END SEMESTER ASSESSMENT (ESA) B.TECH. (CSE)
IV SEMESTER

UE18CS256 – MICROPROCESSOR AND COMPUTER ARCHITECTURE LABORATORY

PROJECT REPORT

ON

BUILDING SECURITY SYSTEM USING ARDUINO

SUBMITTED BY

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ABSTRACT OF THE PROJECT:

❖ This project is implemented using Arduino circuit board.
❖ In this project we made " BUILDING SECURITY SYSTEM " using
   following sensors.
   1) Arduino boards
   2)LCD screen
   3)Buzzer
   4)Servo motors.
   5) Number Keypad
   6)Gas sensor
   7)Led lights
   8)Bread boards.

❖ Our project helps to maintain security of the building.

❖ We have used 2 Arduino boards to implement the security
   system. First arduino board is connected with number keypad, servo
   motor (Main door), buzzer. The second Arduino board is connected
   with leds (indicator), pair of servo motors (emergency exit doors), gas
   sensors etc

❖ We have installed keypad with LCD screen to prompt the user to
   type his password to enter into the building.
   If the user fails to enter the correct password multiple times,
   the system will lock and the door remains closed.

❖ If any intruder tries to enter into the building and types incorrect
   password multiple times, then the system buzzer starts to make a
   emergency sound.

❖ If the building catches fire accidently or by terrorists (manually) the
   gas sensor will sense the smoke from the building and this will
   automatically opens the exit door,

so that the people who were residing inside the building can escape out from the building and save there lives.

CIRCUIT DIAGRAM:
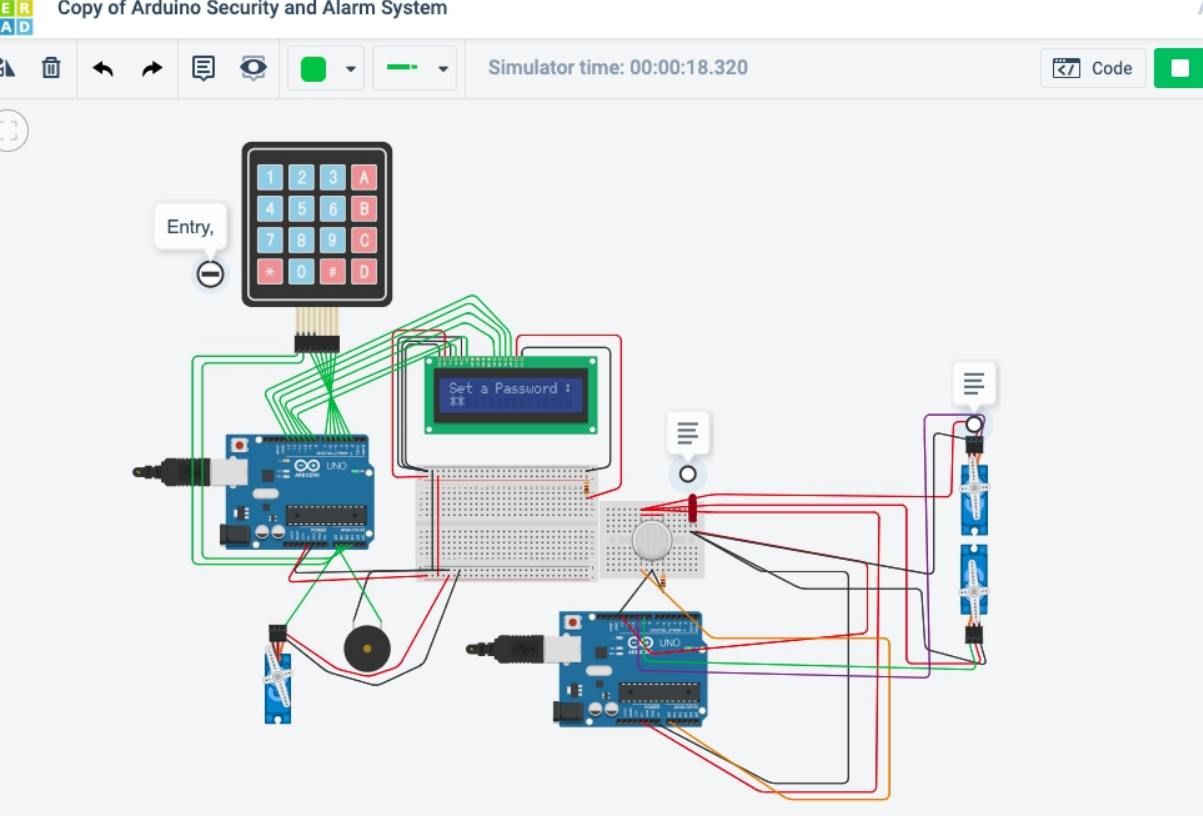
ARDUINO CODE:

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

LiquidCrystal LCD( 8, 9, 10, 11, 12, 13 ) ;

Servo servo ;

const int buzzerPin = 14 ;
const int servoPin = 15 ;

const byte ROWS = 4, COLS = 4 ;

char keys[ROWS][COLS] = {{'1','2','3','A'},
  {'4','5','6','B'},
   {'7','8','9','C'},
   {'*','0','#','D'}
} ;


byte rowPins[ROWS] = { 16, 17, 2, 3 } ;

byte colPins[COLS] = { 4, 5, 6, 7 } ;

Keypad kpd = Keypad( makeKeymap(keys), rowPins, colPins, ROWS, COLS ) ;

char password[16], string[16] ;
int flag_h_setpassword = 1, flag_inputpassword = 0, flag_inputstring = 0, flag_opendoor = 1,
flag_state = 0, flag_remoteopen = 0, flag_lockdown = 0 ;
int count = 0, trial_count=0, pos = 0, state = 0 ;

void setup() {
  for(int k=8 ; k<14 ; k++) {
    pinMode(k,OUTPUT) ;
  }

  LCD.begin(16, 2) ;


  pinMode(buzzerPin, OUTPUT) ;
  servo.attach(servoPin) ;




  LCD.setCursor(0,0) ;
  LCD.print("   WELCOME !!") ;
  LCD.setCursor(0,1) ;
  LCD.print("Set a Password :") ;
```

```
  InitializePassword(), InitializeString() ;
  CloseDoor() ;
}



void loop() {
    if( Serial.available() > 0 ) {
    state = Serial.read() ;
    flag_state = 0 ;
  }


  if( trial_count < 3 ) {

    char key = kpd.getKey() ;

    if( key != NO_KEY ) {

      if( flag_h_setpassword == 1 ) {
        H_SetPassword() ;
      }
      if( key == '*' ) {
        if( flag_inputpassword == 1 ) {
          InitializePassword(), H_SetPassword() ;
        }
        else if( flag_inputstring = 1 ) {
          InitializeString(), H_EnterPassword() ;
        }
      }
      else if( key == '#' ) {
        if( flag_inputpassword == 1  &&  count > 0 ) {
          flag_inputpassword = 0 ;
          password[count] = '\0' ;
          H_EnterPassword() ;
        }
        else if( flag_inputstring == 1  &&  count > 0 ) {
          flag_inputstring = 0 ;
          string[count] = '\0' ;
          if( Compare_Password_and_String() == 1 ) {
            LCD.clear() ;
            LCD.print("***VERIFIED!!***") ;
            Serial.println("UNLOCKED !!") ;
            trial_count = 0 ;
            for( int i=0 ; i<3 ; ++i ) {
              tone(buzzerPin, 500, 200) ;
              delay(230) ;
              tone(buzzerPin, 100, 200) ;
              delay(300) ;
              OpenDoor() ;
            }
          }
```

```
        else {
          LCD.clear() ;
          LCD.print("Wrong Password !") ;
          Serial.println("Someone unsuccessfully attempted to open the lock !") ;
          ++trial_count ;
          tone(buzzerPin, 100, 1000) ;
          delay(1000) ;
          H_EnterPassword() ;
        }
      }
    }
    else if( flag_inputpassword == 1  ||  flag_inputstring == 1 ) {
      LCD.print(key) ;
      delay(100) ;
      LCD.setCursor(count,1) ;
      LCD.print('*') ;
      if( flag_inputpassword == 1 )   password[count] = key ;
      else if( flag_inputstring == 1 )   string[count] = key ;
      ++count ;
    }
  }
}
else {
  LCD.clear() ;
  LCD.setCursor(0,0) ;
  LCD.print("SYSTEM LOCKDOWN!") ;
  tone(buzzerPin, 1000, 1000) ;
  delay(1500) ;
  flag_lockdown = 1 ;
}
}


void InitializePassword() {
  for( int i=0 ; i<16 ; ++i )
    password[i] = 0 ;
}

void InitializeString() {
  for( int i=0 ; i<16 ; ++i )
    string[i] = 1 ;
}

void H_SetPassword() {
  LCD.clear() ;
  LCD.setCursor(0,0) ;
  LCD.print("Set a Password :") ;
  LCD.setCursor(0,1) ;
  flag_h_setpassword = 0 ;
  flag_inputpassword = 1, count = 0 ;
}
```

```
void H_EnterPassword() {
  CloseDoor() ;
  LCD.clear() ;
  LCD.setCursor(0,0) ;
  LCD.print("Enter Password :") ;
  LCD.setCursor(0,1) ;
  flag_inputstring = 1, count = 0 ;
}

int Compare_Password_and_String() {
  int i ;
  for( i=0  ;  password[i]!='\0' && string[i]!='\0'  ;  ++i ) {
    if( password[i] != string[i] )
      return 0 ;
  }
  if( password[i] == '\0'  &&  string[i] == '\0' )
    return 1 ;
  else   return 0 ;
}

void OpenDoor() {
  if( flag_opendoor == 1 )
    return;
  for( pos=15 ; pos<=100 ; ++pos ) {
    servo.write(pos) ;
    delay(15) ;
  }
  flag_opendoor = 1 ;
}

void CloseDoor()  {
  if( flag_opendoor == 0 )
    return;
  for( pos=100 ; pos>=15; --pos ) {
    servo.write(pos) ;
    delay(15) ;
  }
  flag_opendoor = 0 ;
}
```

2 Aurdino
```
#include<Servo.h>
int sensor=0;

Servo m1;
```

```
Servo m2;

int pos1 = 0;
int pos2 = 0;

int flago1=0;
int flago2=0;

void setup() {
  m1.attach(9);
  m2.attach(10);
  pinMode(13, OUTPUT);
  Serial.begin(9600);
}
void loop() {
  sensor = analogRead(A0);


  if (sensor > 250)
  {
    digitalWrite(13, HIGH);
    Serial.println(sensor);
    open1();
    Serial.print("FIRE !! Please Exit ");
  }

  else {
    digitalWrite(13, LOW);
    close1();
  }

}

void open1()
{
    m1.write(90);
    m2.write(90);

}

void close1()
{
    m1.write(0);
    m2.write(0);
}
```
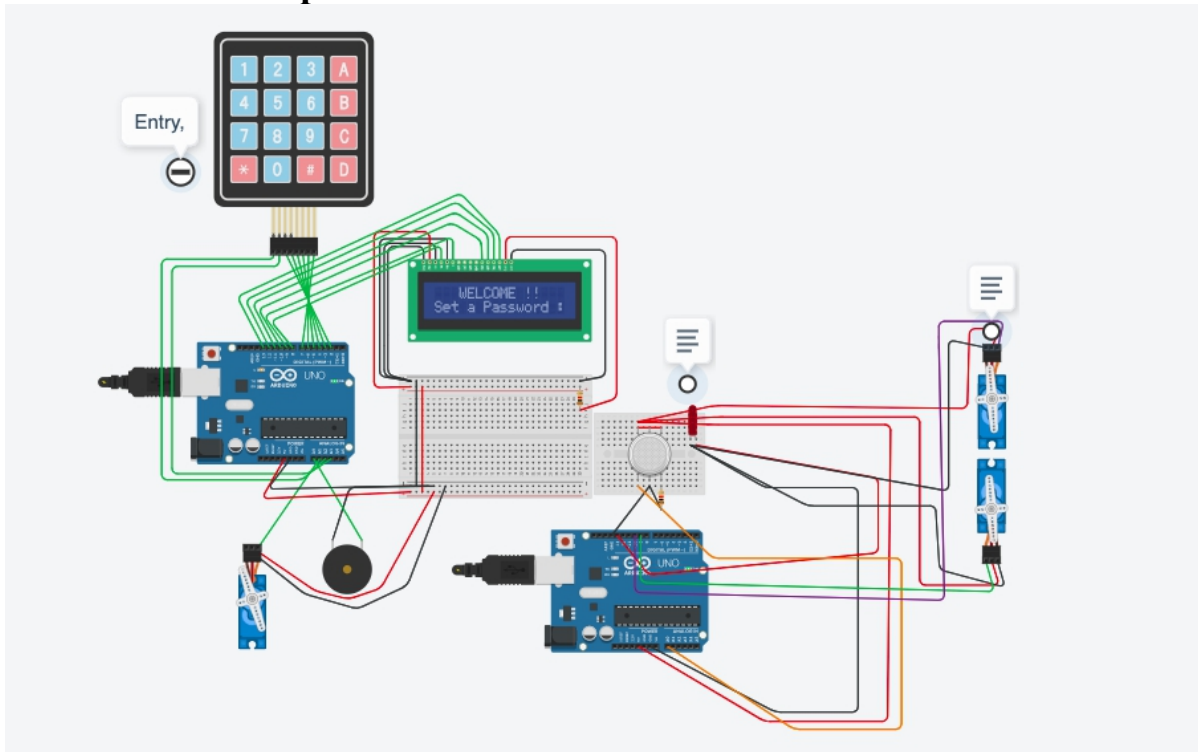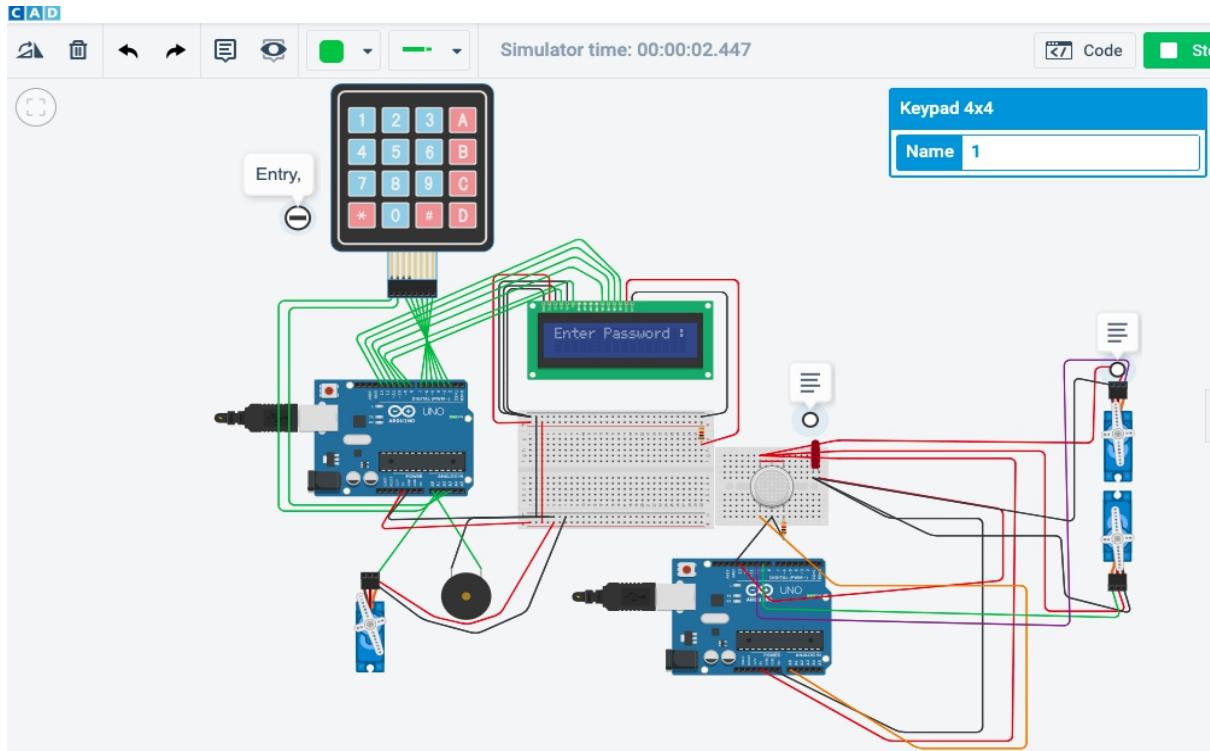
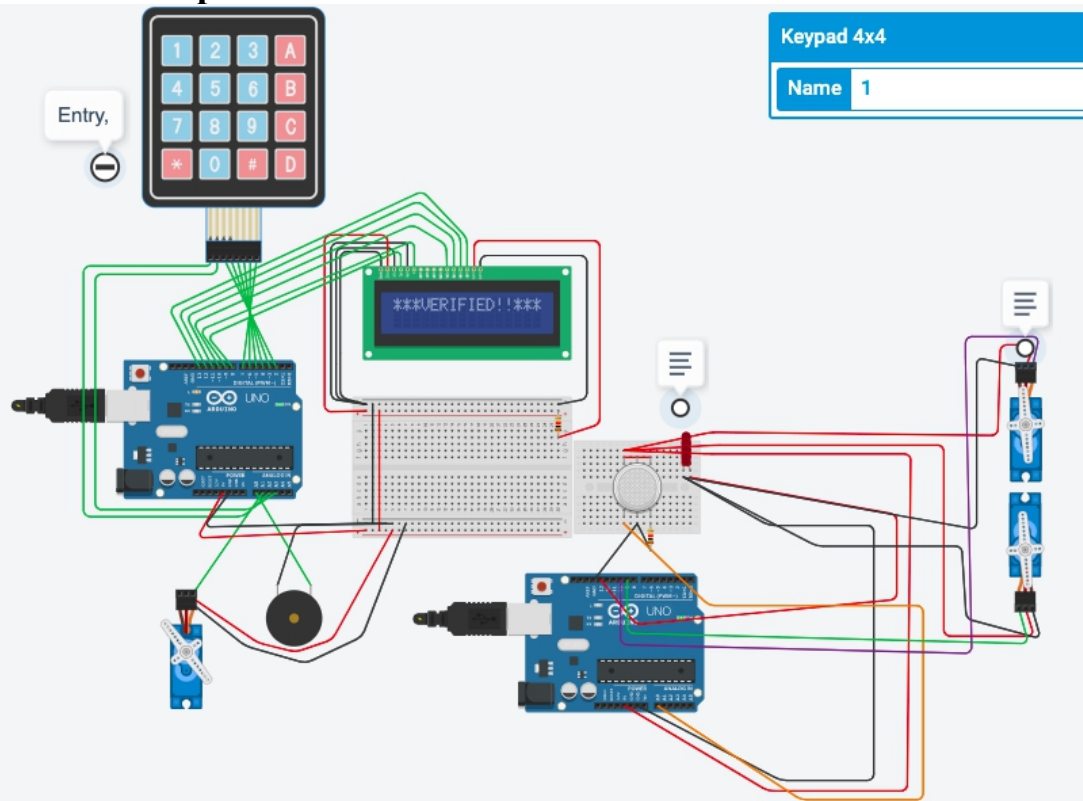# SCREEN SHOTS OF THE OUTPUT:

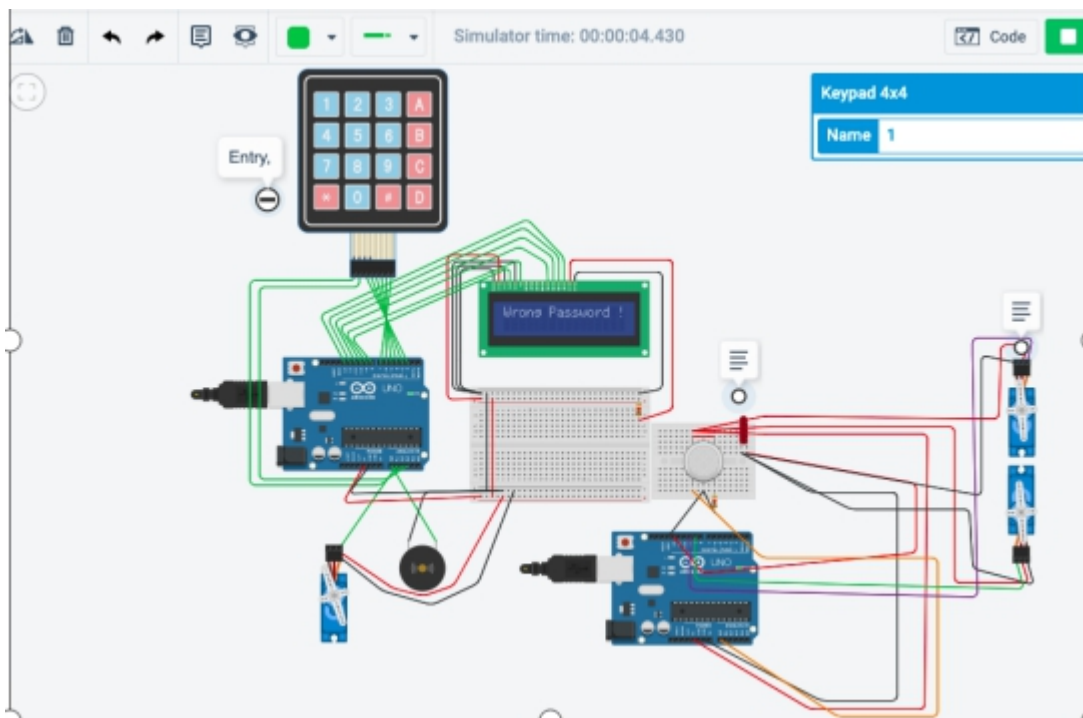**welcome and set password**

Set password

enter password

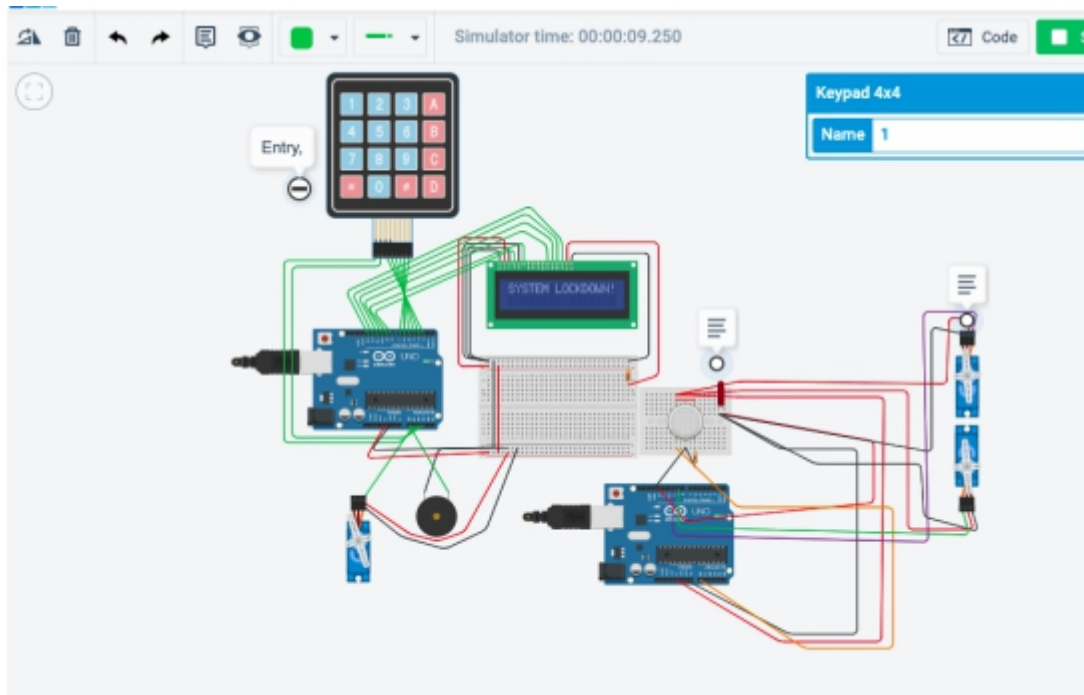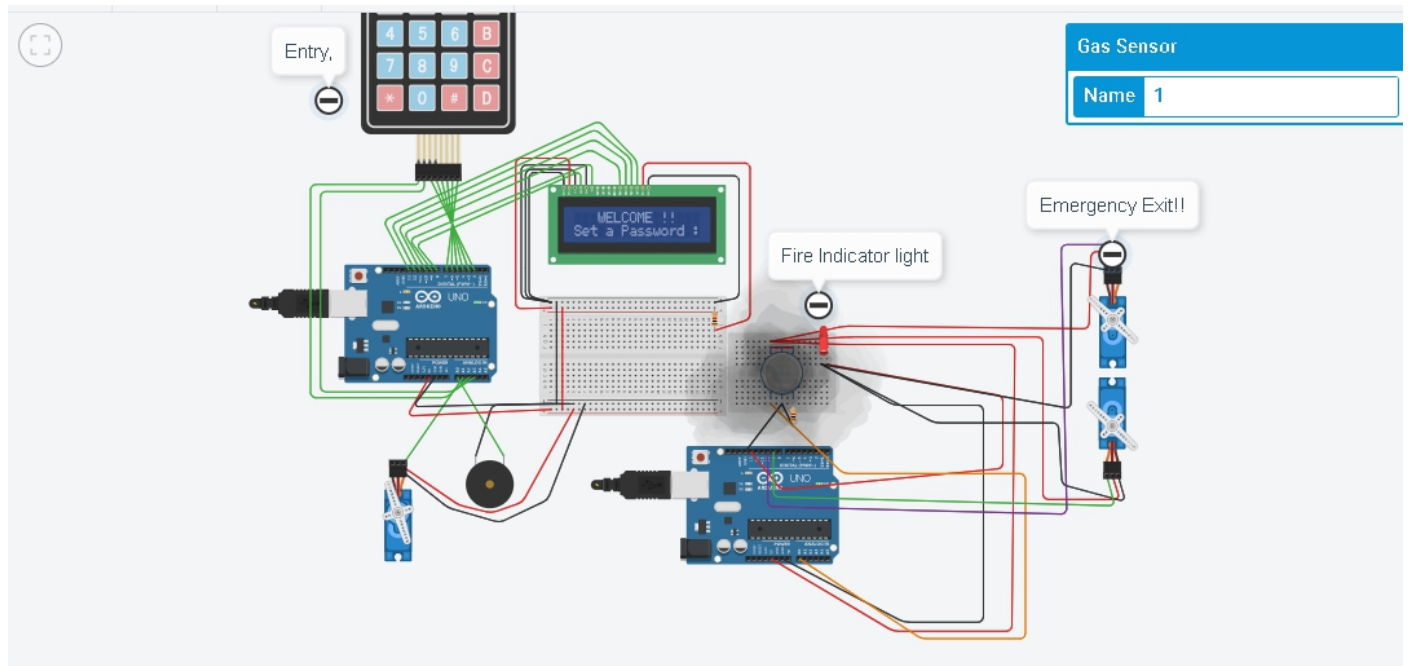# Verified as correct password

Wrong password

System lockdown if wrong password entered 3 times

Fire alarm system. When the building catches fire. The emergency doors will open automatically

REFERENCES

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https://en.wikipedia.org/wiki/Arduino
https://www.arduino.cc/en/guide/introduction
https://learn.sparkfun.com/tutorials/what-is-an-arduino/all

https://www.seeedstudio.com/blog/2019/12/04/introduction-to-the-arduino-what-is-arduino/