

**Summer 2022**

Microprocessor Interfacing and Embedded System Lab

**CSE331 Sec-7**

**Project Report on Door Lock System**

**Submitted to:**

Dr. Sakhawat Hussain

Department of Electrical and Computer Engineering

**Submitted by:**

Ahnaf Daiyan Azmir (ID: 1931027042)

Shadman Sakib (ID: 1931024042)

Akil Hossain Prottoy (ID: 1931795642)

Our aim of this project is to create a simulation-based door lock system that opens up only with particular passcode. The door lock system is simulated in Proteus software. Proteus is a Virtual System Modelling and circuit simulation application. Code through which the whole simulation is running is composed in Arduino software which is an open-source electronics platform based on easy-to-use hardware and software.

The simulation asks the user to input a password, if the password is correct, the PWM-servo motor rotates indicating opening of a door knob. This is followed by some additional features. As soon as the door opens, a countdown is visible in the LCD screen and as soon as count falls to 0 the door closes again. This also depicts the advance security feature that this door lock system has. If user fails to put in the correct code, no rotation of the motor (door knob) occurs and the LCD screen displays incorrect password followed by initiation of further protocols.

**Components used:**

1. Arduino Board (Simulino Uno Board)
2. Motor (PWM-Servo)
3. LCD Display (LM016L)
4. Keypad
5. Power & Ground
6. 2 LED Lights
7. Wires and Pins

**Description:**

Firstly, we placed an Arduino into the board followed by LEDS, motor, keypad and LCD screen. In our Arduino code we initially included all the components, like for LCD we had to add the **include<LiquidCrystal.h>** as header, for motor **<Servo.h>**. Then we initialized our keypad from which user will provide input. We declared a variable in which our passcode for the door is stored. We connected our two LEDS to pin **12** and **13** respectively, the servo motor is connected to pin **9**. The LCD is connected to pin **16** and **2**.

In **void loop()** function, if **currentposition** variable is 0 , then **displayscreen()** function will run which will ask user to enter a password. Returning from the function the user will provide password and it will be visible in the screen in \*\*\*\* for security reasons. If user password and the programmed password matches the **unlockdoor()** function runs. This **unlockdoor()** function will cause a green light from the LED, ( digitalWrite(12,High) ).This will be followed by a welcome message indicating that the password is correct.

Immediately the servo motor will rotate which indicates that a door knob is being moved. Following this **counterbeep()** function runs. This function acts as a counter telling the user they have 5 seconds time to enter unless the door will get locked. After the **counterbeep()** function has finished executing the call returns back to **unlockdoor()** function. Now again servo motor rotates indicating that the door is being shut, the **currentposition** is set back to 0 and the screen is cleared using lcd.clear() and the function **displayscreen()** is called. Hence again the user is asked to enter a passcode to open the door.

Now if the user provides an incorrect passcode, the red LED will beep and an Incorrect password message will be visible in the LCD screen. Following this again **displayscreen()** function will be called asking the user to enter a passcode.

**Functions/Functionalities used in the Arduino code:**

void setup()

void loop()

void unlockdoor()

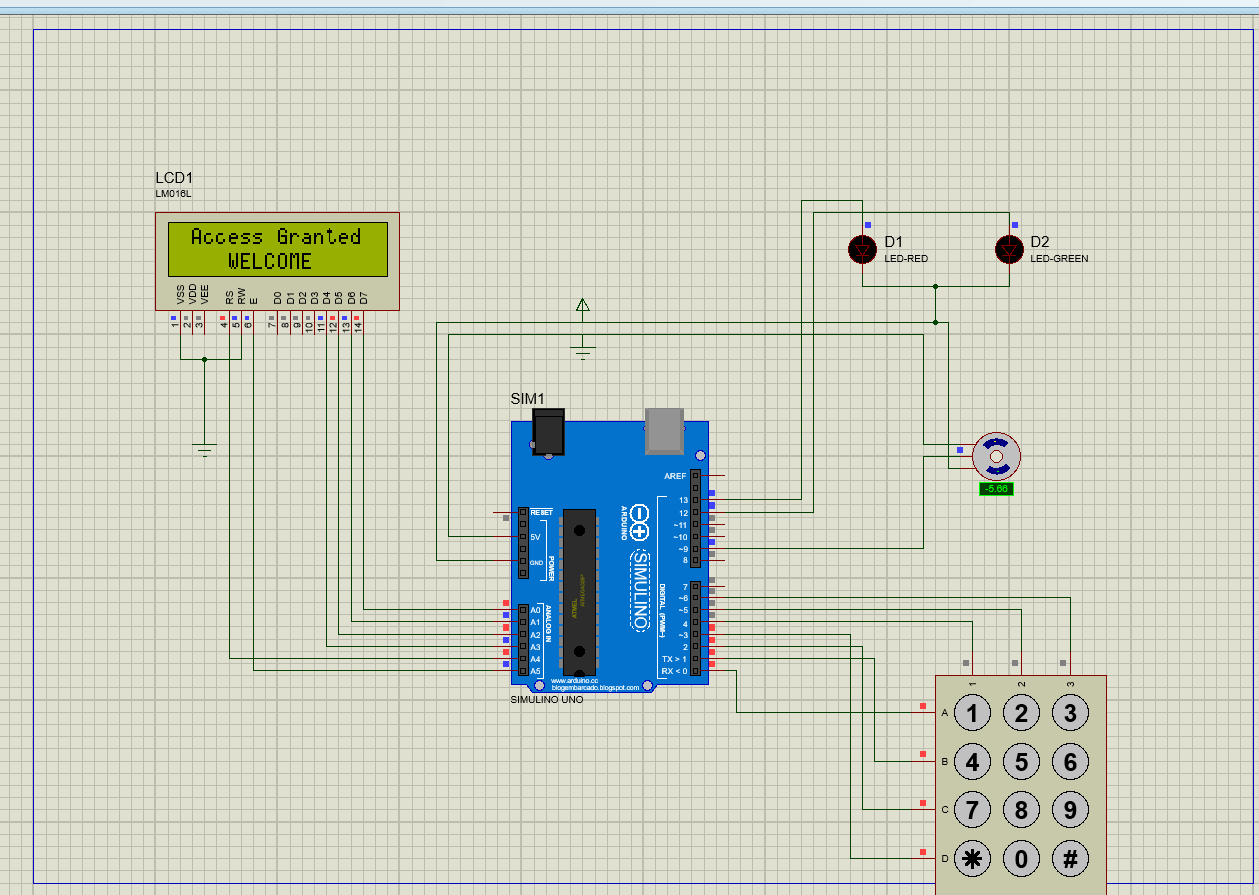
void incorrect()

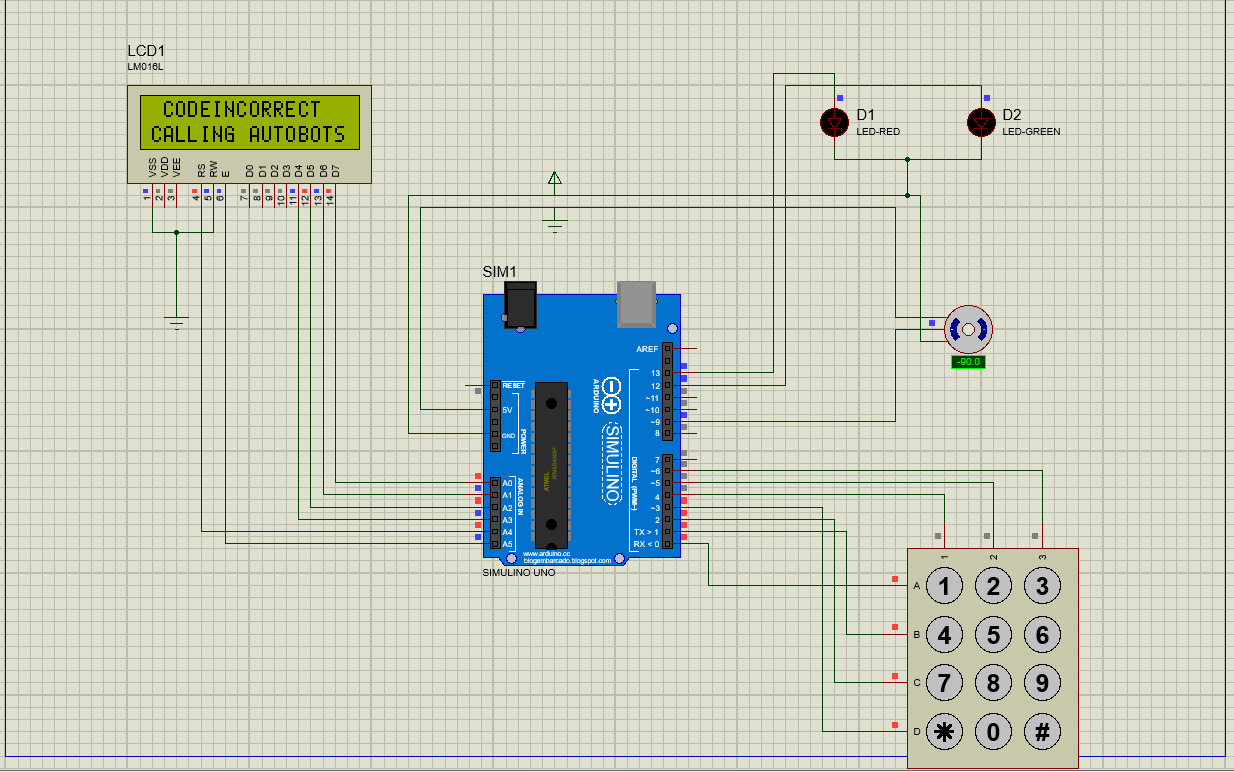
void clearscreen()

void displayscreen()

void counterbeep()

**Door lock system simulation screenshots:**



****

**Arduino Code:**

#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="3235";

int currentposition=0;

int red = 13;

int green = 12;

void setup(){

pinMode(13,OUTPUT);

pinMode(12,OUTPUT);

myservo.attach(9);

lcd.begin(16,2);

}

// ------ loop()------------//

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("\*");

}

if(code==password[currentposition]){

++currentposition;

if(currentposition==4){

unlockdoor();

currentposition=0;

}

}else{

incorrect();

currentposition=0;

}

}

}

//------------------ unlock door()--------------//

void unlockdoor(){

digitalWrite(12,HIGH);

delay(800);

digitalWrite(12,LOW);

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 =0; pos<=180; pos +=5){

myservo.write(pos);

delay(5);

}

delay(800);

counterbeep();

delay(700);

for(pos = 180; pos >= 0; pos -=5){

myservo.write(pos);

delay(15);

currentposition=0;

lcd.clear();

displayscreen();

}

}

//--------------------incorrect()--------------//

void incorrect(){

digitalWrite(13,HIGH);

delay(1000);

digitalWrite(13,LOW);

delay(500);

lcd.clear();

lcd.setCursor(1,0);

lcd.print("CODE ");

lcd.setCursor(5,0);

lcd.print("INCORRECT");

delay(700);

lcd.setCursor(15,1);

lcd.println(" ");

lcd.setCursor(0,1);

lcd.println("CALLING AUTOBOTS");

delay(3500);

lcd.clear();

displayscreen();

}

//-------clearscreen()--------------------/

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(" ");

}

//------------displayscreen()--------------------//

void displayscreen(){

lcd.setCursor(0,0);

lcd.println("ENTER CODE");

lcd.setCursor(0 ,1);

lcd.println("TO UNLOCK DOOR");

}

//-------------- counterbeep()------------------//

void counterbeep(){

delay(500);

lcd.clear();

lcd.setCursor(2,0);

delay(400);

lcd.println("GET IN PLEASE");

lcd.setCursor(4,1);

lcd.print(" 5 ");

delay(400);

lcd.clear();

lcd.setCursor(2,0);

lcd.println("DOOR IS OPEN");

delay(500);

lcd.setCursor(2,0);

lcd.println("GET IN PLEASE");

lcd.setCursor(4,1);

lcd.print(" 4 ");

delay(400);

lcd.clear();

lcd.setCursor(2,0);

lcd.println("DOOR IS OPEN");

delay(500);

lcd.setCursor(2,0);

lcd.println("GET IN PLEASE");

lcd.setCursor(4,1);

lcd.print(" 3 ");

delay(400);

lcd.clear();

lcd.setCursor(2,0);

lcd.println("DOOR IS OPEN");

delay(500);

lcd.setCursor(2,0);

lcd.println("GET IN PLEASE");

lcd.setCursor(4,1);

lcd.print(" 2 ");

delay(400);

lcd.clear();

lcd.setCursor(2,0);

lcd.println("DOOR IS OPEN");

delay(500);

lcd.setCursor(2,0);

lcd.println("GET IN PLEASE");

lcd.setCursor(4,1);

lcd.print(" 1 ");

delay(400);

lcd.clear();

lcd.setCursor(2,0);

lcd.println("DOOR IS OPEN");

delay(500);

delay(500);

lcd.clear();

lcd.setCursor(2,0);

lcd.print("RE-LOCKING");

delay(400);

lcd.setCursor(12,0);

lcd.print(".");

delay(400);

lcd.setCursor(13,0);

lcd.print(".");

delay(400);

lcd.setCursor(14,0);

lcd.print(".");

delay(400);

lcd.clear();

lcd.setCursor(4,0);

lcd.print("GOOD BYE!");

delay(600);

}

As we were not familiar with Arduino beforehand, we had to seek and take help from various resources for completing this Door Lock System project. This Door Lock System has almost all features a modern door lock system requires. With modern door lock system being so efficient with their lock system, our Door Lock System has all the advanced attributes to disrupt the already settled market.