**LAB-05**

**CSE2020**

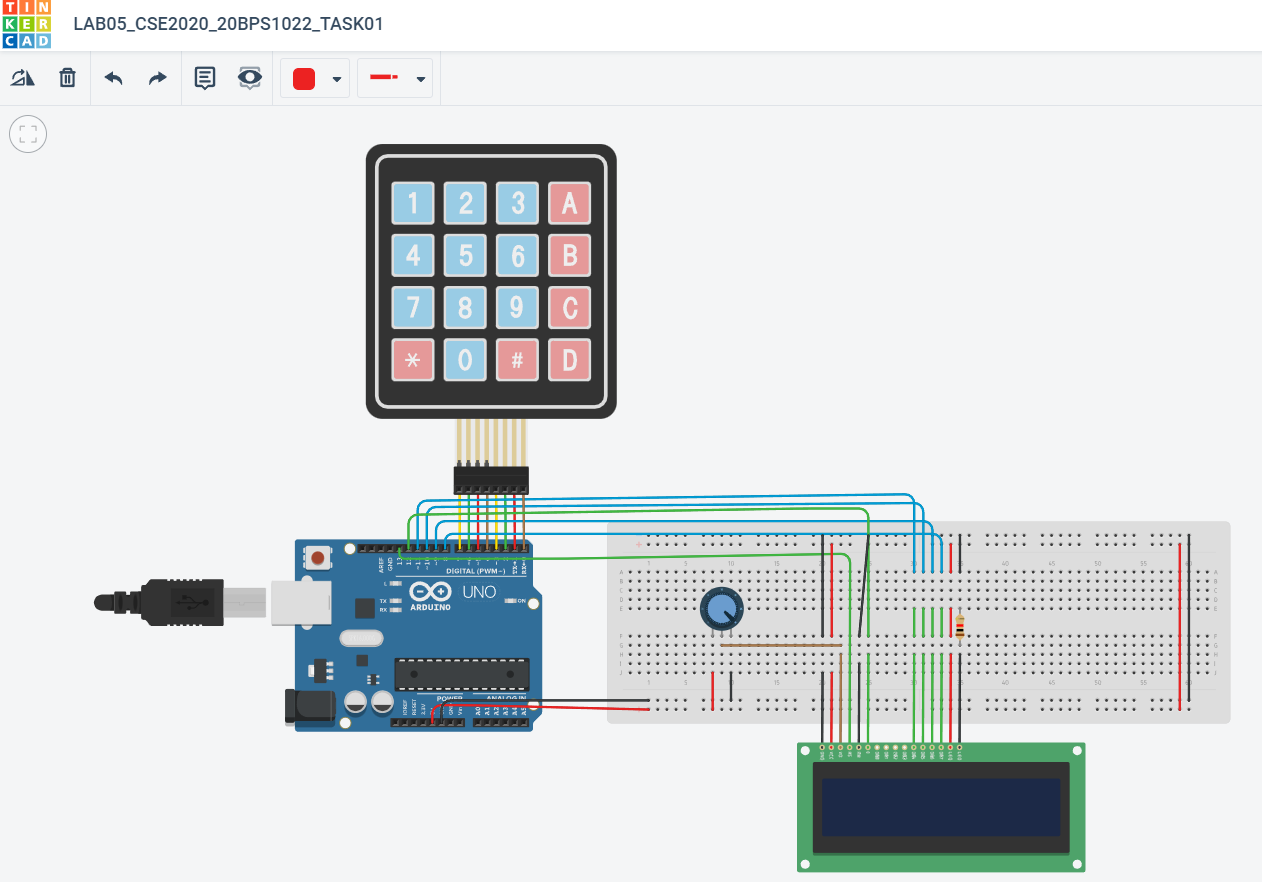
**INTRODUCTION TO CPS LAB**

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**Reg No.: 20BPS1022 Date: February 07, 2022**

**Task 1: Scientific Calculator using ARDUINO UNO R3, KEYPAD, LCD, RESISTOR, POTENTIOMETER**.

**Circuit:**



**Code:**

#include <Keypad.h>

#include <Wire.h>

#include <LiquidCrystal.h>

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

long first = 0;

long second = 0;

double total = 0;

char customKey;

const byte ROWS = 4;

const byte COLS = 4;

char keys[ROWS][COLS] = {

{'1','2','3','+'},

{'4','5','6','-'},

{'7','8','9','\*'},

{'C','0','=','/'}

};

byte rowPins[ROWS] = {7,6,5,4};

byte colPins[COLS] = {3,2,1,0};

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

void setup()

{

lcd.begin(16, 2);

for(int i=0;i<=3;i++);

lcd.setCursor(0,0);

lcd.print("Calculator");

delay(4000);

lcd.clear();

lcd.setCursor(0, 0);

}

void loop()

{

customKey = customKeypad.getKey();

switch(customKey)

{

case '0' ... '9':

lcd.setCursor(0,0);

first = first \* 10 + (customKey - '0');

lcd.print(first);

break;

case '+':

first = (total != 0 ? total : first);

lcd.setCursor(0,1);

lcd.print("+");

second = SecondNumber();

total = first + second;

lcd.setCursor(0,3);

lcd.print(total);

first = 0, second = 0;

break;

case '-':

first = (total != 0 ? total : first);

lcd.setCursor(0,1);

lcd.print("-");

second = SecondNumber();

total = first - second;

lcd.setCursor(0,3);

lcd.print(total);

first = 0, second = 0;

break;

case '\*':

first = (total != 0 ? total : first);

lcd.setCursor(0,1);

lcd.print("\*");

second = SecondNumber();

total = first \* second;

lcd.setCursor(0,3);

lcd.print(total);

first = 0, second = 0;

break;

case '/':

first = (total != 0 ? total : first);

lcd.setCursor(0,1);

lcd.print("/");

second = SecondNumber();

lcd.setCursor(0,3);

second == 0 ? lcd.print("Invalid") : total = (float)first / (float)second;

lcd.print(total);

first = 0, second = 0;

break;

case 'C':

total = 0;

lcd.clear();

break;

}

}

long SecondNumber()

{

while( 1 )

{

customKey = customKeypad.getKey();

if(customKey >= '0' && customKey <= '9')

{

second = second \* 10 + (customKey - '0');

lcd.setCursor(0,2);

lcd.print(second);

}

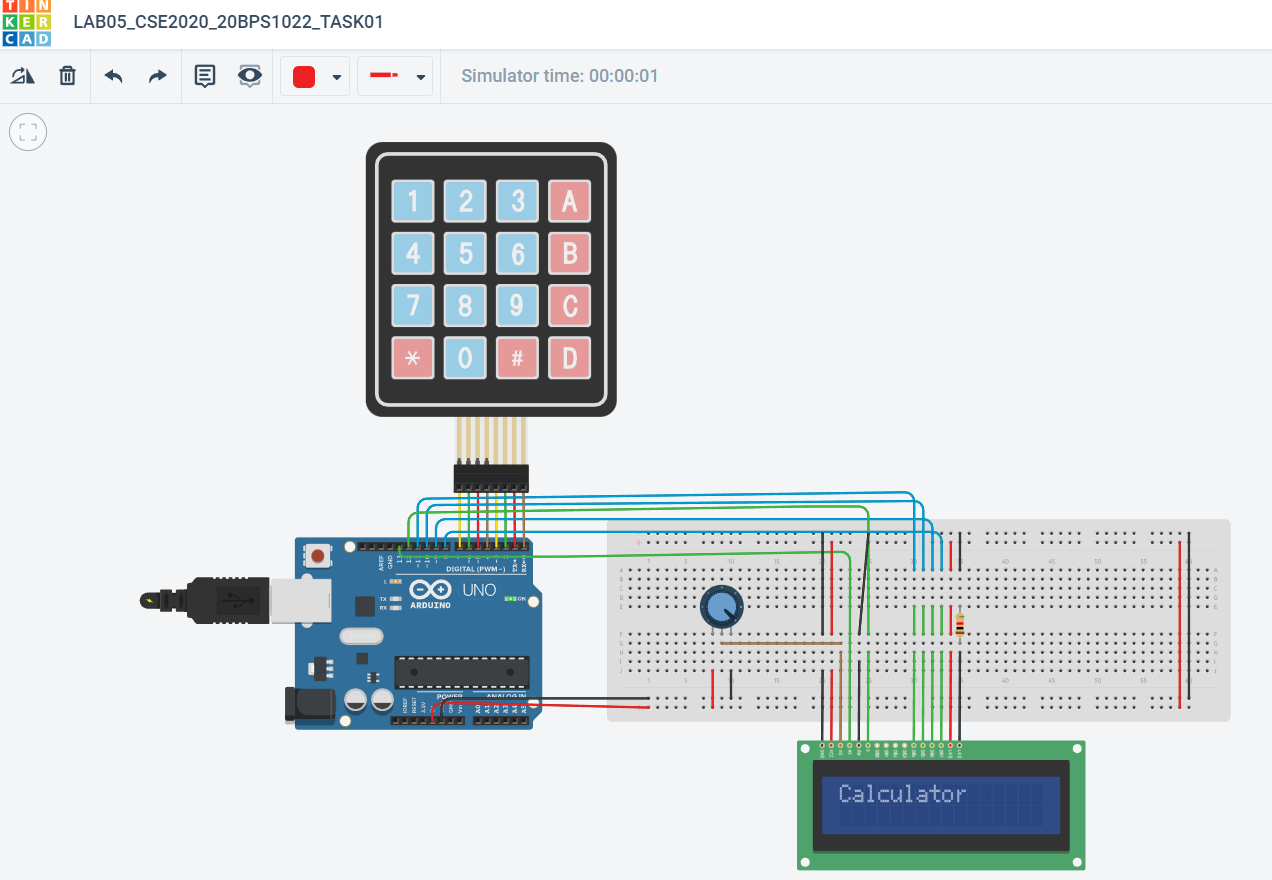
if(customKey == '=') break;

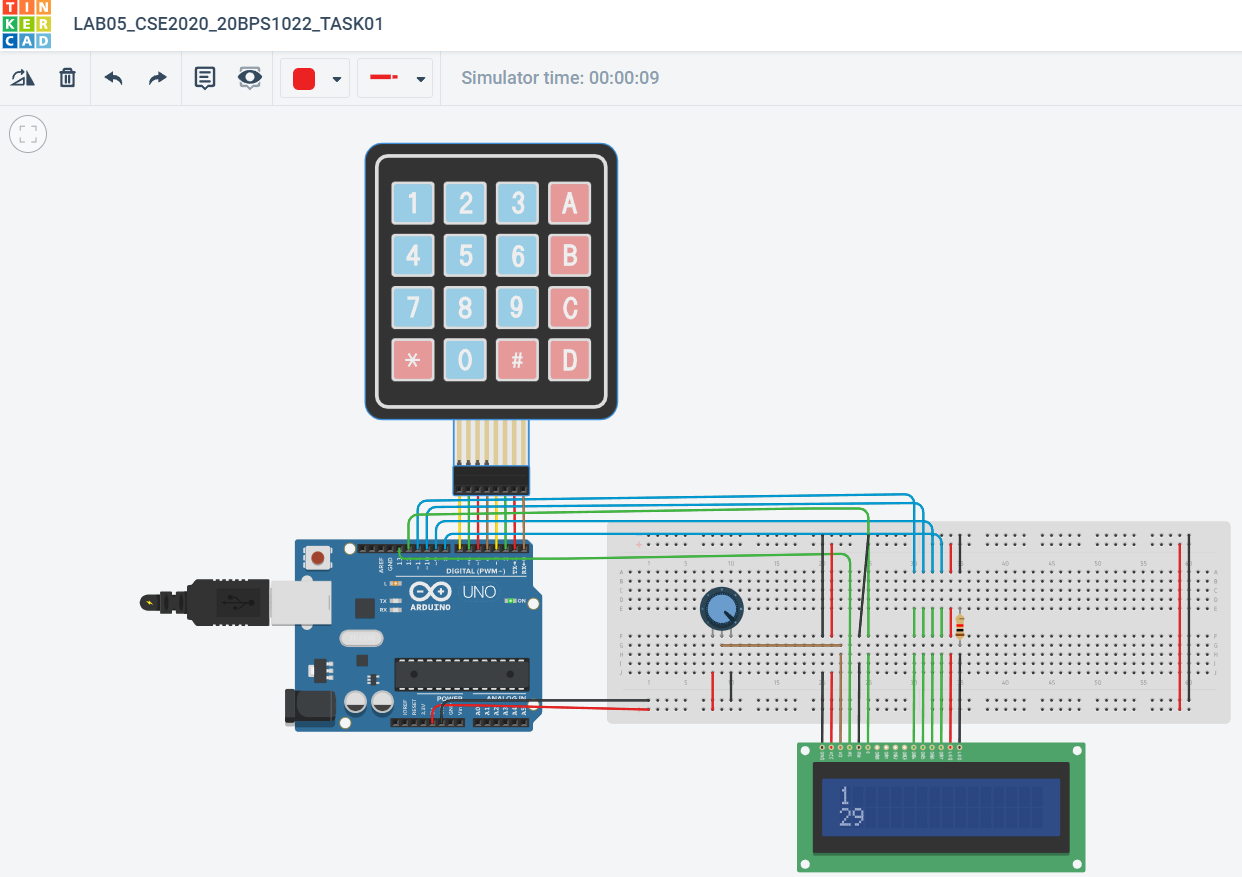
}

return second;

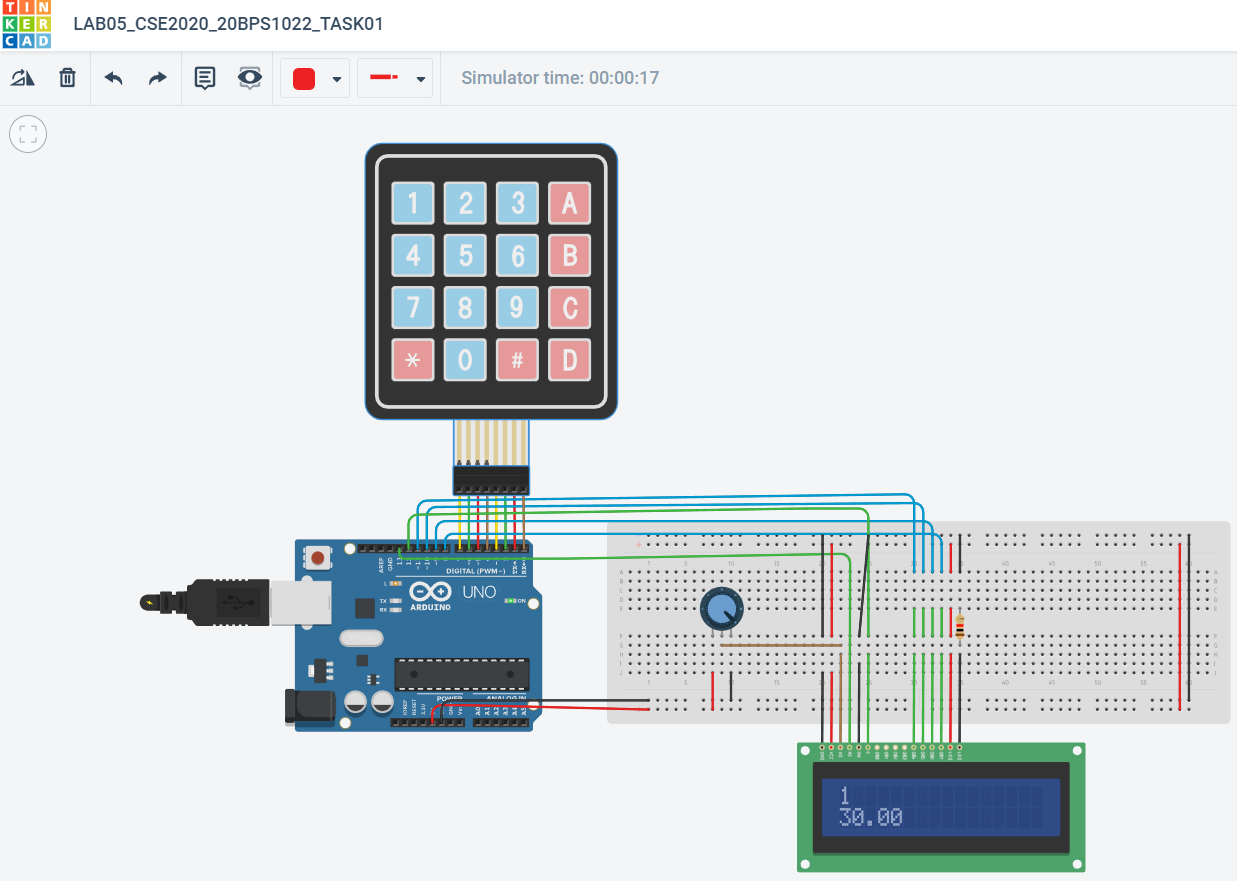
}

**Output:**

****

****

***Adding 1+29***

****

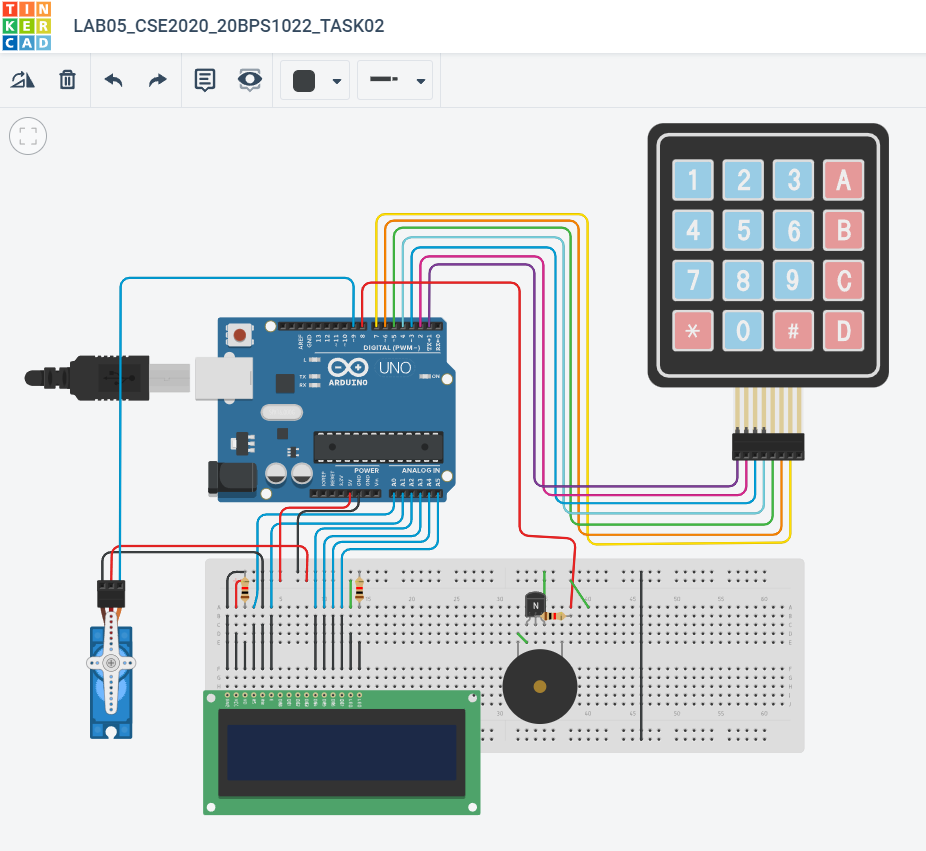
***Sum=30***

**Link:**

[**https://www.tinkercad.com/things/513Ua7vFO0A-lab05cse202020bps1022task01/editel?sharecode=2dr6FXtb7PfGetusqG8mojUCSJ0GdGXIW16ewmNLl4s**](https://www.tinkercad.com/things/513Ua7vFO0A-lab05cse202020bps1022task01/editel?sharecode=2dr6FXtb7PfGetusqG8mojUCSJ0GdGXIW16ewmNLl4s)

**Task 2: Password based door locking system using Arduino, LCD Display, Servo Motor, 4x4 Keypad.**

**Circuit:**

****

**Code:**

#include <Keypad.h>

#include <LiquidCrystal.h>

#include <Servo.h>

Servo myservo;

int pos=0;

LiquidCrystal lcd(A0,A1,A2,A3,A4,A5);

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]={1,2,3,4};

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

Keypad keypad= Keypad(makeKeymap(key),rowPins,colPins,rows,cols);

char\* password="0129";

int currentposition=0;

int redled=10;

int greenled=11;

int buzz=8;

int invalidcount=12;

void setup()

{

displayscreen();

Serial.begin(9600);

pinMode(redled, OUTPUT);

pinMode(greenled, OUTPUT);

pinMode(buzz, OUTPUT);

myservo.attach(9);

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

{

++invalidcount;

incorrect();

currentposition=0;

}

}

}

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(" ");

unlockbuzz();

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

{

myservo.write(pos);

delay(5);

}

delay(2000);

delay(1000);

counterbeep();

delay(1000);

for(pos = 0; pos <= 180; pos +=5)

myservo.write(pos);

delay(15);

currentposition=0;

lcd.clear();

displayscreen();

}

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("INCORRECT, YOU ARE UNAUTHORIZED");

digitalWrite(redled, HIGH);

digitalWrite(buzz, HIGH);

delay(3000);

lcd.clear();

digitalWrite(redled, LOW);

digitalWrite(buzz,LOW);

displayscreen();

}

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(" ");

}

void keypress()

{

digitalWrite(buzz, HIGH);

delay(50);

digitalWrite(buzz, LOW);

}

void displayscreen()

{

lcd.setCursor(0,0);

lcd.println("ENTER THE");

lcd.setCursor(1 ,1);

lcd.println(" PASSWORD:");

}

void armservo()

{

for (pos=180;pos<=180;pos+=50)

{

myservo.write(pos);

delay(5);

}

delay(5000);

for(pos=180;pos>=0;pos-=50)

{

myservo.write(pos);

}

}

void unlockbuzz()

{

digitalWrite(buzz, HIGH);

delay(80);

digitalWrite(buzz, LOW);

delay(80);

digitalWrite(buzz, HIGH);

delay(80);

digitalWrite(buzz, LOW);

delay(200);

digitalWrite(buzz, HIGH);

delay(80);

digitalWrite(buzz, LOW);

delay(80);

digitalWrite(buzz, HIGH);

delay(80);

digitalWrite(buzz, LOW);

delay(80);

}

void counterbeep()

{

delay(1200);

lcd.clear();

digitalWrite(buzz, HIGH);

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:");

digitalWrite(buzz,LOW);

delay(1000);

//2

digitalWrite(buzz, HIGH);

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:");

digitalWrite(buzz,LOW);

delay(1000);

//3

digitalWrite(buzz, HIGH);

lcd.setCursor(2,0);

lcd.println("GET IN WITHIN:");

lcd.setCursor(4,1); //3

lcd.print("3");

delay(100);

lcd.clear();

lcd.setCursor(2,0);

lcd.println("GET IN WITHIN:");

digitalWrite(buzz,LOW);

delay(1000);

//4

digitalWrite(buzz, HIGH);

lcd.setCursor(2,0);

lcd.println("GET IN WITHIN:");

lcd.setCursor(4,1); //4

lcd.print("2");

delay(100);

lcd.clear();

lcd.setCursor(2,0);

lcd.println("GET IN WITHIN:");

digitalWrite(buzz,LOW);

delay(1000);

//

digitalWrite(buzz, HIGH);

lcd.setCursor(4,1);

lcd.print("1");

delay(100);

lcd.clear();

lcd.setCursor(2,0);

lcd.println("GET IN WITHIN::");

digitalWrite(buzz,LOW);

delay(1000);

//5

digitalWrite(buzz, HIGH);

delay(40);

digitalWrite(buzz,LOW);

delay(40);

digitalWrite(buzz, HIGH);

delay(40);

digitalWrite(buzz,LOW);

delay(40);

digitalWrite(buzz, HIGH);

delay(40);

digitalWrite(buzz,LOW);

delay(40);

digitalWrite(buzz, HIGH);

delay(40);

digitalWrite(buzz,LOW);

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();

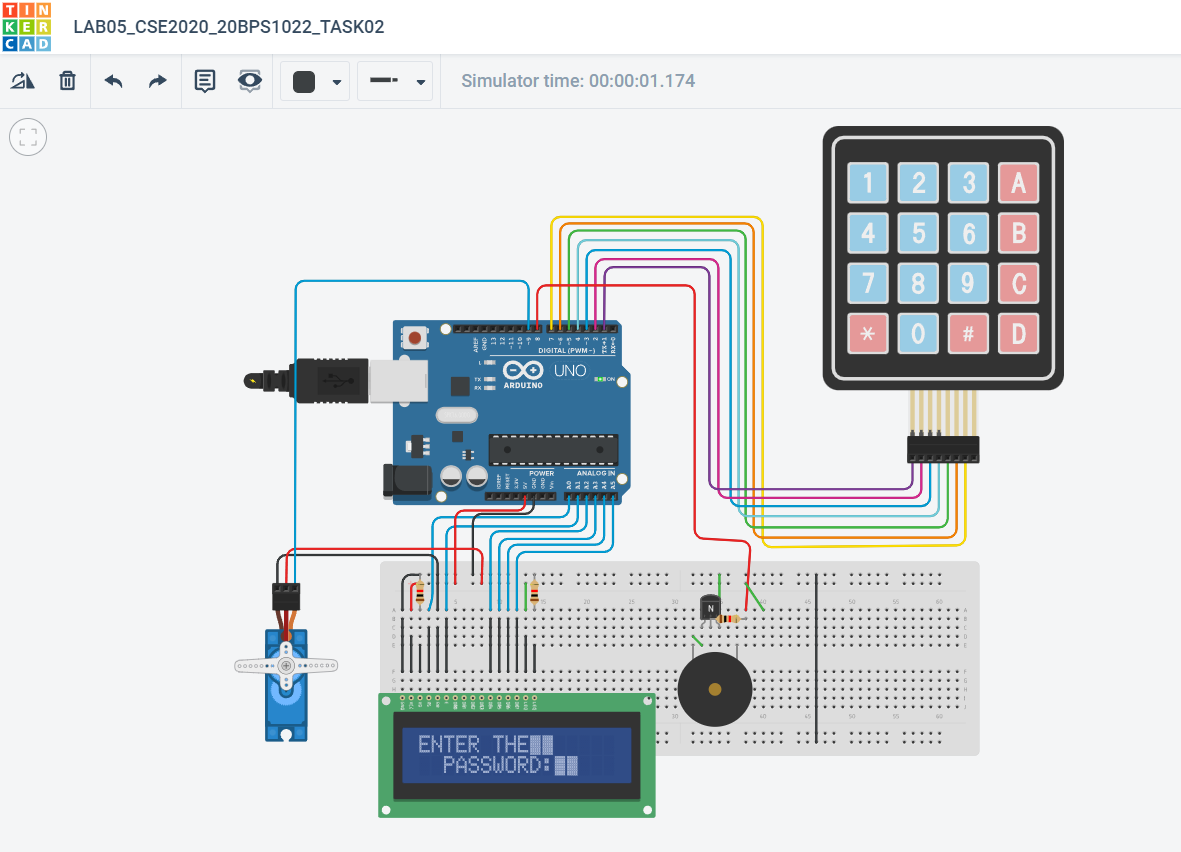
lcd.setCursor(4,0);

lcd.print("LOCKED!");

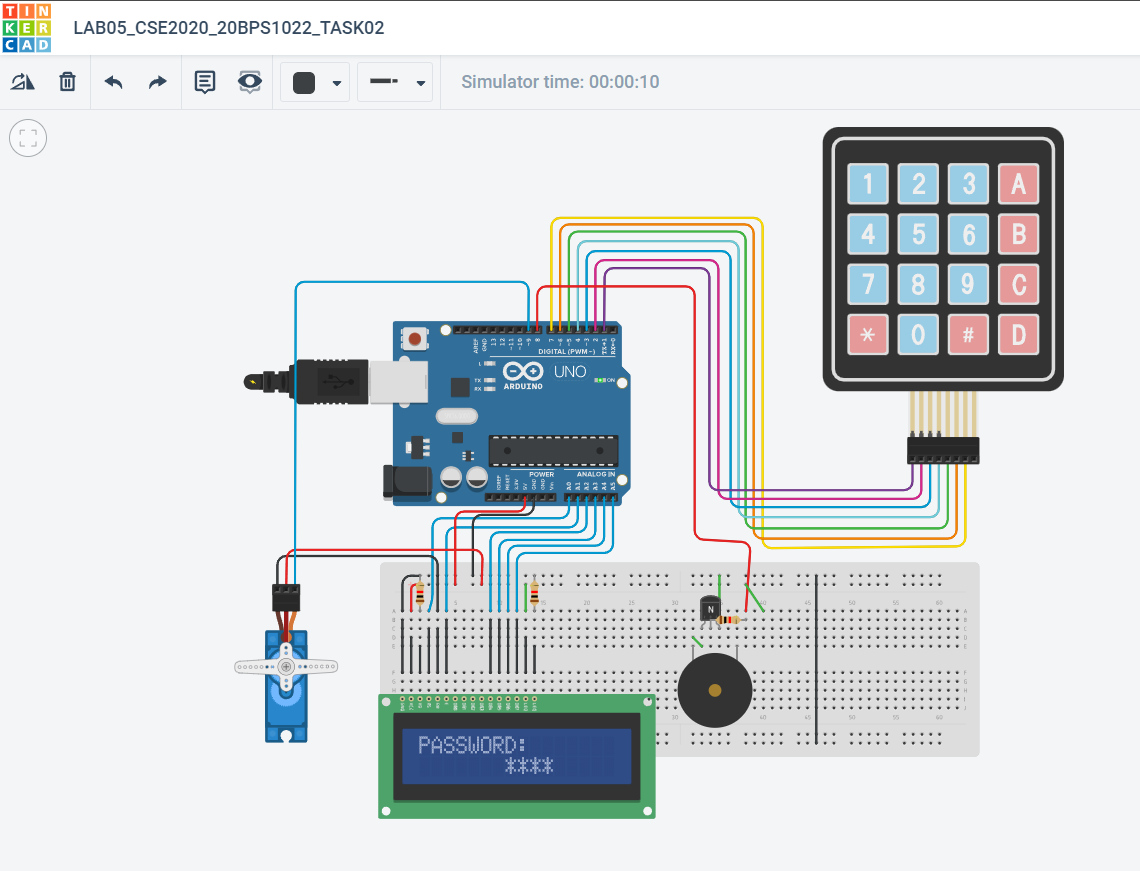
delay(440);

}

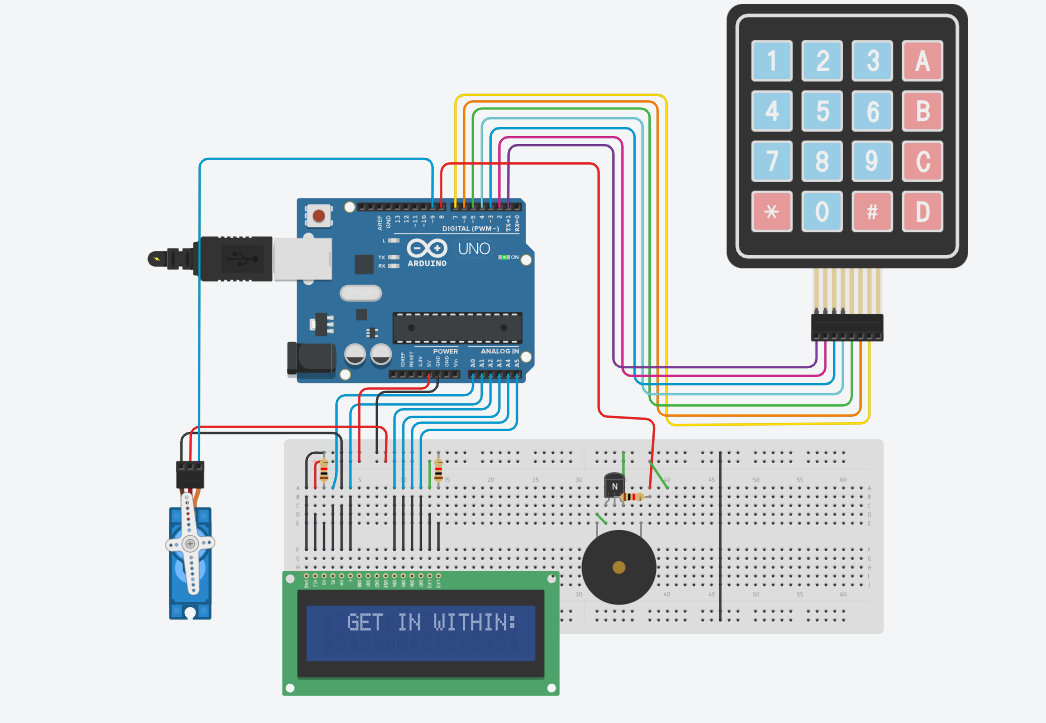
**Output:**

****

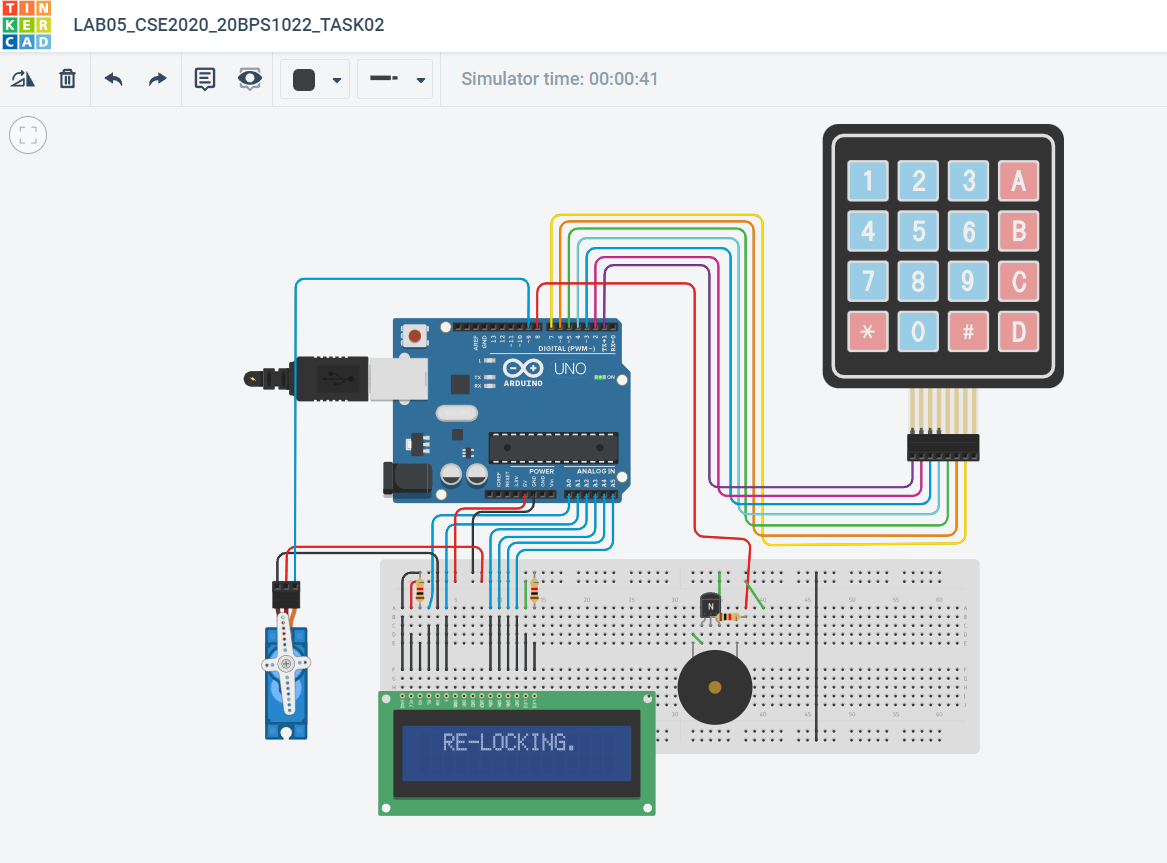
***Entering the password***

****

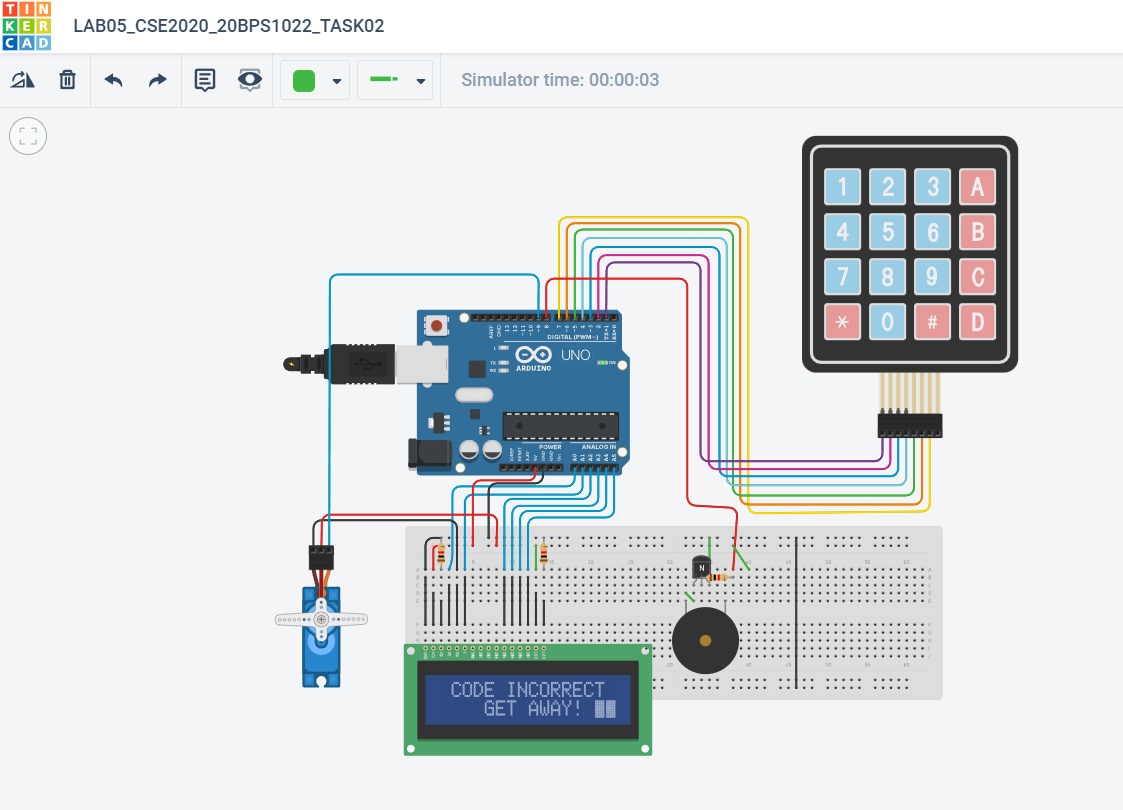
***Entered the password***

****

***Closing the door***

****

***Closed the door***

****

***Incorrect password***

**Link:**

[**https://www.tinkercad.com/things/8jN42Bw81Op-lab05cse202020bps1022task02/editel?sharecode=UuOKBaKHxP-pcdEYYEsmFkPHjV7grwTK4SoNi0GltKM**](https://www.tinkercad.com/things/8jN42Bw81Op-lab05cse202020bps1022task02/editel?sharecode=UuOKBaKHxP-pcdEYYEsmFkPHjV7grwTK4SoNi0GltKM)

**Result:**

**All the circuits were successfully built as required.**