



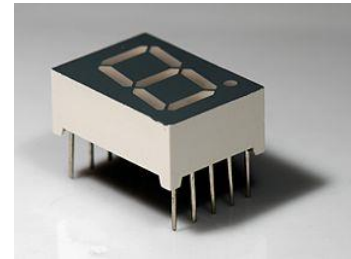
Display

Electro

2022/2023

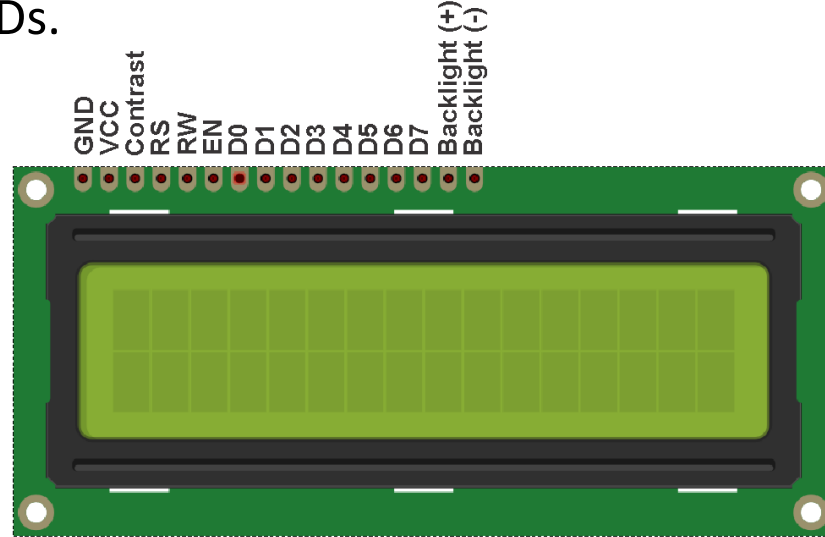
What You Will Learn

- **Liquid Crystal Display (LCD)**
- **Seven Segment Display (SSD)**

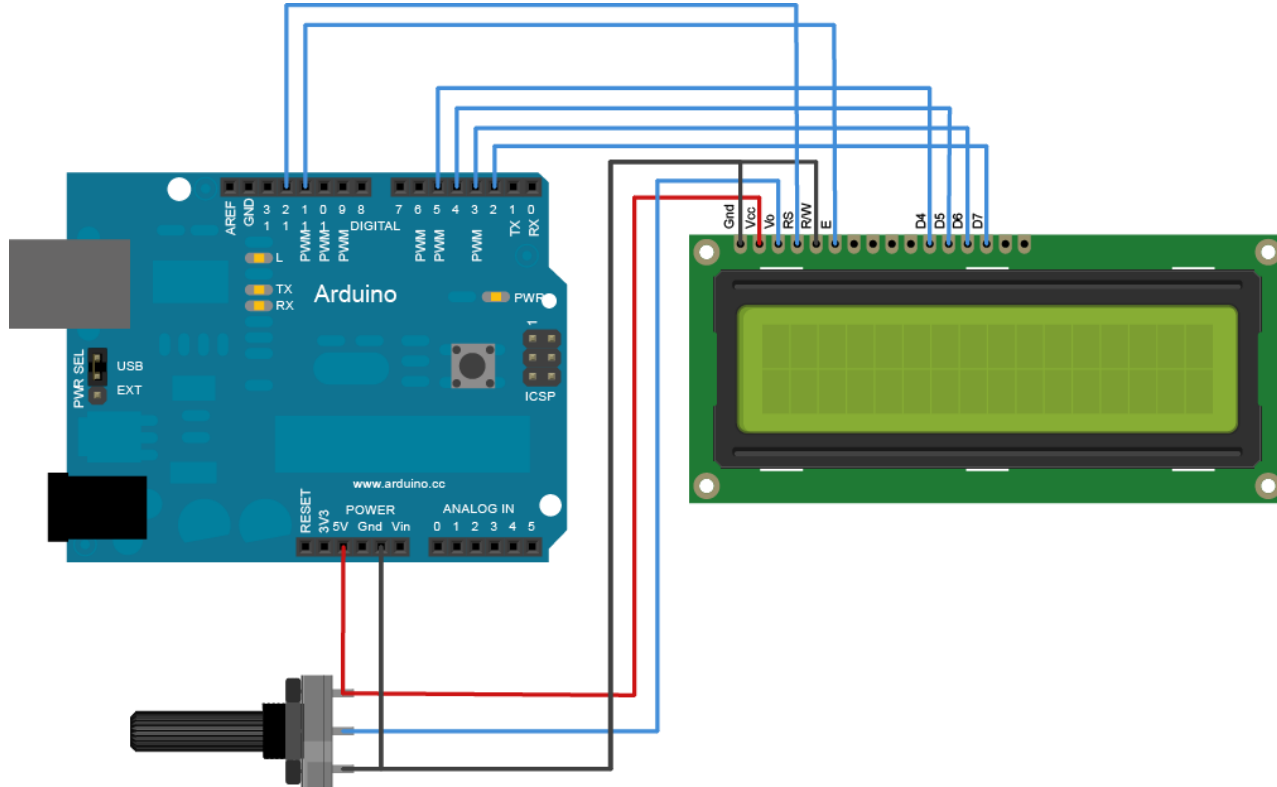


Liquid Crystal Display

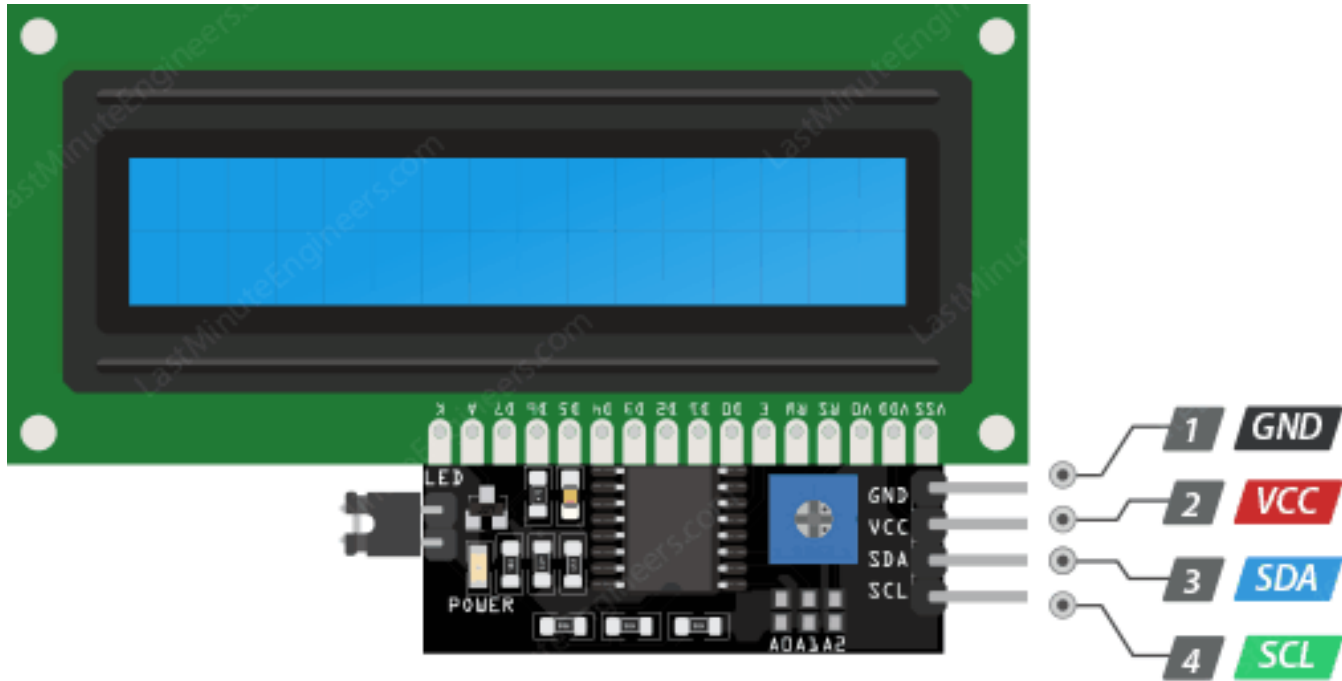
LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over 7 segments and other multi segment LEDs.



Circuit Building

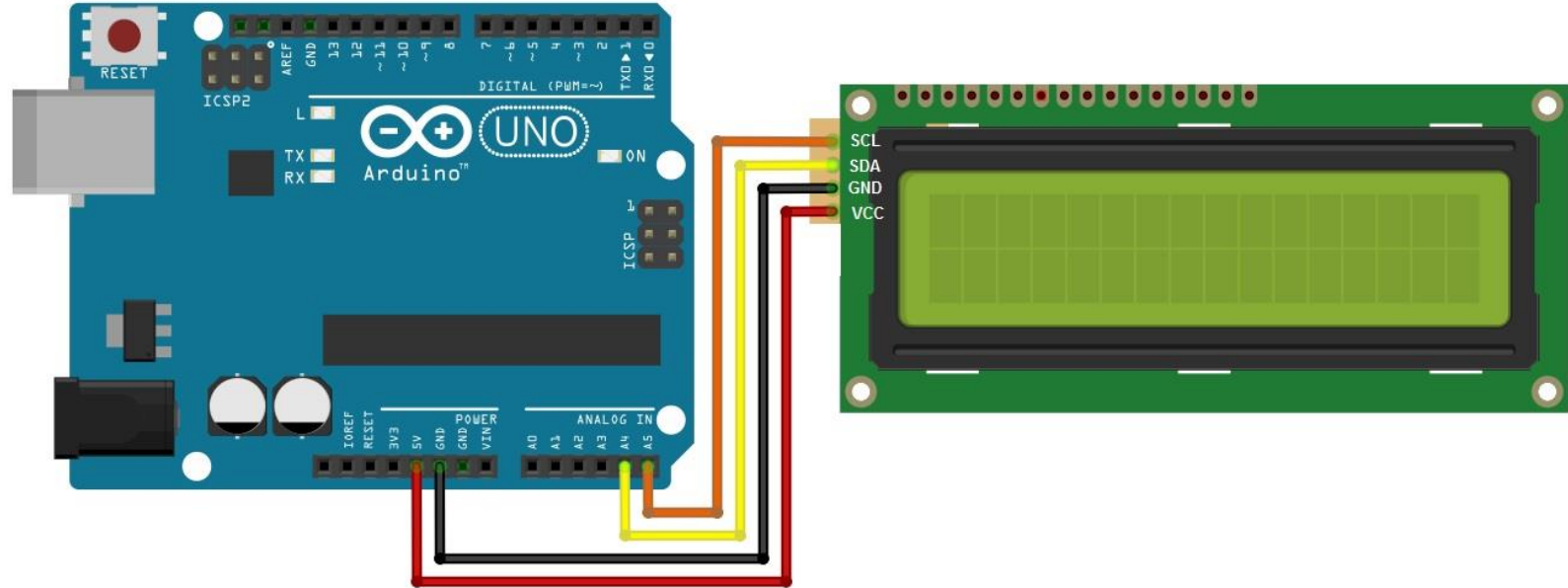


I2C



Circuit Building

With I2C



Let's Code!

```
#include <LiquidCrystal_I2C.h>    //include the LCD-I2C library

LiquidCrystal_I2C lcd(0x27,16,2);    //defining a new LCD with name 'lcd', I2C address: 0x27, LCD size: 16 columns x 2 lines

void setup()
{
  lcd.begin();                    //initialize the lcd variable
  lcd.backlight();                //turn on LCD's backlight
}

void loop()
{
  lcd.setCursor(3,0);             //set the cursor at the fourth column and first line
  lcd.print("Hello, World!");     //print the string "Hello, World!"
  lcd.setCursor(0,1);             //set the cursor at the first column and second line
  lcd.print("Arduino Bootcamp");  //print the string "Arduino Bootcamp"
}
```

Let's Play!

```
#include <LiquidCrystal_I2C.h>    //include the LCD-I2C library

LiquidCrystal_I2C lcd(0x27,16,2);    //defining a new LCD with name 'lcd', I2C address: 0x27, LCD size: 16 columns x 2 lines

void setup()
{
  lcd.begin();          //initialize the lcd variable
  lcd.backlight();      //turn on LCD's backlight
}

void loop()
{
  lcd.clear();          //clear the values printed in the LCD
  lcd.setCursor(2,0);    //set the cursor at the third column and first line
  lcd.print("Electro SC"); //print the string "Electro SC"

  delay(1000);          //wait for a second

  lcd.clear();          //clear the values printed in the LCD
  lcd.setCursor(0,0);    //set the cursor at the first column and first line
  lcd.print("Arduino Bootcamp"); //print the string "Arduino Bootcamp"
}
```


Let's Play v2!

```
#include <LiquidCrystal_I2C.h>    //include the LCD-I2C library

LiquidCrystal_I2C lcd(0x27,16,2);    //defining a new LCD with name 'lcd', I2C address: 0x27, LCD size: 16 columns x 2 lines

void setup()
{
  lcd.begin();          //initialize the lcd variable
  lcd.backlight();      //turn on LCD's backlight

  lcd.setCursor(3,0);    //set the cursor at the fourth column and first line
  lcd.print("Hello, World"); //print the string "Hello, World"
}

void loop()
{
  lcd.display();        //display the given string 'turn on the pixels'
  delay(1000);          //wait for one second
  lcd.noDisplay();      //clear the printed string (turn off the pixels)
  delay(1000);          //wait for one second
}
```

Let's Play v3!

```
#include <LiquidCrystal_I2C.h>    //include the LCD-I2C library

LiquidCrystal_I2C lcd(0x27,16,2);    //defining a new LCD with name 'lcd', I2C address: 0x27, LCD size: 16 columns x 2 lines

void setup()
{
  lcd.begin();          //initialize the lcd variable
  lcd.backlight();      //turn on LCD's backlight

  lcd.setCursor(3,0);    //set the cursor at the fourth column and first line
  lcd.print("Hello, World!"); //print the string "Hello, World!"
}

void loop()
{
  for(int i = 15; i>-13; i--){ //counting from 15 down to -13
    lcd.clear();             //clear the values printed in the LCD
    lcd.setCursor(i,1);      //set the cursor at the i column and second line
    lcd.print("Hello Again!"); //print the string "Hello, World!"
    delay(200);              //wait for 200 milliseconds
  }
}
```

Let's Play v4!

```
#include <LiquidCrystal_I2C.h>    //include the LCD-I2C library

LiquidCrystal_I2C lcd(0x27,16,2);    //defining a new LCD with name 'lcd', I2C address: 0x27, LCD size: 16 columns x 2 lines

void setup()
{
  lcd.begin();                //initialize the lcd variable
  lcd.backlight();            //turn on LCD's backlight

  lcd.setCursor(3,0);          //set the cursor at the fourth column and first line
  lcd.print("Hello, World!");    //print the string "Hello, World!"
}

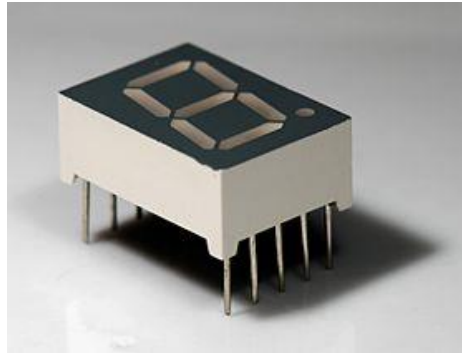
void loop()
{
  for(int positionCounter = 0; positionCounter < 13; positionCounter++){    //counting from 0 to 13
    lcd.scrollDisplayLeft();    //shift the value displayed in LCD to left
    delay(200);    //wait for 200 milliseconds
  }

  for(int positionCounter = 0; positionCounter < 29; positionCounter++){    //counting from 0 to 29
    lcd.scrollDisplayRight();    //shift the value displayed in LCD to right
    delay(200);    //wait for 200 milliseconds
  }

  for(int positionCounter = 0; positionCounter < 16; positionCounter++){    //counting from 0 to 16
    lcd.scrollDisplayLeft();    //shift the value displayed in LCD to left
    delay(200);    //wait for 200 milliseconds
  }
}
```

Seven Segment Display

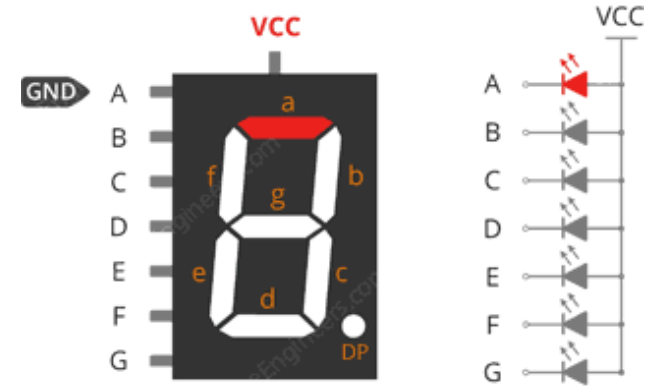
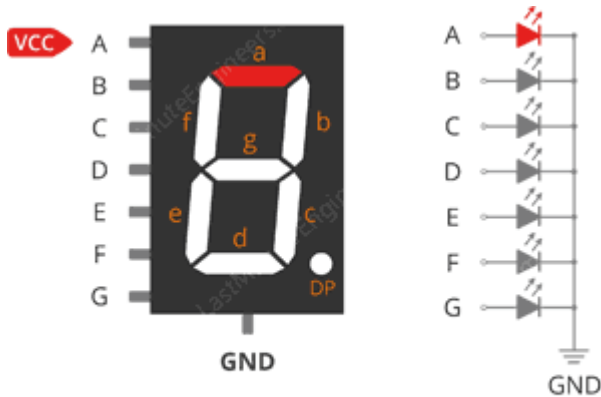
A **seven-segment** display (SSD), or **seven-segment** indicator, is a form of electronic display device for displaying decimal numerals that is an alternative to the more complex dot matrix displays.



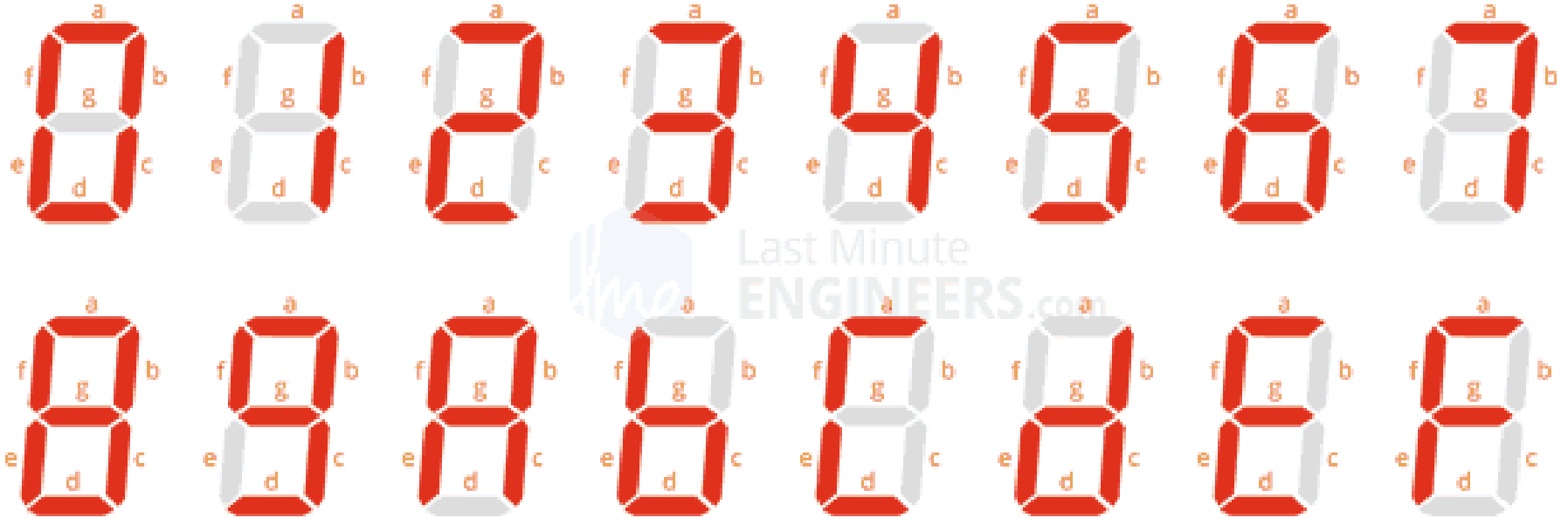
Seven Segment Display

There are two types of seven segment:

1. **Common Ground** (Active High, LED turns on when you give it **HIGH** signal).
2. **Common VCC** (Active Low, LED turns on when you give it a **LOW** signal).



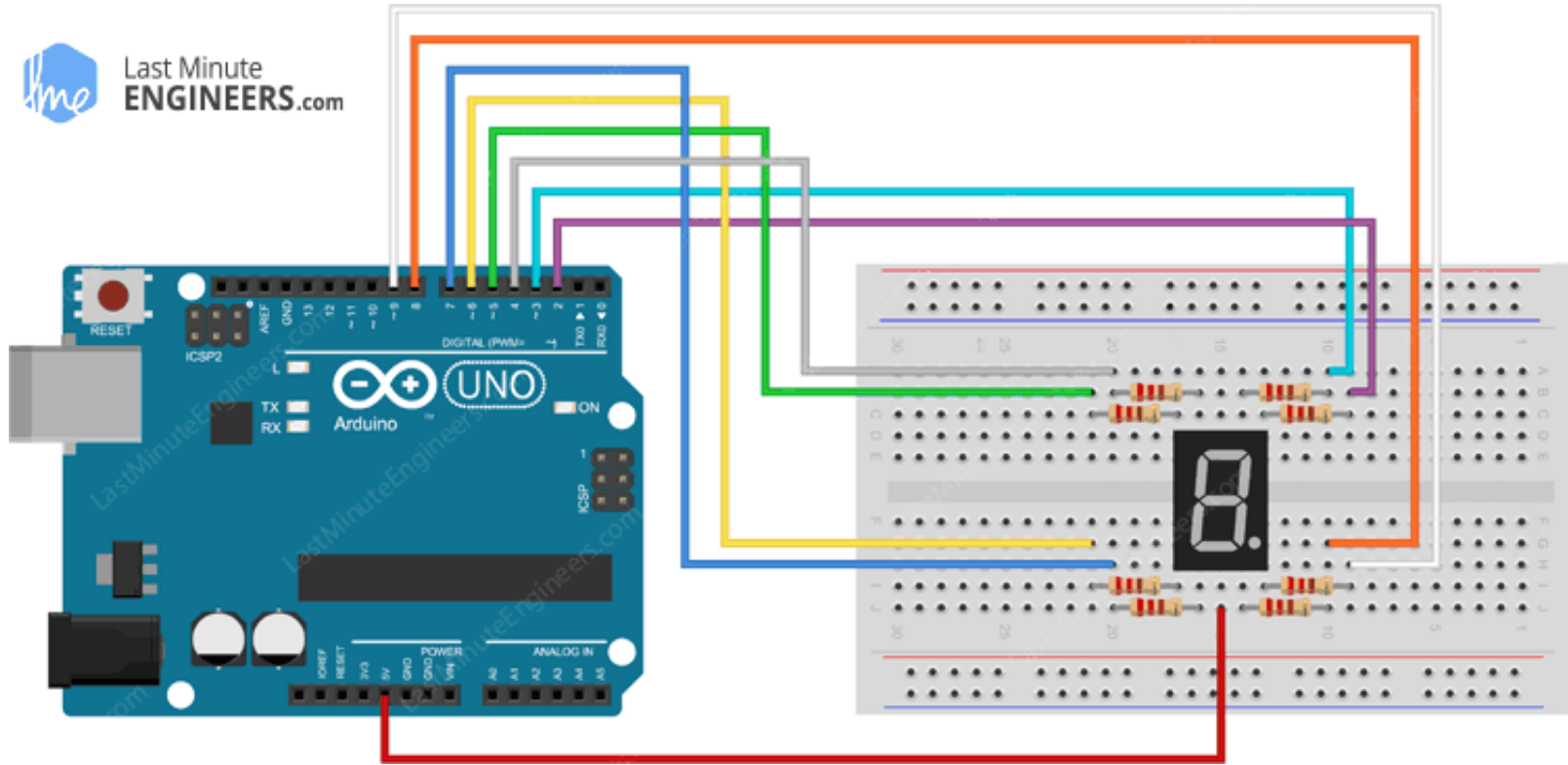
Seven Segment Display



Circuit Building (Common VCC)



Last Minute
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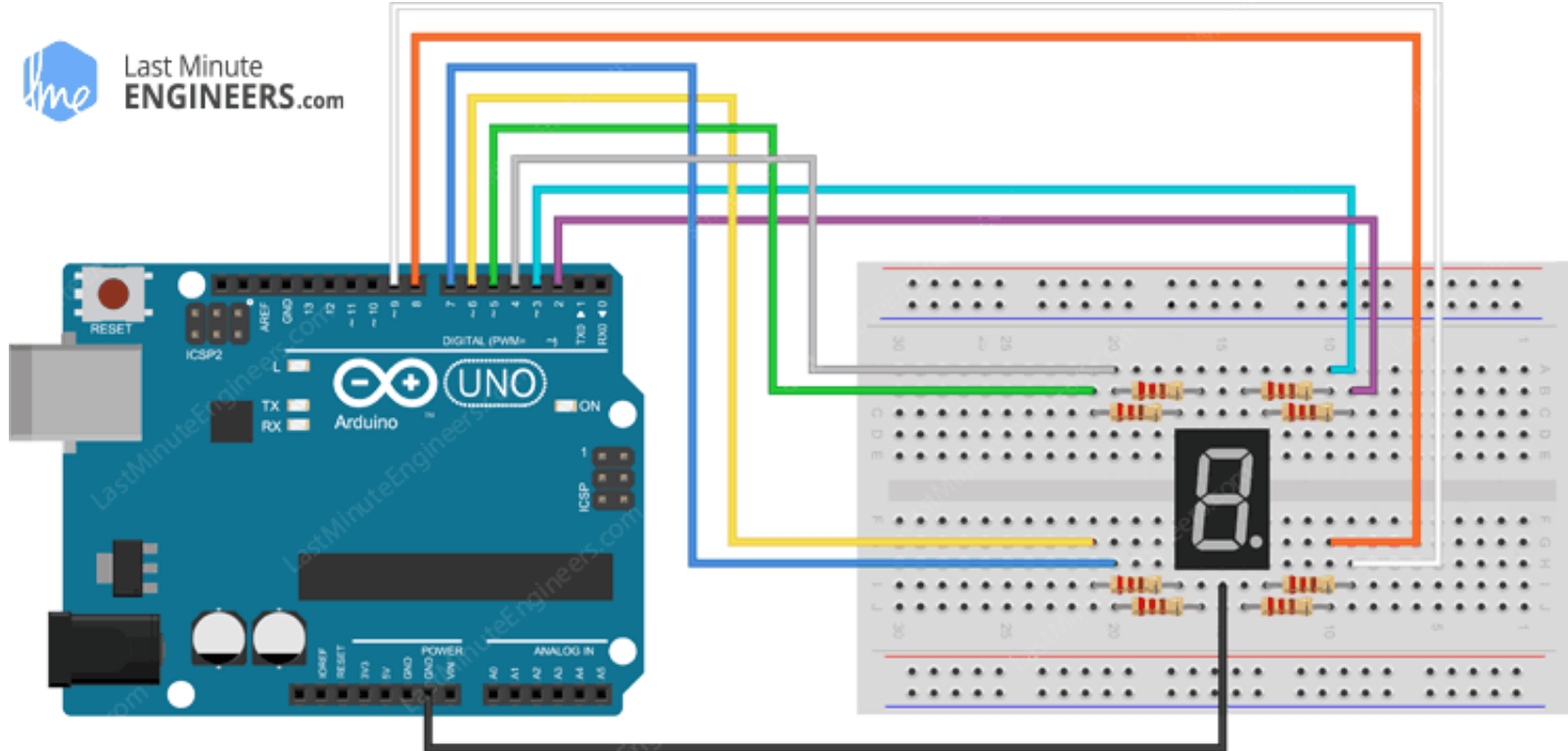
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Circuit Building (Common GND)



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Let's Code!

```
//pins decalation
int a = 2;
int b = 3;
int c = 4;
int d = 5;
int e = 6;
int f = 8;
int g = 9;

void setup() {
  //setting up all the pins as output
  pinMode(a, OUTPUT);
  pinMode(b, OUTPUT);
  pinMode(c, OUTPUT);
  pinMode(d, OUTPUT);
  pinMode(e, OUTPUT);
  pinMode(f, OUTPUT);
  pinMode(g, OUTPUT);
}

//defining a function to turn off all the pins
void turnOff() {
  digitalWrite(a, LOW);
  digitalWrite(b, LOW);
  digitalWrite(c, LOW);
  digitalWrite(d, LOW);
  digitalWrite(e, LOW);
  digitalWrite(f, LOW);
  digitalWrite(g, LOW);
}

//defining a function to display a digit
void displayDigit (int digit){
  //Conditions for displaying segment a:
  if(digit !=1 && digit != 4){
    digitalWrite(a,HIGH);
  }
  //Conditions for displaying segment b:
  if(digit != 5 && digit != 6){
    digitalWrite(b,HIGH);
  }
  //Conditions for displaying segment c:
  if(digit != 2){
    digitalWrite(c,HIGH);
  }
  //Conditions for displaying segment d:
  if(digit != 1 && digit != 4 && digit != 7){
    digitalWrite(d,HIGH);
  }
  //Conditions for displaying segment e:
  if(digit == 2 || digit == 6 || digit == 8 || digit == 0){
    digitalWrite(e,HIGH);
  }
  //Conditions for displaying segment f:
  if(digit != 1 && digit != 2 && digit != 3 && digit == 7){
    digitalWrite(f,HIGH);
  }
  //Conditions for displaying segment :
  if(digit != 0 && digit != 1 && digit != 7){
    digitalWrite(g,HIGH);
  }
}

void loop() {
  for(int i=0; i<10; i++){    //counting from 0 to 10
    displayDigit(i);         //calling the defined function above and display the digit on the SSD
    delay(1000);              //wait for a second
    turnOff();                //Turn off all the led
  }
}
```

Let's Code With Library!

```
#include "SevSeg.h"
SevSeg sevseg;

void setup()
{
    //Set to 1 for single digit display
    byte numDigits = 1;

    //defines common pins while using multi-digit display. Left empty as we have a single digit display
    byte digitPins[] = {};

    //Defines arduino pin connections in order: A, B, C, D, E, F, G, DP
    byte segmentPins[] = {7, 8, 4, 5, 6, 2, 3, 13};
    bool resistorsOnSegments = true;

    //Initialize sevseg object. Uncomment second line if you use common cathode 7 segment
    sevseg.begin(COMMON_CATHODE, numDigits, digitPins, segmentPins, resistorsOnSegments);
    //sevseg.begin(COMMON_ANODE, numDigits, digitPins, segmentPins, resistorsOnSegments);

    sevseg.setBrightness(90);
}

void loop()
{
    //Display numbers one by one with 2 seconds delay
    for(int i = 0; i < 10; i++)
    {
        sevseg.setNumber(i);
        sevseg.refreshDisplay();
        delay(2000);
    }
}
```

That's it!



CLUB ELECTRO



@electro.sc

<https://github.com/electro-sc/Arduino-Bootcamp-2023>

Thanks!