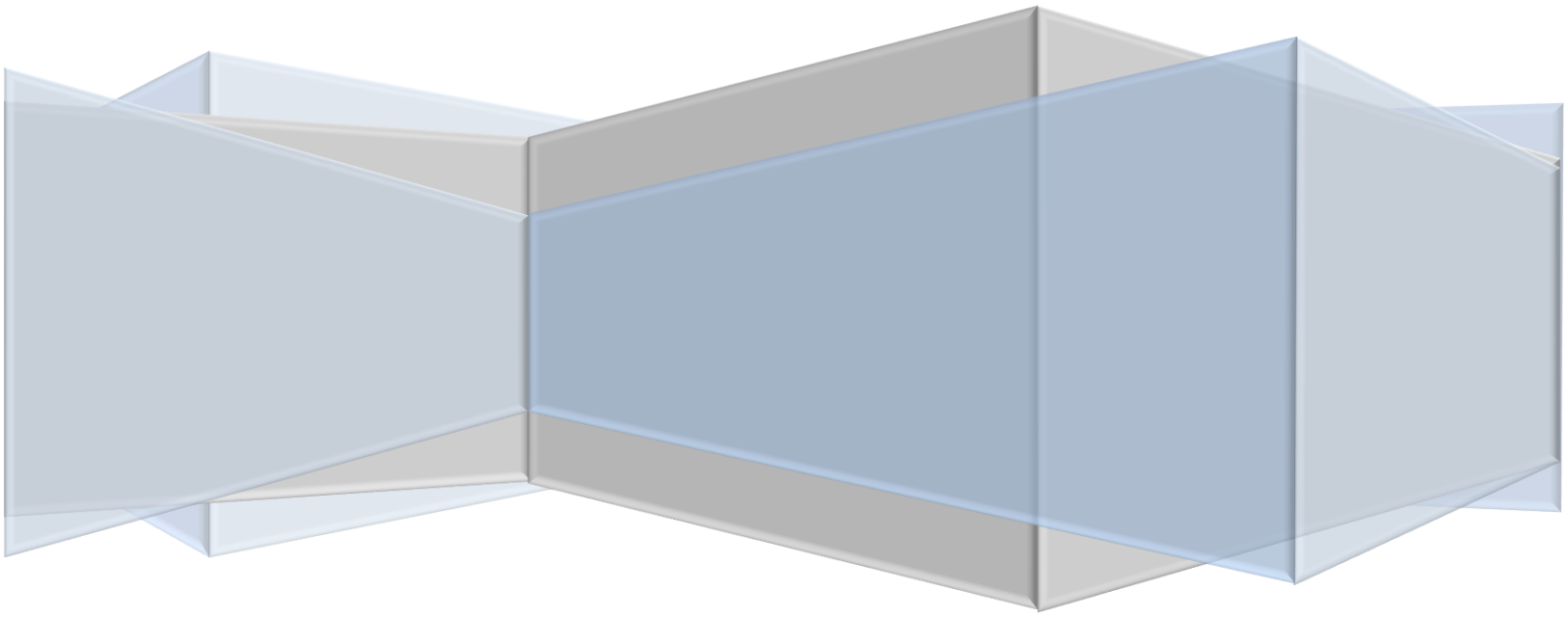
Smart Door Lock Circuit

Aya Abd AlKarim Yousef



Introduction:

Arduino in Tinkercad circuits, we can build a password-based security system. To allow the user of entering a password, 4×4 keypad module is accompanied with a 16×9 LCD display. Basically, LCD display allows the user of entering a password by the keypad module. The first-time password is “123456”, according to the provided code.

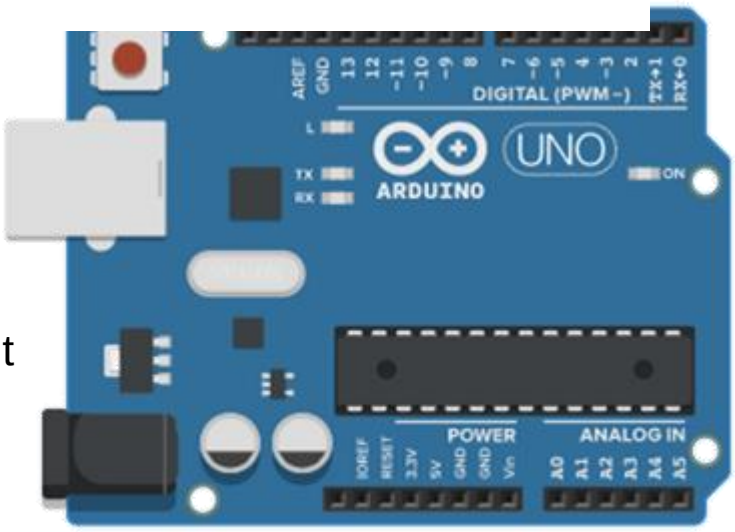
When the system is unlocked, the LCD display shows a message of “Door is Open”. Also, that is controlled and relayed with the Arduino. The data such as the correct passcode, are saved in the Arduino Uno.

Hardware Design:

Components:

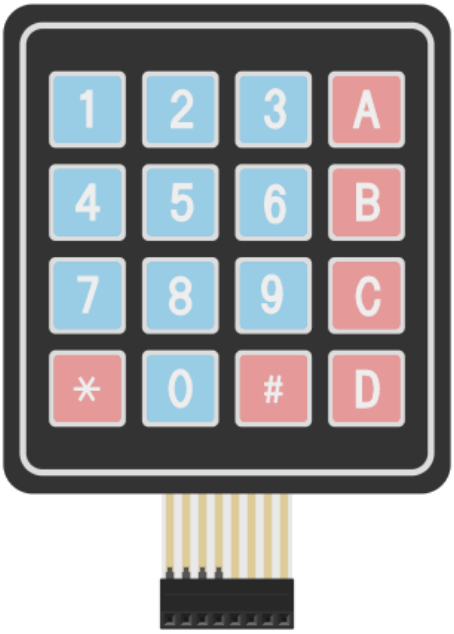
Arduino UNO:

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output pins that can be interfaced to various expansion boards and other circuits.



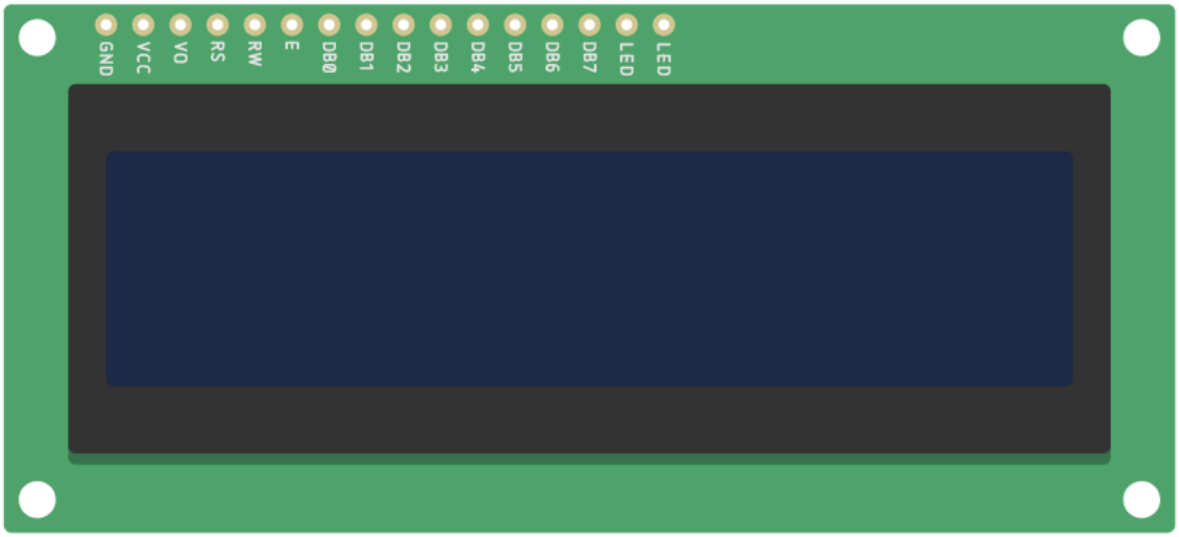
KEYPAD:

A keypad is a block or pad of buttons' set having an arrangement of digits, symbols or alphabetical letters. Pads mostly contain numbers. Numeric keypads are used with computers.



LCD:

A LCD is an electronic display module which uses liquid crystal to produce a visible image. The 16×2 LCD display is a very basic module commonly used in DIYs (Do It Yourself) and circuits. The 16×2 translates a display of 16 characters per line in 2 such lines. In this LCD each character is displayed in a 5×7-pixel matrix.

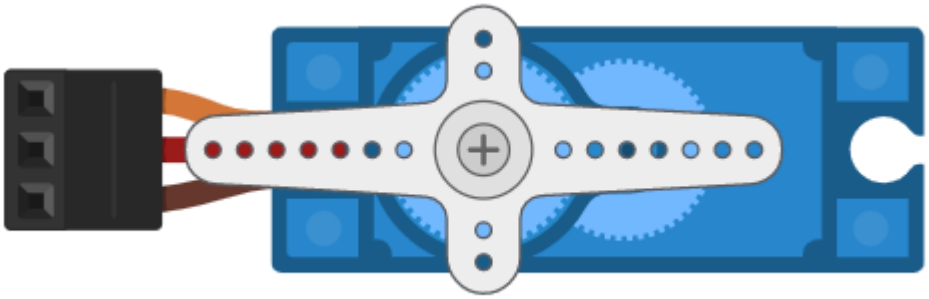


220-ohm Resistor:

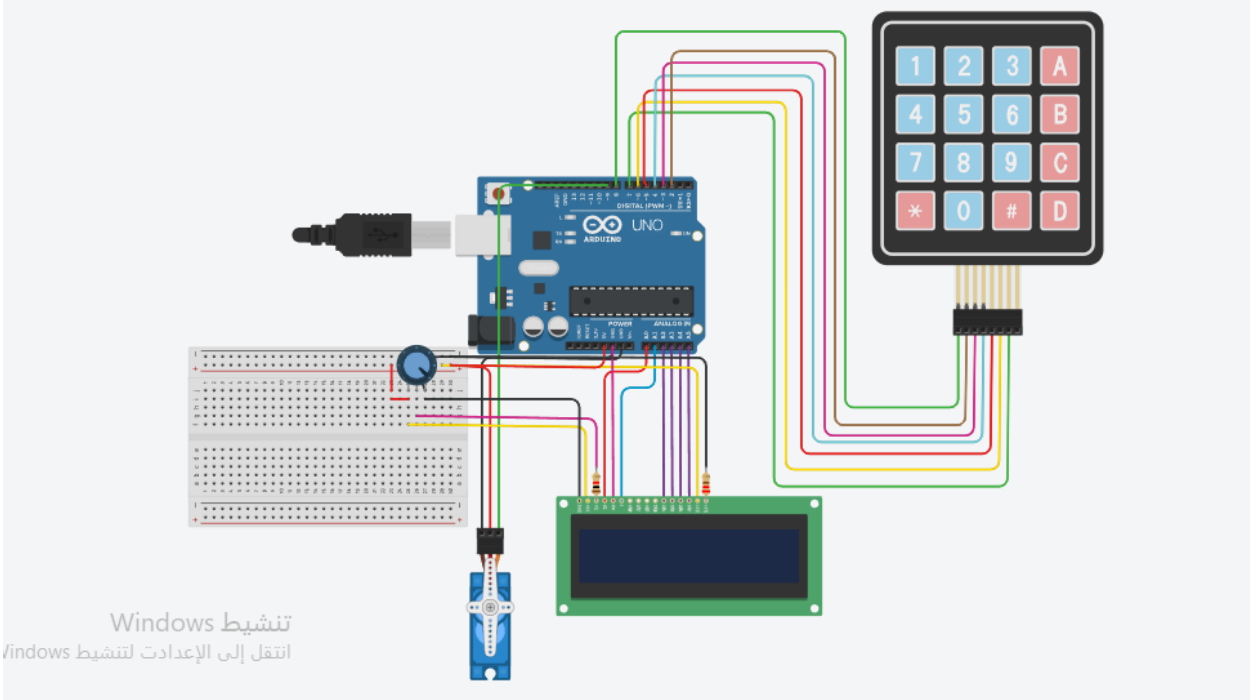
A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce the current flow, adjust signal levels, divide voltages, bias active elements and terminate the transmission lines.

Servo motor:

A servomotor (or servo motor) is a rotary or linear actuator that allows for precise control of angular or linear position and of velocity or acceleration. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, usually a dedicated module designed specifically for the use with servomotors.



Hardware Diagram:



Procedure:

At first, we are going to connect the keypad to the Arduino uno. The keypad has 8 pins, 4 of them are for columns and 4 for rows. For the column pins, we are going to connect them with the digital input pins of the Arduino UNO numbers 2 to 4. However, for the row pins we are going to connect them to the digital pins number 5 to 8of the Arduino UNO.

The code :

```
#include <Keypad.h>
#include <LiquidCrystal.h>
#include <Servo.h>
Servo myservo;
LiquidCrystal lcd(A0, A1, A2, A3, A4, A5);
#define Password_Lenght 7
int pos = 0;
char Data[Password_Lenght];
char Master[Password_Lenght] = "123456";
byte data_count = 0, master_count = 0;
bool Pass_is_good;
char customKey;
const byte ROWS = 4;
const byte COLS = 3;
char keys[ROWS][COLS] = {
  {'1', '2', '3'},
  {'4', '5', '6'},
```

```
  {'7', '8', '9'},
  {'*', '0', '#'}
};
bool door = true;
byte rowPins[ROWS] = {8, 2, 3, 4};
byte colPins[COLS] = {5, 6, 7};
Keypad customKeypad( makeKeymap(keys), rowPins, colPins, ROWS, COLS); //initialize an instance of class NewKeypad
void setup()
{
  myservo.attach(9);
  ServoClose();
  lcd.begin(16, 2);
Serial.begin(9600);
}
void loop()
{
if (door == 0){
```

```
    customKey = customKeypad.getKey();
    if (customKey == '#')
    {
      lcd.clear();
      ServoClose();
      lcd.print("  Door is close");
      delay(3000);
      door = 1;
    }
  }
  else Open();
}
void clearData()
{
  while (data_count != 0)
  {
    Data[data_count--] = 0;
  }
```

```
 return;
}

void ServoOpen()
{
  for (pos = 180; pos >= 0; pos -= 5) {
    // in steps of 1 degree
    myservo.write(pos);
    delay(15);
  }
}
void ServoClose()
{
  for (pos = 0; pos <= 180; pos += 5) {
    myservo.write(pos);
    delay(15);
  }
}
void Open()
```

```
{
  lcd.setCursor(0, 0);
  lcd.print(" Enter Password");
  customKey = customKeypad.getKey();
  if (customKey)
  {
    Data[data_count] = customKey;
    lcd.setCursor(data_count,1);
    lcd.print(Data[data_count]);
   data_count+=1;
   Serial.println(data_count);
  }
  if (data_count == Password_Lenght - 1)
  {
    if (!strcmp(Data, Master))
    {
      lcd.clear();
      ServoOpen();
     lcd.print("  Door is Open");
```

```
delay(5000);
      door = 1;
    }
    else{
      lcd.clear();
      lcd.print("  Wrong Password");
      delay(1000);
      door = 0;
    }
clearData();
    }
}
```