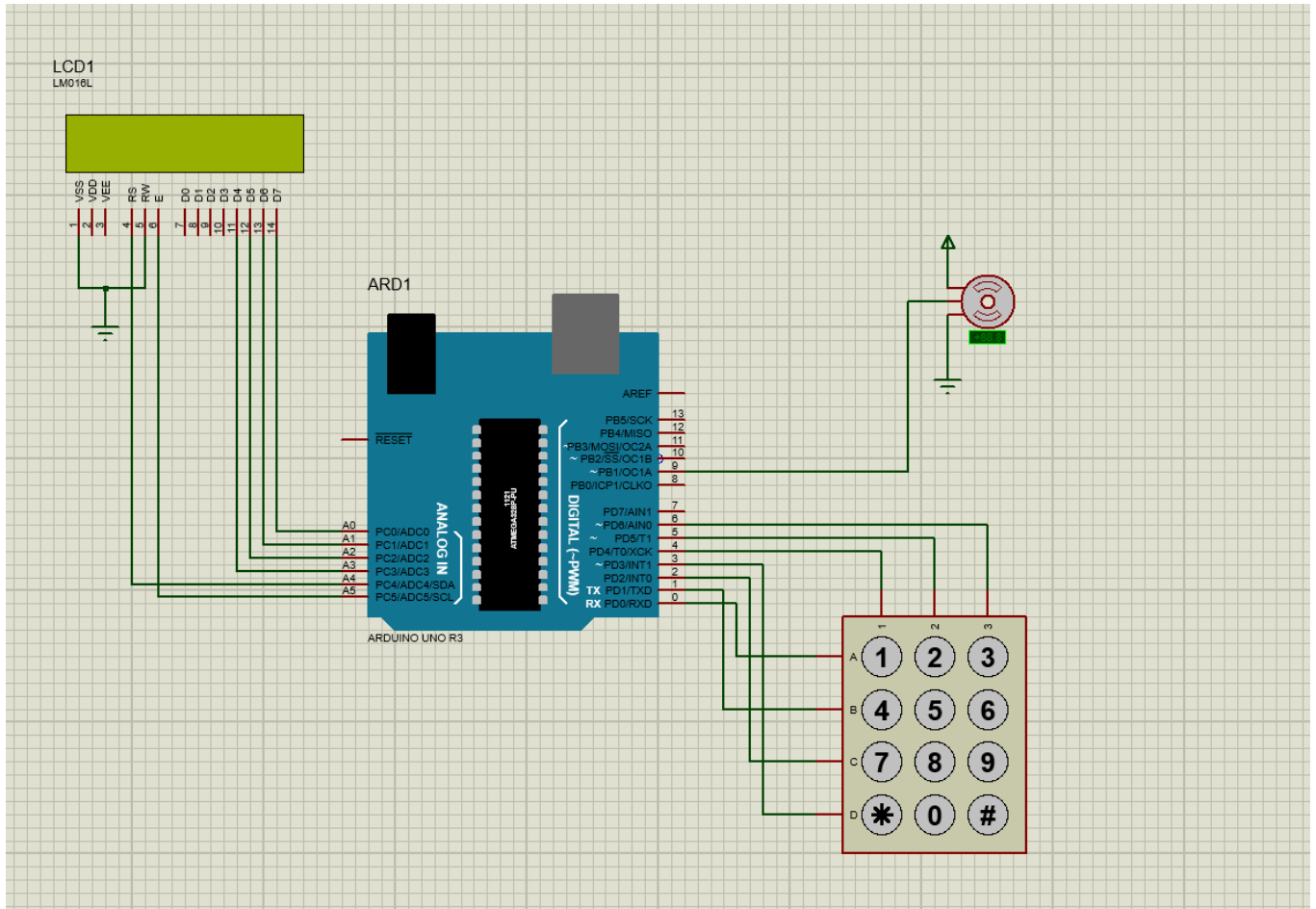


Fig 1: Circuit Diagram of Modern Door opening system using Arduino UNO R3

The circuit above shows the design of Modern Door Locking system. The components used are Arduino UNO R3, 4X3 matrix keypad, Servo motor, LCD display. The Arduino board is connected to an LCD and a servo motor. The servo motor is used to push (lock) or pull (unlock) the latch on the door. A 16 x 2 LCD is required to display the message by Arduino. Here we connect the servo motor with Arduino Digital pin D9 and with a 5volt power supply. This servo motor has a total of 3 input lines (GND, +5V & SIGNAL LINE). A 4 x 3 matrix keypad is used. The keypad is required for password input and to manually lock the customized door locker. It consists of 12 keys (soft

R3

switch) 3 keys in Rows (A, B, C, D) and 4 keys in

Columns (1, 2, 3). When a key is pressed, it establishes a connection in between the corresponding rows and columns. Once the circuit is done, the LCD displays the message as follow

“ *ENTER THE CODE* TO OPEN DOOR!!” . If the password typed in is incorrect the system stops one from typing further and displays the message “CODE INCORRECT. GETAWAY!” . The motor does not rotate to open the door. If the password typed in is correct, the servo motor starts rotating in the anti clock-wise direction and the LCD displays the message “Access Granted WELCOME!”. After this the LCD displays the message “GET IN WITHIN:” and starts the countdown for 5 seconds. Once the five seconds are up, the message “RE-LOCKING” is displayed and the servo motor starts rotating in the clock-wise direction this time thereby locking the door. The LCD now displays the message “LOCKED!”.

Advantages and Limitations of using Modern Door Locking system.

Advantages:

1. This project provides security.
2. Power consumption is less.
3. Used commonly available components.
4. Project is simple and easy.

Limitations:

1. It is a low range circuit, i.e. it is not possible to operate the circuit remotely.
2. If you forget the password it is not possible to open the door.

Chapter 4

SOFTWARE AND COMPONENT DESCRIPTION

4.1 ARDUINO UNO:

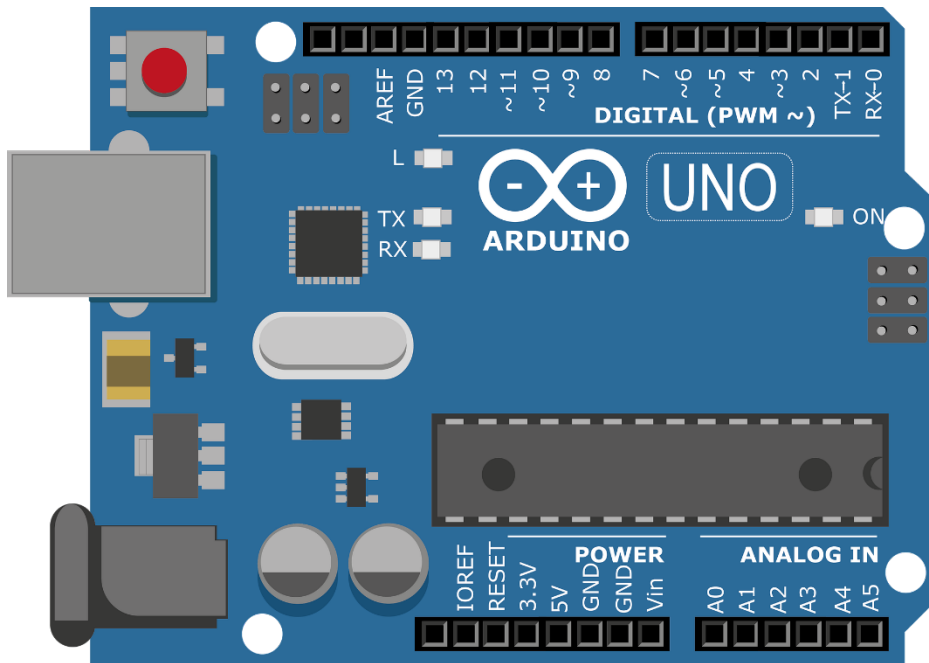


Fig2: Aurdino UNO board

Arduino UNO is microcontroller board based on the ATmega328p. It has 14 digital input/output pins (of which 6 can be used as PWM output), 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. We can connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

Arduino is an open source electronic platform based on easy to use hardware and software. Arduino boards are able to read inputs- light on a sensor, a finger on a button, or a twitter message and turn it into an output- activating a motor turning on LED.

Arduino simplifies the process of working with microcontrollers, but it offers some advantages for teachers, students, and interested amateurs over other systems:

- Inexpensive-Arduino boards are relatively inexpensive compared to other microcontroller platforms. The least expensive version of the Arduino module can be assembled by hand and even the pre-assembled Arduino modules cost less than 50 dollar.
- Cross-platform-The Arduino software runs on Windows, Macintosh OSX, and Linux operating systems. Most microcontroller systems are limited to windows.
- Simple, clear programming environment- The Arduino software (IDE) is easy to use for beginners, yet flexible enough for advance users to take advantages of as well.
- Open source and extensible hardware- The plans of the Arduino boards are published under a Creative Common license, so experienced circuit designers can make their own version of the module, extending it

and improving it. Even relatively inexperienced users can build the breadboard versions of the module in order to understand how to work and save money.

Open source and extensible software- The Arduino software is published as open source tools, available for extension by experienced programmers. The language can be expanded through C++ libraries, and people wanting to understand the technical details can make the leap from Arduino to the AVR C programming language on which it is based. Similarly, you can add AVR C code directly into your Arduino programs if you want to.

4.1.1 Arduino Software:

The Arduino integrated development environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in the programming language Java.

It is used to write and upload programs to Arduino compatible boards, but also, with the help of 3rd party cores, other vendor development boards.

The source code for the IDE is released under the GNU General Public License, version 2. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiringproject, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub `main()` into an executable cyclic executive program with the GNU toolchain, also included with the IDE distribution. The Arduino IDE employs the program `avrdude` to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware.

4.2 PROTEUS DESIGN SUITE:

The Proteus Design Suite is a Windows application for schematic capture, simulation, and PCB (Printed Circuit Board) layout design. It can be purchased in many configurations, depending on the size of designs being produced and the requirements for microcontroller simulation. All PCB Design products include an autorouter and basic mixed mode SPICE simulation capabilities.

4.2.2 Microcontroller Simulation:

The micro-controller simulation in Proteus works by applying either a hex file or a debug file to the microcontroller part on the schematic. It is then co-simulated along with any analog and digital electronics connected to it. This enables its use in a broad spectrum of project prototyping in areas such as motor control, temperature control and user interface design. It also finds use in the general hobbyist community and, since no hardware is required, is convenient to use as a training or teaching tool.

The PCB Layout module is automatically given connectivity information in the form of a netlist from the schematic capture module. It applies this information, together with the user specified design rules and various design automation tools, to assist with error free board design. PCB's of up to 16 copper layers can be produced with design size limited by product configuration.

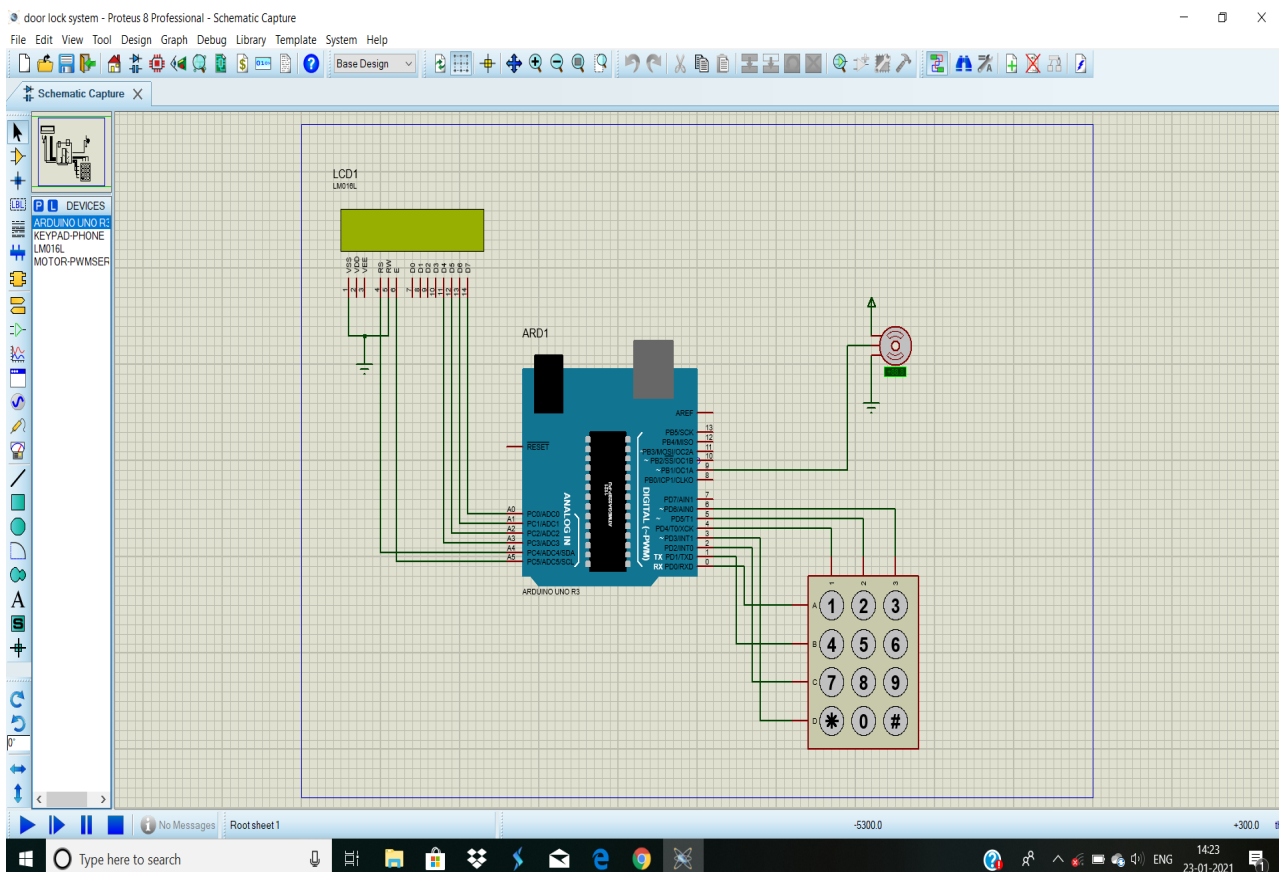
Chapter 5

RESULTS & CONCLUSION

This chapter includes results of the project, the conclusion and how the project can be improved for future work

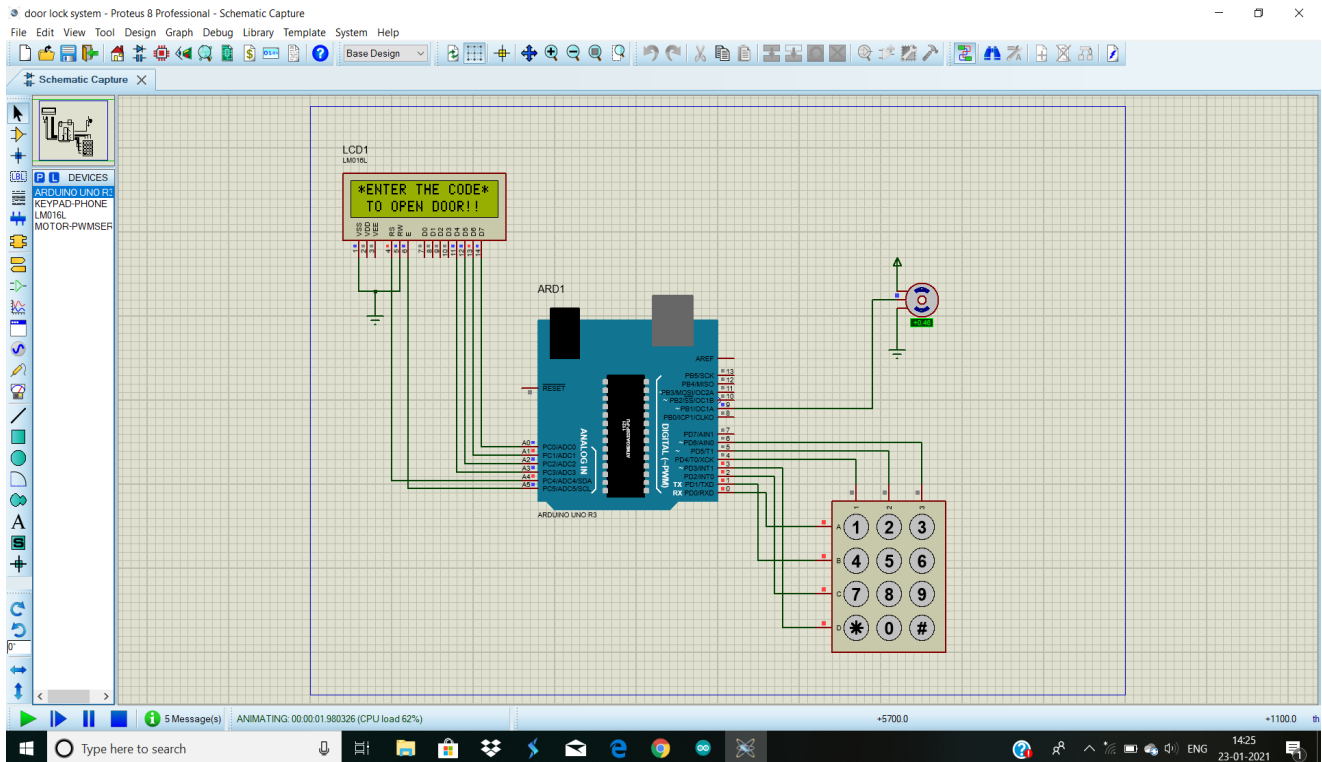
5.1 RESULTS

Step 1: Open the circuit designed in the proteus 8 professional software ,click on the play button on the bottom left to start simulation.



Snapshot 5.1 Circuit designed in the Proteus software

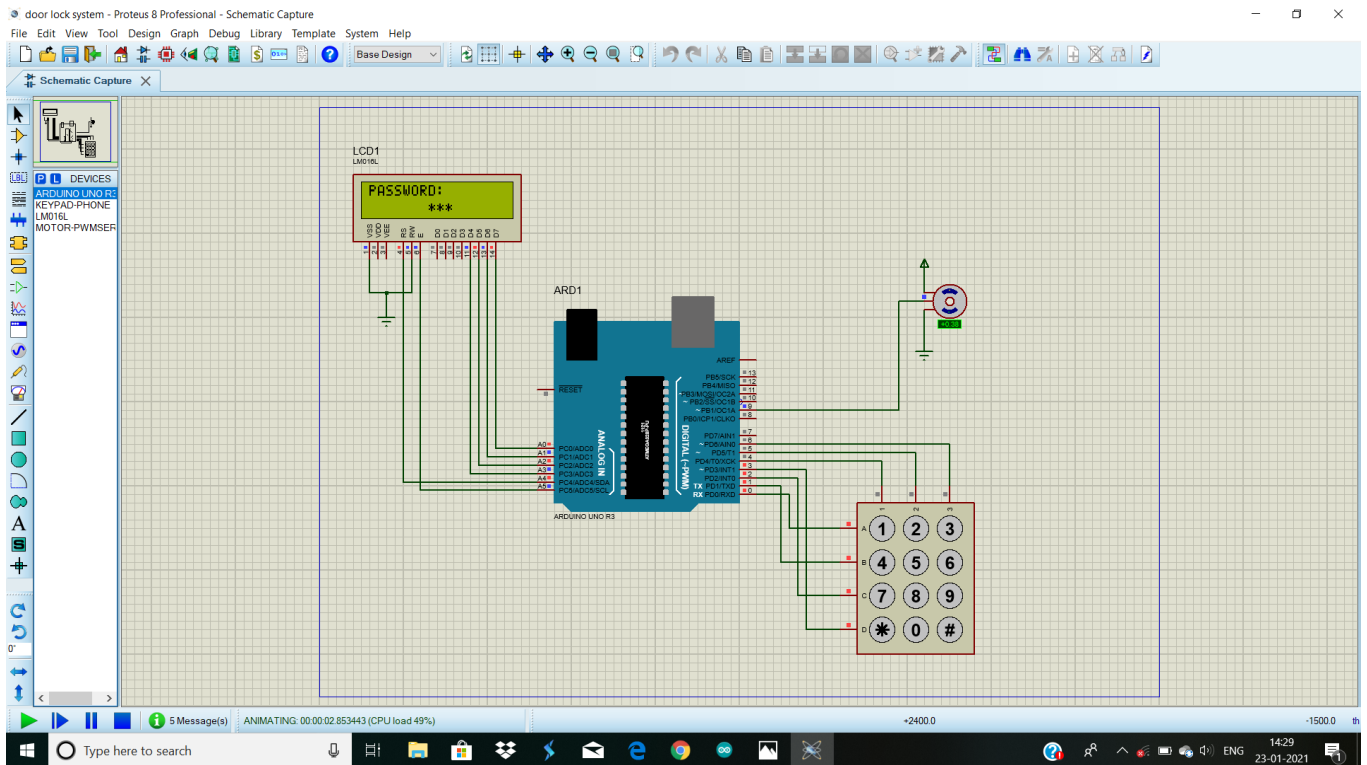
Step 2: Once the play button is pressed , LCD displays the message as shown in fig 5.2 i.e.,asking the user to enter password.



Snapshot 5.2 LCD displaying the message

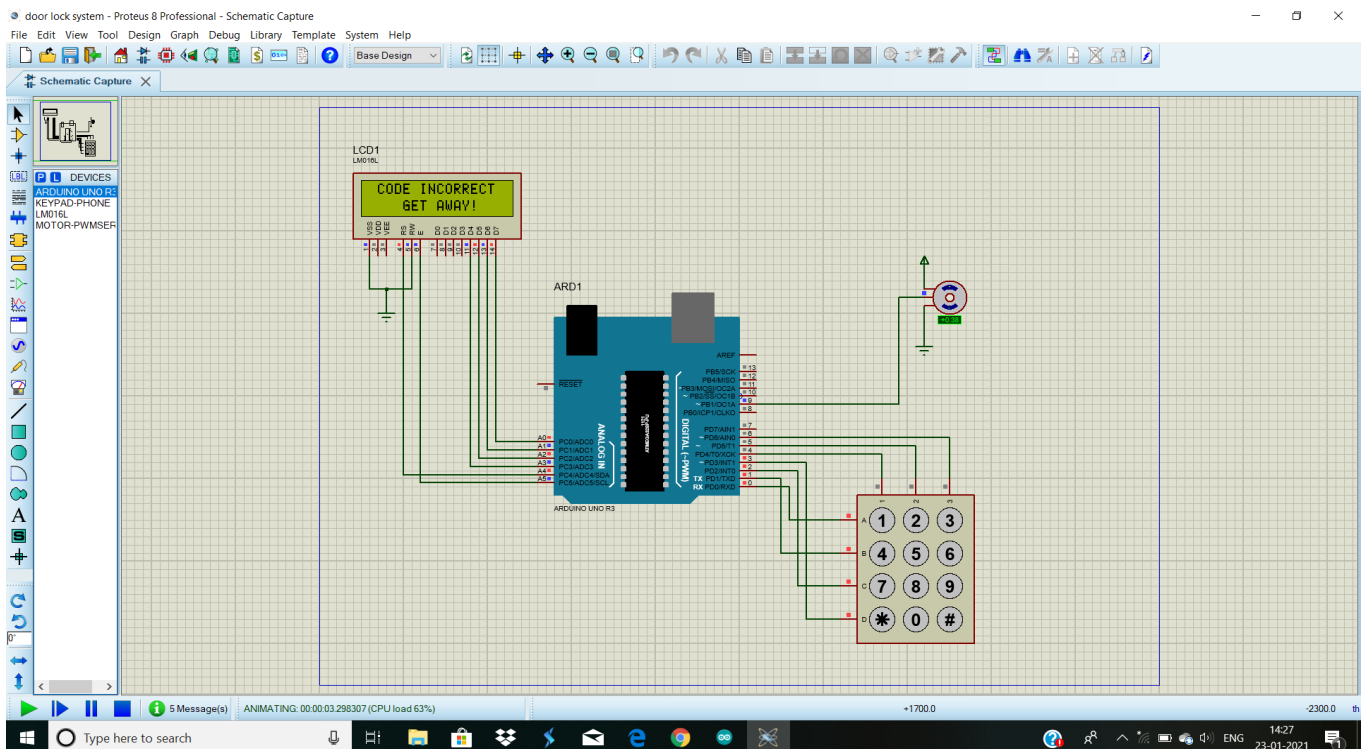
Step 3:The entered password digit is displayed in * to hide the digit as shown in below fig 5.3 .

Modern door opening system using Arduino UNO R3



Snapshot 5.3 LCD displaying Password entered

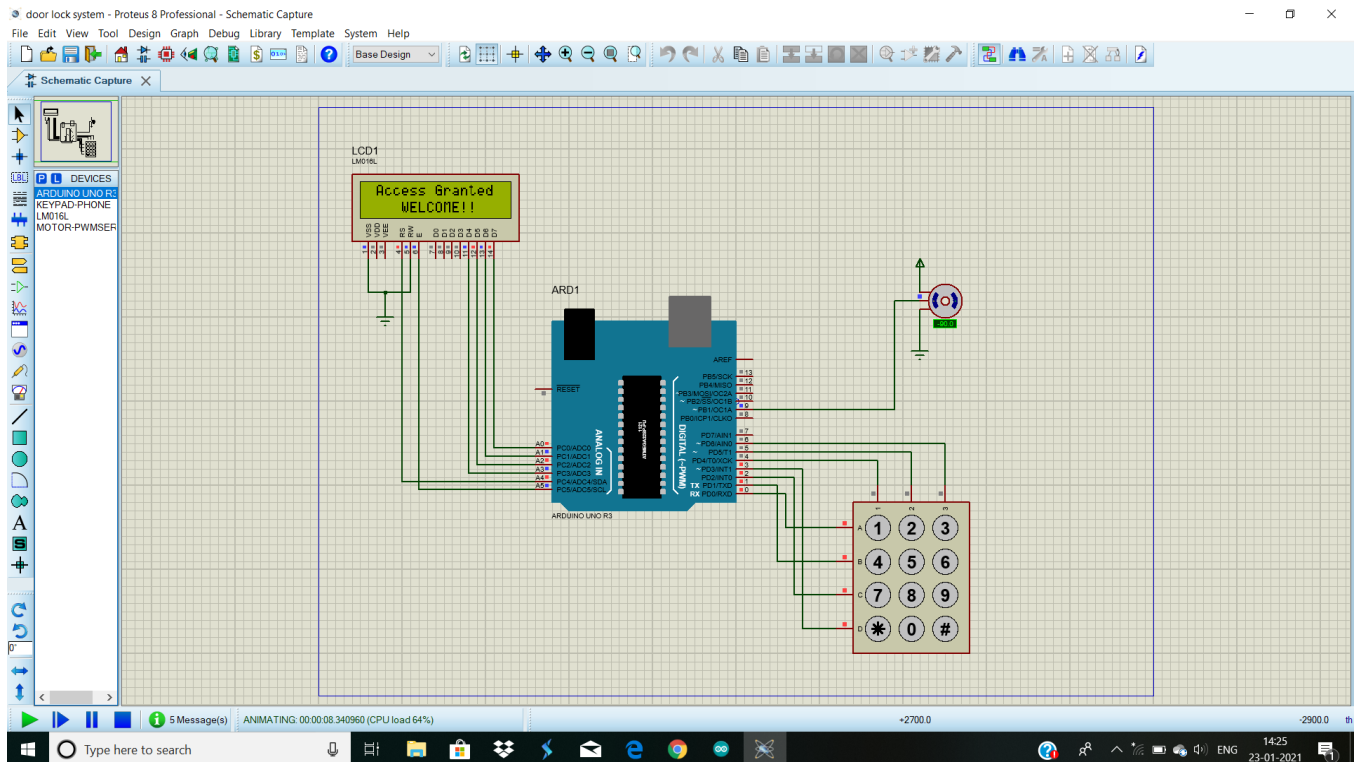
If the entered code/password doesnot match with the actual code mentioned in the program ,the LCD displays the message as shown in fig 5.4 below.



Modern door opening system using Arduino UNO R3

Snapshot 5.4 LCD displaying code incorrect message

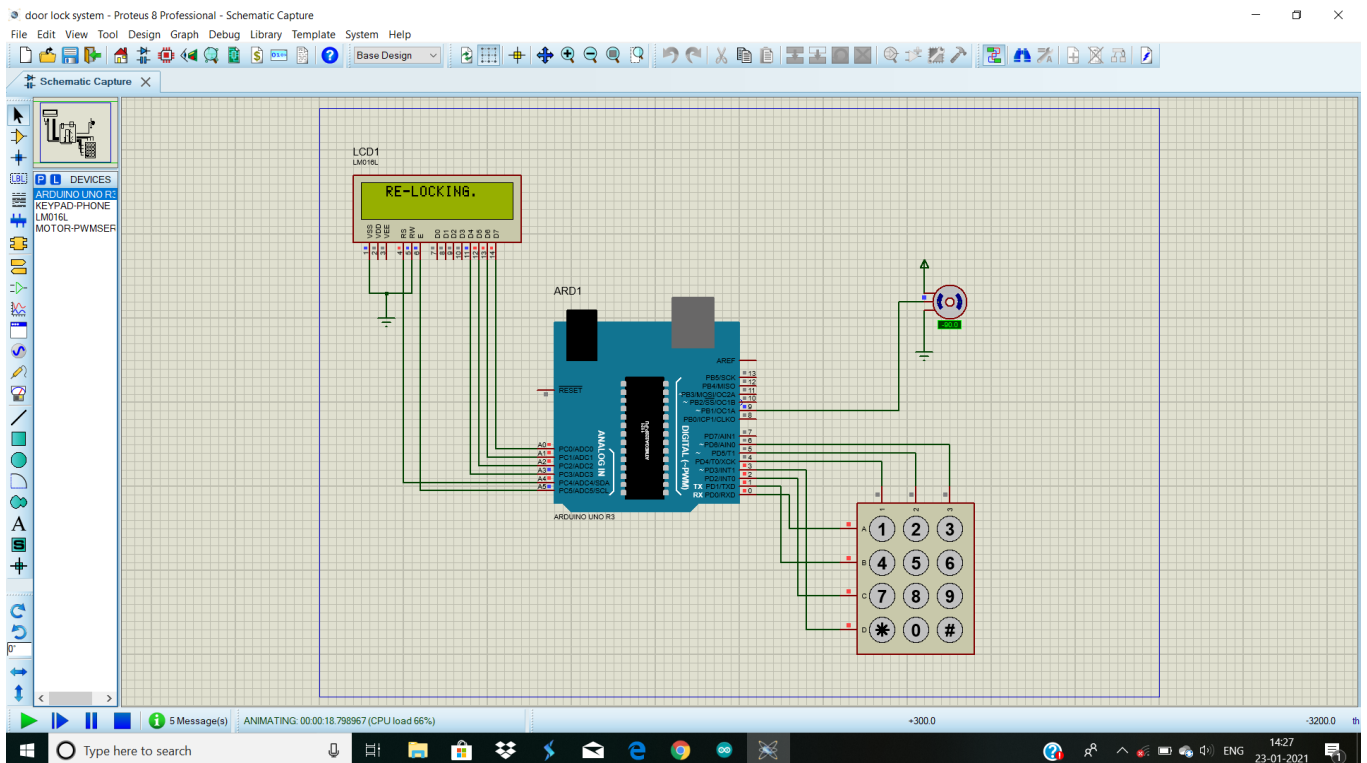
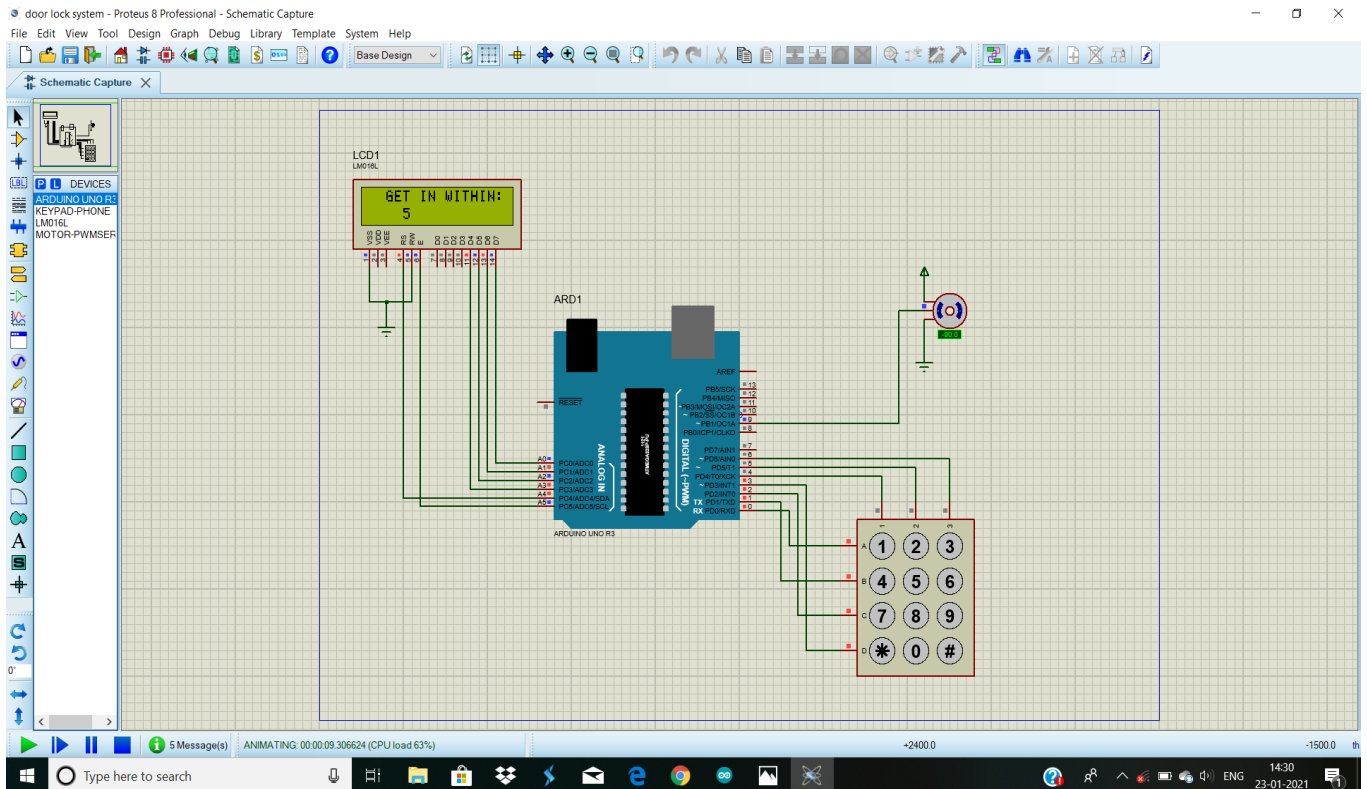
Step4: If the entered code matches with the actual code given in the program, then the servo motor rotates anticlockwise to open the door and LCD displays message as shown in fig 5.5 below.



Snapshot 5.5 LCD displaying WELCOME message

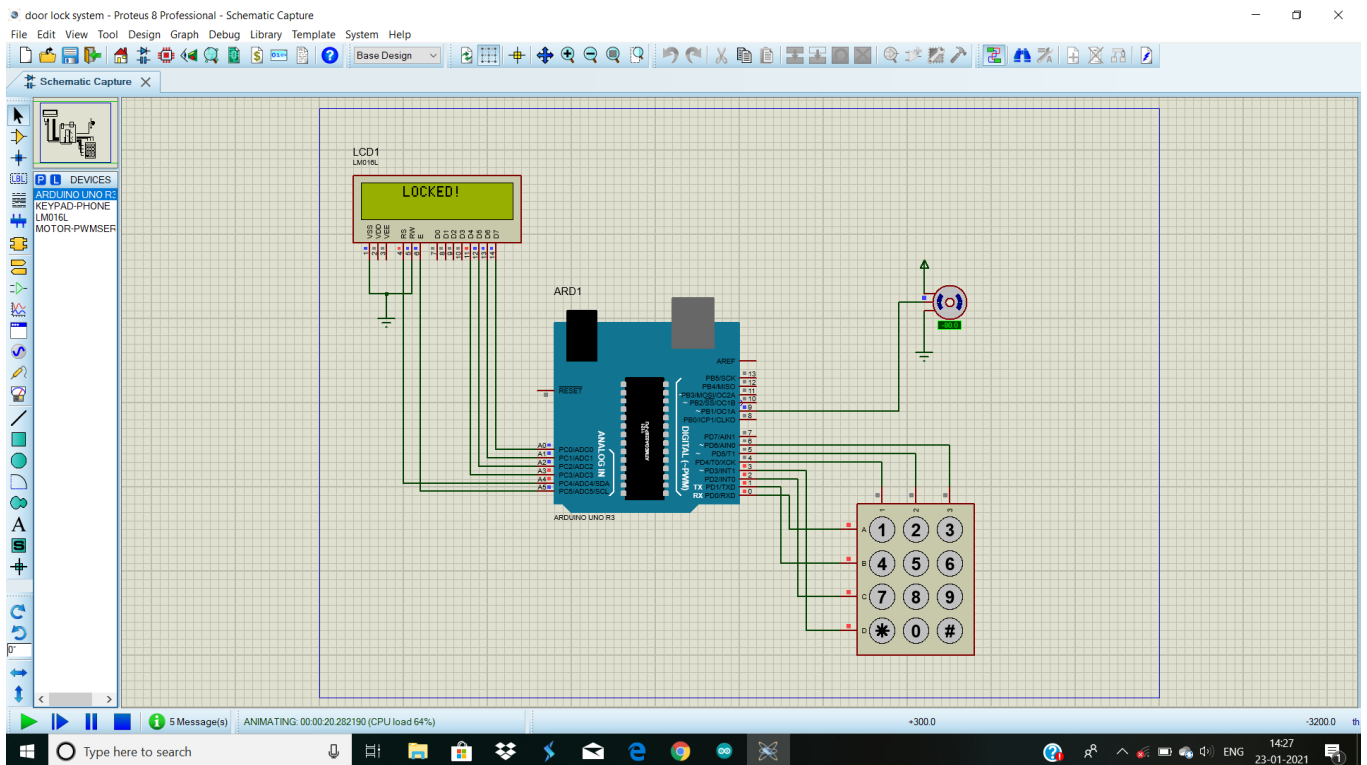
Modern door opening system using Arduino UNO R3

Step 5: After waiting for 5 seconds the door relocks by rotating the servo motor clockwise, thus the LCD displays the message as shown in fig 5.6 ,fig 5.7& fig5.8.

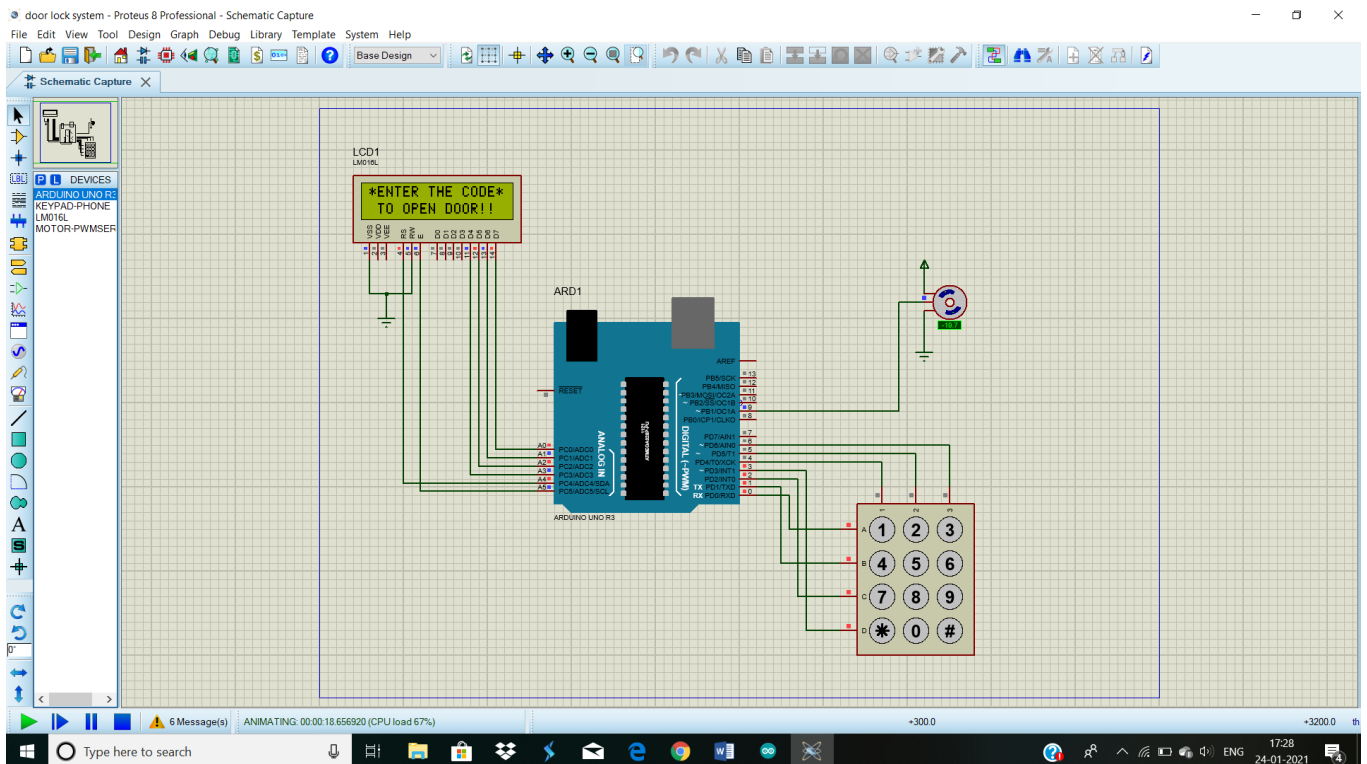


Snapshot 5.6 LCD displaying re-locking of door

Modern door opening system using Arduino UNO R3



Snapshot 5.7 LCD displaying locked message



Snapshot 5.8 Servo motor rotating clockwise

5.2 CONCLUSION

Modern door opening/lockingsystem is used in the place where we need more security.It can also be used to secure lockers and other protective doors. The system comprises a number keypad and keypad is connected to Arduino UNO R3 .Thearduino continuously monitors the keypad and if somebody enters the password it will check the entered password with the password which was stored in the memory and if they are same ,itopens the door.

The system allows the person who knows the password and doesnot allow the person who don't know the password.

Thus this project is productive in providing enough security as long as the password is not shared. In future this can be provided maximum security by the above enhancements in order to completely satisfy the user's needs.Hence ,a common man can afford to buy such locking system in minimal cost to keep his valuables safely without any worries.

5.3 FUTURESCOPE

The security level can be increased by adding a biometric fingerprint scanner. We can interface sensors like fire, LPG, PIR motion detector to arduino in case of any accident so that door will open automatically. This simple circuit can be used at places like home to ensure better safety. With a slight modification, this project can also be used to control the switching of loads through password. It can also be used at organizations to ensure authorized access to highly secured places.

REFERENCES

- Link for code : <https://drive.google.com/file/d/1GjqJ...>
- Karan khar , Aniket A kale, Supriya Rajankar, “ARDUINO BASED DOOR ACCESS CONTROL”

