1602 Liquid Crystal Display

Outline

This lesson will teach you how to use **1602 Liquid Crystal Display** to show “hello world”.

Materials

Arduino Uno x 1

1K Resistor x 1

Breadboard x 1

LCD 1602 x 1

DuPont Wires (few pcs)

Product Description

The LCD 1602 character LCD module is designed to display letters, numbers, symbols, and dot matrix. It has two modes of operation divided into 4-bit and 8-bit data transmission.

It is widely used in low power consumption applications.

Technical Parameters

Display capacity: 16 x 2 characters

Chip operating voltage: 4.5 ~ 5.5V

Operating current: 2.0mA (5.0V)

The best operating voltage of the module: 5.0V

Character size: 2.95 x 4.35mm (W * H)

Interface Pin Description

Pin no	Symbol	Description
1	VSS	Power supply ground
2	VDD	Positive power supply
3	VO	Contrast setting
4	RS	Command / data selection
5	RW	Reading/ writing data
6	E	Enable
7	D0	Data 0
8	D1	Data 1
9	D2	Data 2
10	D3	Data 3
11	D4	Data 4
12	D5	Data 5
13	D6	Data 6
14	D7	Data 7
15	A	Positive backlight
16	K	Backlight ground

Interface specification

1st pin: VSS is the ground power supply.

2nd pin: VDD is used to connect 5V positive power supply.

3rd pin: V0 is a regulator of the contrast of the display. The contrast is the weakest when connect with positive power, the contrast is highest when connect with ground power. And it will produce "ghosting" if the contrast is too high, you can use a 10K potentiometer to adjust the contrast.

4th pin: RS is register selection pin, high-level is data register selection while low-level is instruction register selection.

5th pin: R/W is the reading and writing signal line, high-level is reading operation while low-level is writing operation. When RS and R/W are low, you can write the instruction or display address. When RS is low and R/W is high, you can read signals. When RS is high and R/W is low, you can write data.

6th pin: E is the enable pin, when it goes from high to low, the liquid crystal module carries out the instruction.

7th~14th pin: D0 - D7 is a two-way parallel bus, used to transmit commands and data.

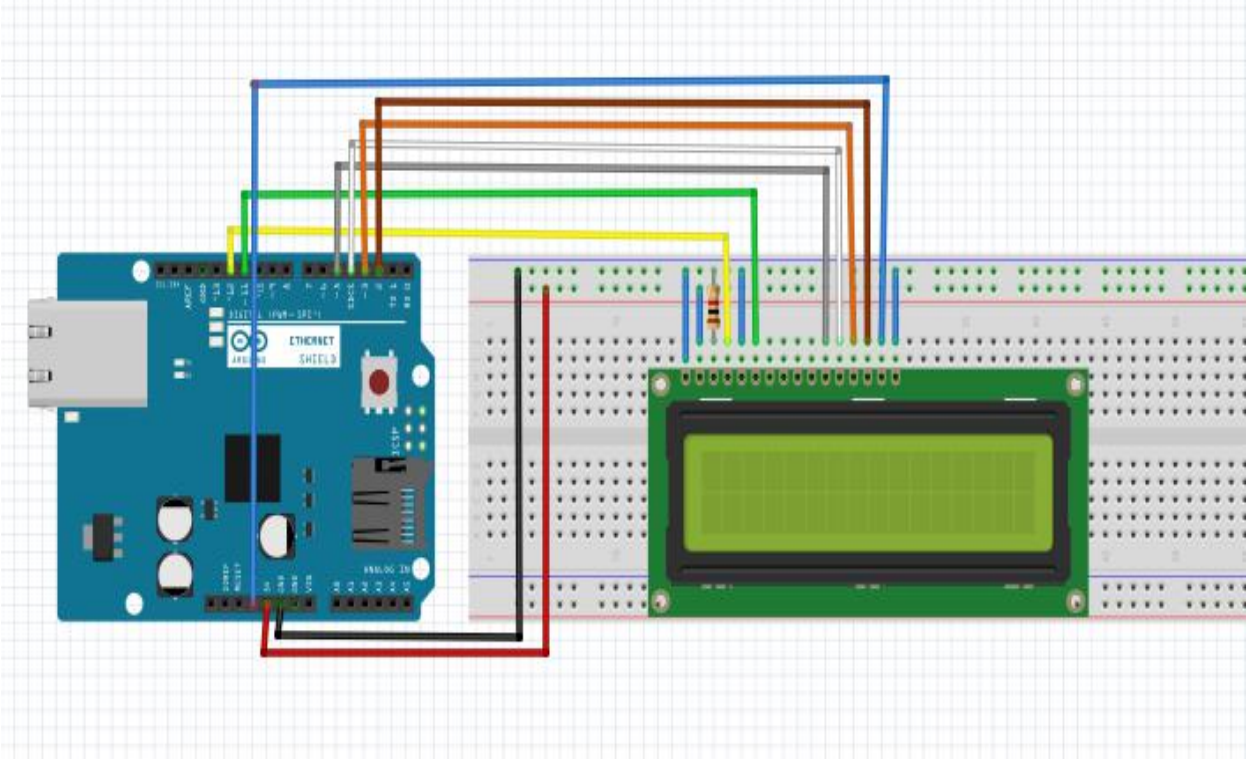
15th Pin: the back light source power

16th Pin: the back light source ground.

The basic operation of the 1602 liquid crystal is divided into the following four kinds

Read the state	INPUT	RS=L, R/W=H, E=H	OUTPUT	D0~D7= Status word
Written instructions	INPUT	RS=L, R/W=L, D0~D7=Order code E=High pulse	OUTPUT	NC
Read the data	INPUT	RS=H, R/W=H, E=H	OUTPUT	D0~D7= Data
Write the data	INPUT	RS=H, R/W=L, D0~D7=Data E= High pulse	OUTPUT	NC

Wiring Diagram



Sample Code

```
#include <LiquidCrystal.h>

// initialize the library with the numbers of the interface pins
LiquidCrystal lcd(12, 11, 5, 4, 3, 2);

void setup() {
  // set up the LCD's number of columns and rows:
  lcd.begin(16, 2);
  // Print a message to the LCD.
  lcd.print("hello, world!");
}

void loop() {
  // set the cursor to column 0, line 1
  // (note: line 1 is the second row, since counting begins with 0):
  lcd.setCursor(0, 1);
  // print the number of seconds since reset:
  lcd.print(millis() / 1000);
}
```

Results