Lesson 18 LCD Display

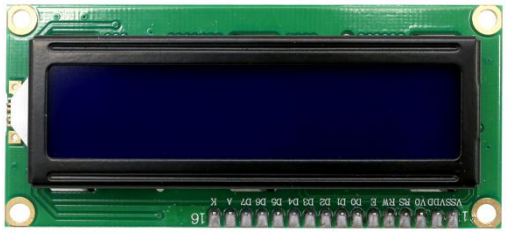
Introduction

In this lesson, you will learn how to connect an LCD Display to Arduino UNO R3 and display what we type.

In addition, with the Potentiometer we can control the brightness of the screen.

Hardware Required

- ✓ 1 * RexQualis UNO R3
- ✓ 1 * LCD1602 module
- ✓ 1 * Potentiometer (10k)
- ✓ 1 * Breadboard
- ✓ 16* M-M Jumper Wires



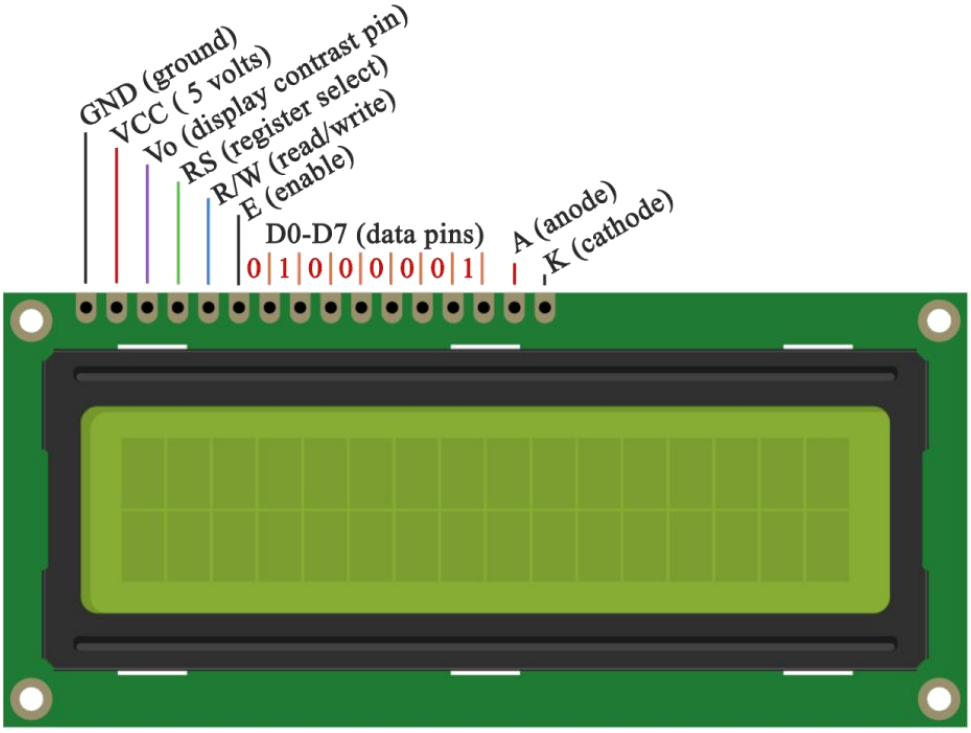
Principle

LCD1602

The lcd display has 16 pins and the first one from left to right is the Ground pin. The second pin is the VCC which we connect the 5 volts pin on the Arduino Board. Next is the Vo pin on which we can attach a potentiometer for controlling the contrast of the display.

Next, The RS pin or register select pin is used for selecting whether we will send commands or data to the LCD. For example if the RS pin is set on low state or zero volts, then we are sending commands to the LCD like: set the cursor to a specific location, clear the display, turn off the display and so on. And when RS pin is set on High state or 5 volts we are sending data or

characters to the LCD.



Code interpretation

```
//LCD RS pin to digital pin 12

//LCD Enable pin to digital pin 2

//LCD D0 pin to digital pin 3

//LCD D1 pin to digital pin 4

//LCD D2 pin to digital pin 5

//LCD D3 pin to digital pin 6

//LCD D4 pin to digital pin 7

//LCD D5 pin to digital pin 8

//LCD D6 pin to digital pin 9

//LCD D7 pin to digital pin 10
```

```
//LCD R/W pin to digital pin 11
//LCD VSS pin to ground
//LCD VCC pin to 5V
//LCD K pin to ground
//LCD A pin to 5V
//LCD V0 pin to 10K resistor:
//ends to +5V and ground


int DI = 12;
int RW = 11;
int DB[] = {3, 4, 5, 6, 7, 8, 9, 10};//Use an array to define the pins
int Enable = 2;
void LcdCommandWrite(int value) {
 // Define all pins
 int i = 0;
 for (i=DB[0]; i <= DI; i++) //Assignment
{
    digitalWrite(i,value & 01);//Because 1602 LCD signal identification is D7-D0 (not D0-D7), here is used to invert the signal.
    value >>= 1;
 }
```

```
  digitalWrite(Enable,LOW);
  delayMicroseconds(1);
  digitalWrite(Enable,HIGH);
  delayMicroseconds(1);
  digitalWrite(Enable,LOW);
  delayMicroseconds(1);
}
void LcdDataWrite(int value) {
  // Define all pins
  int i = 0;
  digitalWrite(DI, HIGH);
  digitalWrite(RW, LOW);
  for (i=DB[0]; i <= DB[7]; i++) {
     digitalWrite(i,value & 01);
     value >>= 1;
  }
  digitalWrite(Enable,LOW);
  delayMicroseconds(1);
  digitalWrite(Enable,HIGH);
  delayMicroseconds(1);
  digitalWrite(Enable,LOW);
```

```
 delayMicroseconds(1);
 }
void setup (void) {
 int i = 0;
 for (i=Enable; i <= DI; i++) {
    pinMode(i,OUTPUT);
 }
 delay(100);
 // Initialize the LCD
 LcdCommandWrite(0x38);      // Set to 8-bit interface, 2 lines
display, 5x7 text size
 delay(64);
 LcdCommandWrite(0x38);      // Set to 8-bit interface, 2 lines
display, 5x7 text size
 delay(50);
 LcdCommandWrite(0x38);      // Set to 8-bit interface, 2 lines
display, 5x7 text size
 delay(20);
 LcdCommandWrite(0x06);    // Input method setting
                           // Auto increment, no shift is displayed
 delay(20);
 LcdCommandWrite(0x0E);    // display setting
```

```
                                    // Turn on the display, the cursor
shows, no flicker
  delay(20);
  LcdCommandWrite(0x01);    // The screen is empty and the cursor
position is zeroed
  delay(100);
  LcdCommandWrite(0x80);    // display setting
  //Turn on the display, the cursor shows, no flicker
  delay(20);
}
void loop (void) {
    LcdCommandWrite(0x01);    // The screen is empty and the cursor
position is zeroed
    delay(10);
    LcdCommandWrite(0x80+3);
    delay(10);
    // Write information
    LcdDataWrite('W');
    LcdDataWrite('e');
    LcdDataWrite('l');
    LcdDataWrite('c');
    LcdDataWrite('o');
```

```
    LcdDataWrite('m');
    LcdDataWrite('e');
    LcdDataWrite(' ');
    LcdDataWrite('t');
    LcdDataWrite('o');
    delay(10);
    LcdCommandWrite(0xc0+3);    // Define the cursor position as the third position of the second line
    delay(10);
    LcdDataWrite('R');
    LcdDataWrite('e');
    LcdDataWrite('x');
    LcdDataWrite('q');
    LcdDataWrite('u');
    LcdDataWrite('a');
    LcdDataWrite('l');
    LcdDataWrite('i');
    LcdDataWrite('s');
    delay(5000);
    LcdCommandWrite(0x01);    // The screen is empty and the cursor position is zeroed
    delay(10);
```

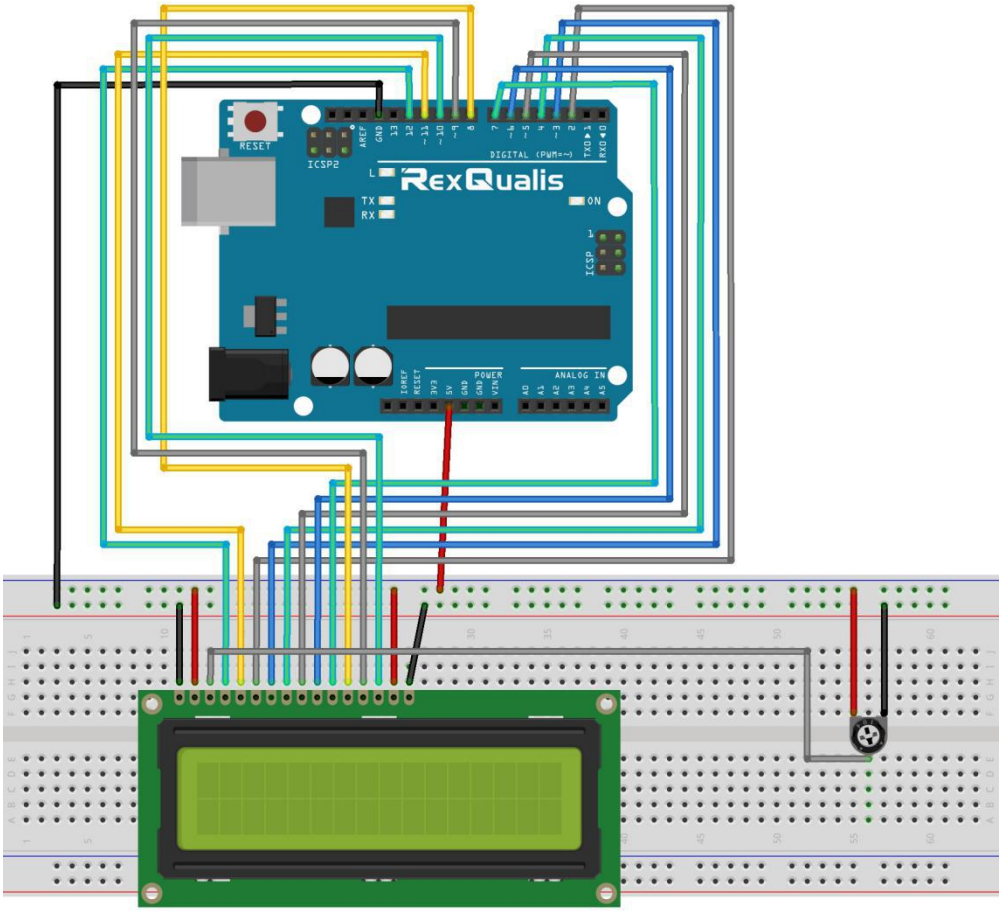
```
LcdCommandWrite(0x80+2); //Define the cursor position as the second position of the first line
delay(10);
LcdDataWrite('M');
LcdDataWrite('a');
LcdDataWrite('k');
LcdDataWrite('e');
LcdDataWrite(' ');
LcdDataWrite('S');
LcdDataWrite('c');
LcdDataWrite('i');
LcdDataWrite('e');
LcdDataWrite('n');
LcdDataWrite('c');
LcdDataWrite('e');
delay(10);
LcdCommandWrite(0xc0+6);  // Define the cursor position as the sixth position of the second line
delay(10);
LcdDataWrite('F');
LcdDataWrite('u');
LcdDataWrite('n');
```

```
delay(5000);
LcdCommandWrite(0x01);    // The screen is empty and the cursor position is zeroed
delay(10);
LcdCommandWrite(0x80+2); //Define the cursor position as the second position of the first line
delay(10);
LcdDataWrite('M');
LcdDataWrite('a');
LcdDataWrite('k');
LcdDataWrite('e');
LcdDataWrite(' ');
LcdDataWrite('S');
LcdDataWrite('c');
LcdDataWrite('i');
LcdDataWrite('e');
LcdDataWrite('n');
LcdDataWrite('c');
LcdDataWrite('e');
delay(10);
LcdCommandWrite(0xc0+4);    // Define the cursor position as the fourth position of the second line
```

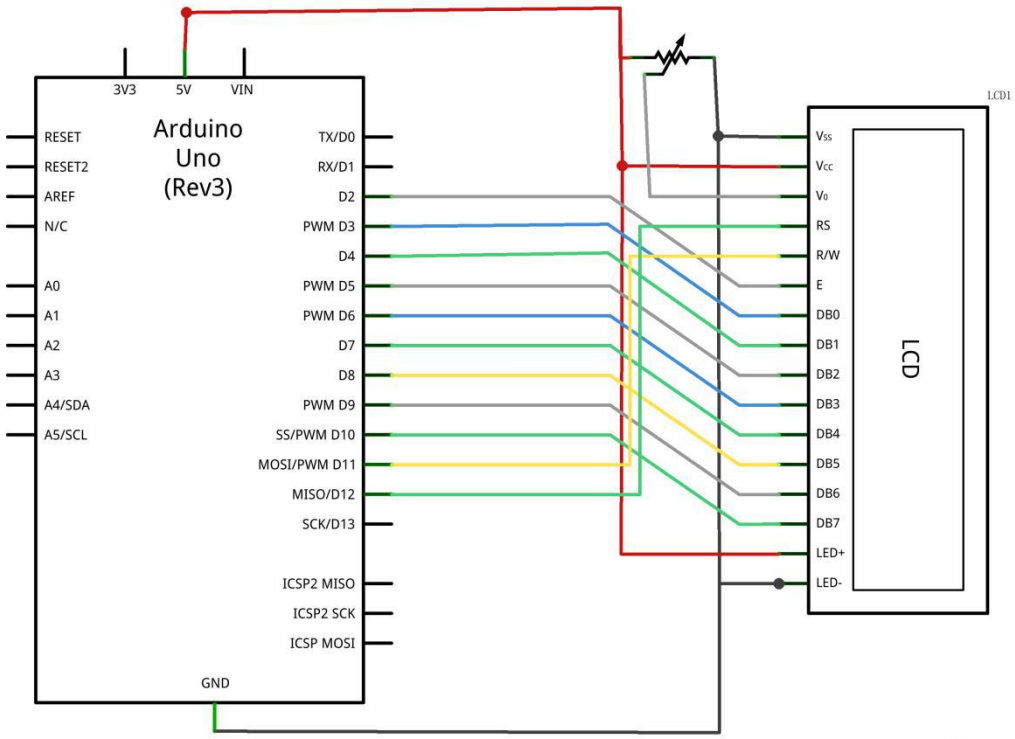
```
delay(10);
LcdDataWrite('P');
LcdDataWrite('o');
LcdDataWrite('p');
LcdDataWrite('u');
LcdDataWrite('l');
LcdDataWrite('a');
LcdDataWrite('r');
delay(5000);
}
```

Experimental Procedures

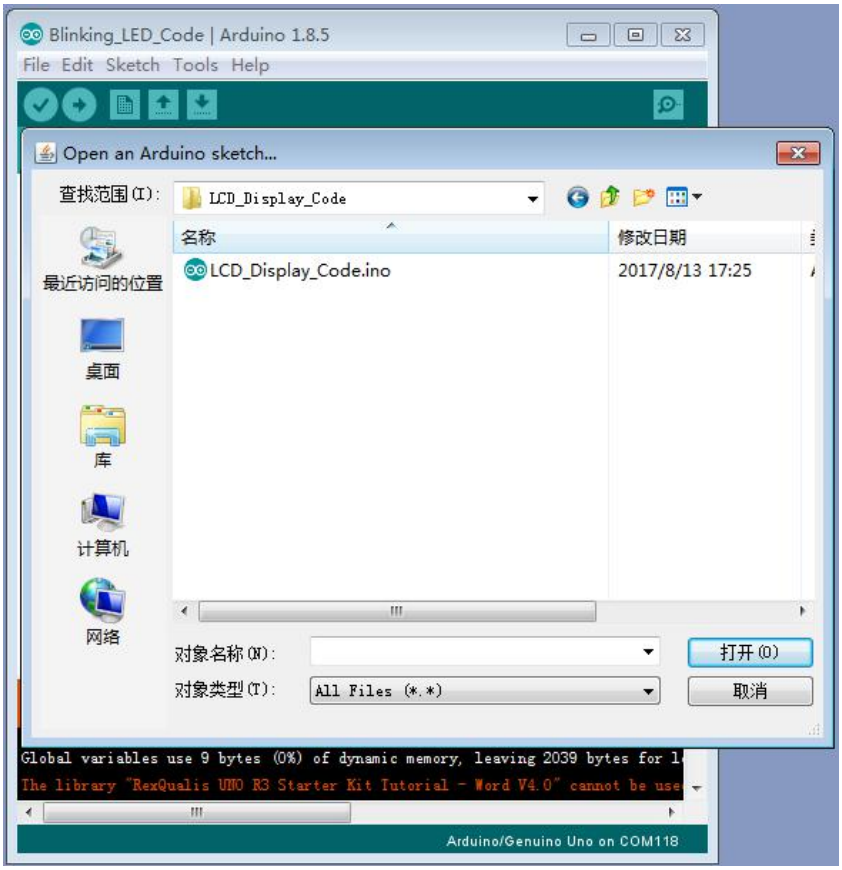
Step 1:Build the circuit



Schematic Diagram



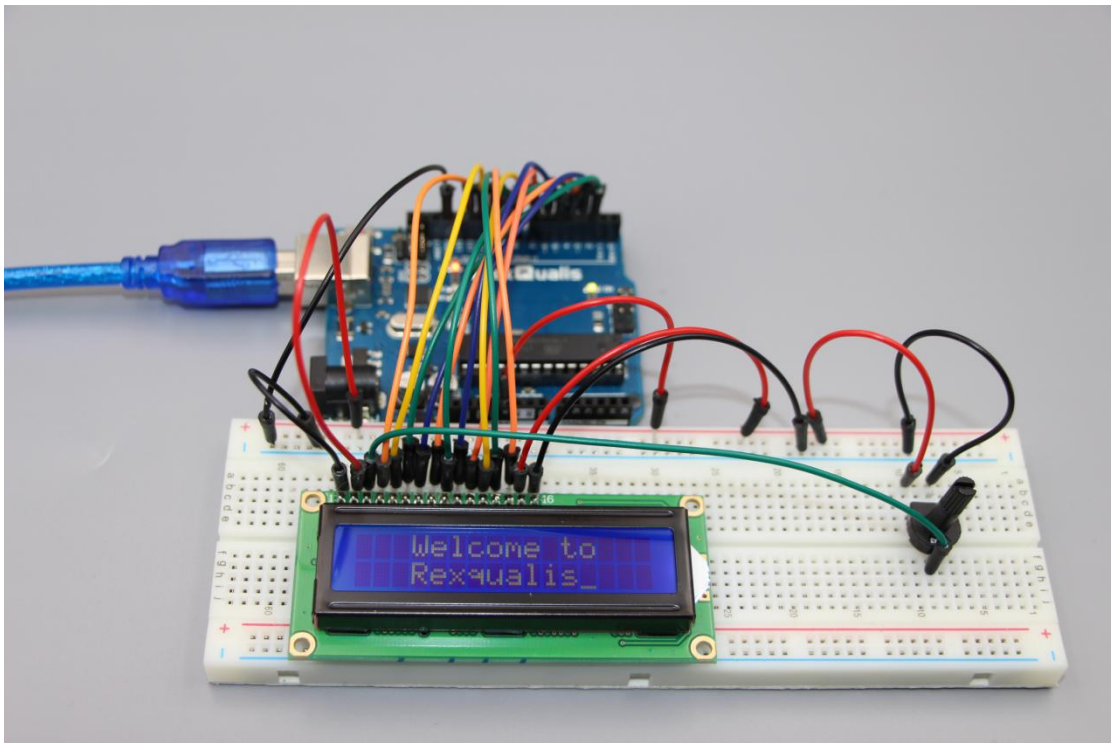
Step 2: Open the code:LCD_Display_Code



Step 3: Attach Arduino UNO R3 board to your computer via USB cable and check that the 'Board Type' and 'Serial Port' are set correctly.

Step 4: Upload the code to the RexQualis UNO R3 board.

Then, you can see on the LCD Display that we have just entered the text "Welcome to, Rexqualis……",and you can adjust the brightness of the screen with the Potentiometer.



If it isn’ t working, make sure you have assembled the circuit correctly, verified and uploaded the code to your board. For how to upload the code and install the library, check Lesson 0 Preface.