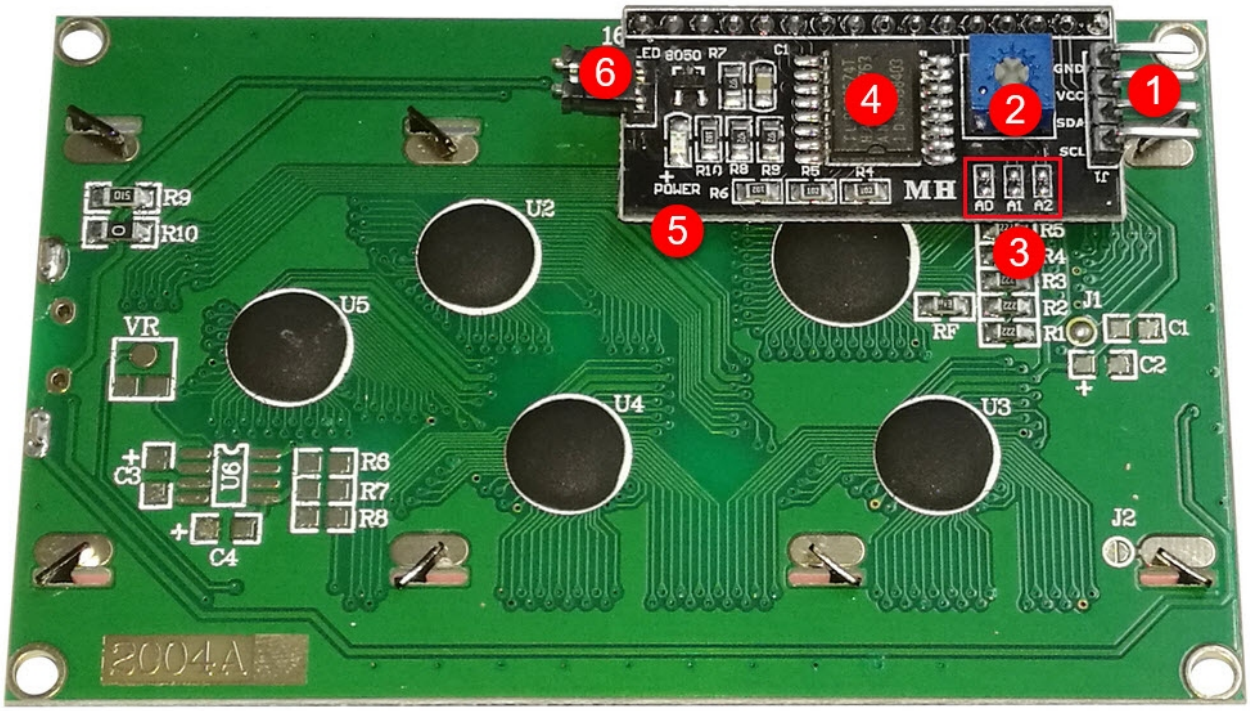
LCD 20x4 I2C

SPECIFICATIONS

- LED type is 20-Character 4-Line, blue Backlight and white font (STN Negative Blue)
- Be I2C-Bus Interface that can connect 8 LCDs together in the same Bus (setup each Address differently)
- IC No.PCF8574A or PCF8574 is used to extend Port for connecting to LCD
- Use Power Supply 5VDC

COMPONENTS OF LCD 20x4 I2C



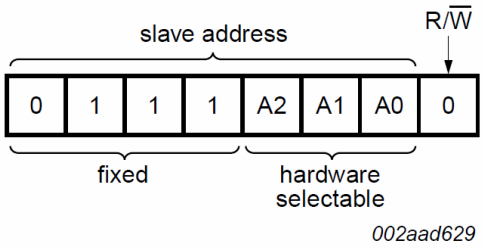
1. There are 4 Pins as listed below;
   - **PIN GND:** PIN GROUND
   - **PIN VCC:** PIN POWER SUPPLY 5VDC
   - **PIN SDA:** PIN Signal DATA of I2C-Bus System
   - **PIN SCL:** PIN Signal CLOCK of I2C-Bus System

2. Adjustable Resistor adjusts the brightness and contrast of LCD Display.

3. Jumper chooses Address(A0-A2) of LCD Display. If this Jumper is disconnected, it becomes Logic "1"; but, if it is connected, it becomes Logic "0" instead. Normally, this Jumper is not soldered, the initial Address is 0x3F (A2=1, A1=1, A0=1). If user requires changing the Address, there are 8 available values; 0x38-0x3F as shown in the table below;

PCF8574A address map

Pin connectivity			Address of PCF8574A								Address byte value		7-bit hexadecimal address without R/W
A2	A1	A0	A6	A5	A4	A3	A2	A1	A0	R/W	Write	Read	
V_{SS}	V_{SS}	V_{SS}	0	1	1	1	0	0	0	-	70h	71h	38h
V_{SS}	V_{SS}	V_{DD}	0	1	1	1	0	0	1	-	72h	73h	39h
V_{SS}	V_{DD}	V_{SS}	0	1	1	1	0	1	0	-	74h	75h	3Ah
V_{SS}	V_{DD}	V_{DD}	0	1	1	1	0	1	1	-	76h	77h	3Bh
V_{DD}	V_{SS}	V_{SS}	0	1	1	1	1	0	0	-	78h	79h	3Ch
V_{DD}	V_{SS}	V_{DD}	0	1	1	1	1	0	1	-	7Ah	7Bh	3Dh
V_{DD}	V_{DD}	V_{SS}	0	1	1	1	1	1	0	-	7Ch	7Dh	3Eh
V_{DD}	V_{DD}	V_{DD}	0	1	1	1	1	1	1	-	7Eh	7Fh	3Fh



PCF8574A

If it is IC No.PCF8574, the initial Address is 0x27 (A2=1, A1=1, A0=1). If user requires changing the Address, there are 8 available values; 0x20-0x27 as shown in the table below;

PCF8574 address map

Pin connectivity			Address of PCF8574								Address byte value		7-bit hexadecimal address without R/W
A2	A1	A0	A6	A5	A4	A3	A2	A1	A0	R/W	Write	Read	
V_{SS}	V_{SS}	V_{SS}	0	1	0	0	0	0	0	-	40h	41h	20h
V_{SS}	V_{SS}	V_{DD}	0	1	0	0	0	0	1	-	42h	43h	21h
V_{SS}	V_{DD}	V_{SS}	0	1	0	0	0	1	0	-	44h	45h	22h
V_{SS}	V_{DD}	V_{DD}	0	1	0	0	0	1	1	-	46h	47h	23h
V_{DD}	V_{SS}	V_{SS}	0	1	0	0	1	0	0	-	48h	49h	24h
V_{DD}	V_{SS}	V_{DD}	0	1	0	0	1	0	1	-	4Ah	4Bh	25h
V_{DD}	V_{DD}	V_{SS}	0	1	0	0	1	1	0	-	4Ch	4Dh	26h
V_{DD}	V_{DD}	V_{DD}	0	1	0	0	1	1	1	-	4Eh	4Fh	27h

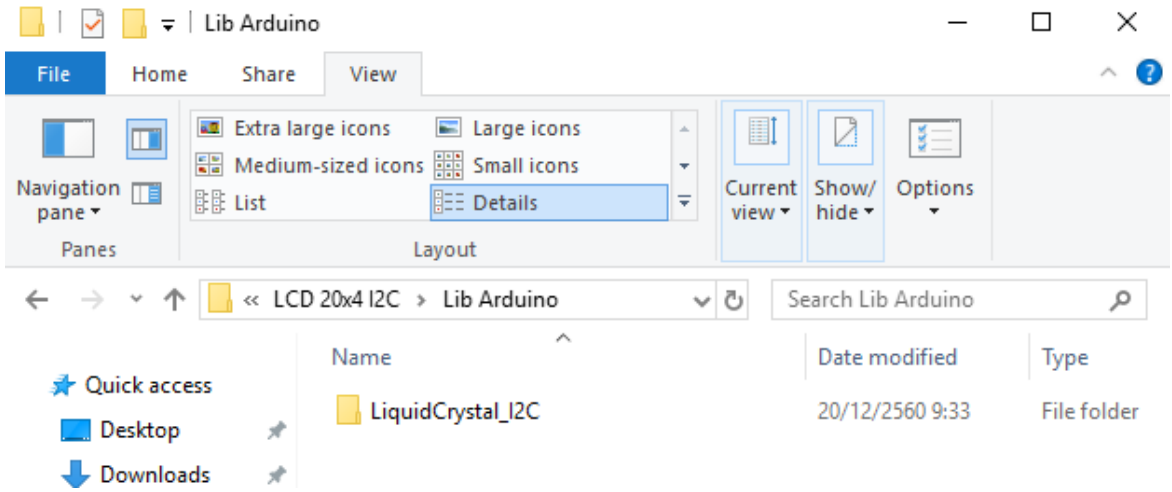
4. Use IC No.PCF8574A or PCF8574 to extend Port.

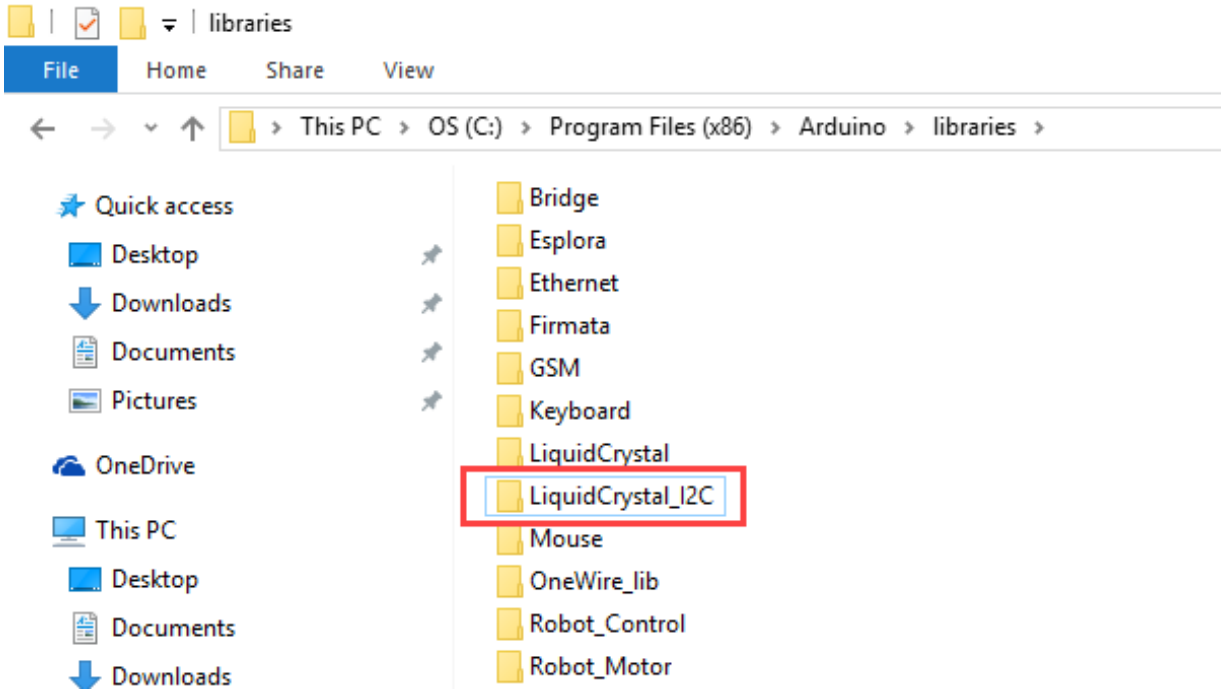
5. LED POWER shows state of supplying Power of LCD Display.

6. Jumper ON/OFF Power Supply of Backlight is at the back of LCD Display. If it is connected, it enables Power Supply of Backlight at the back of LCD Display.

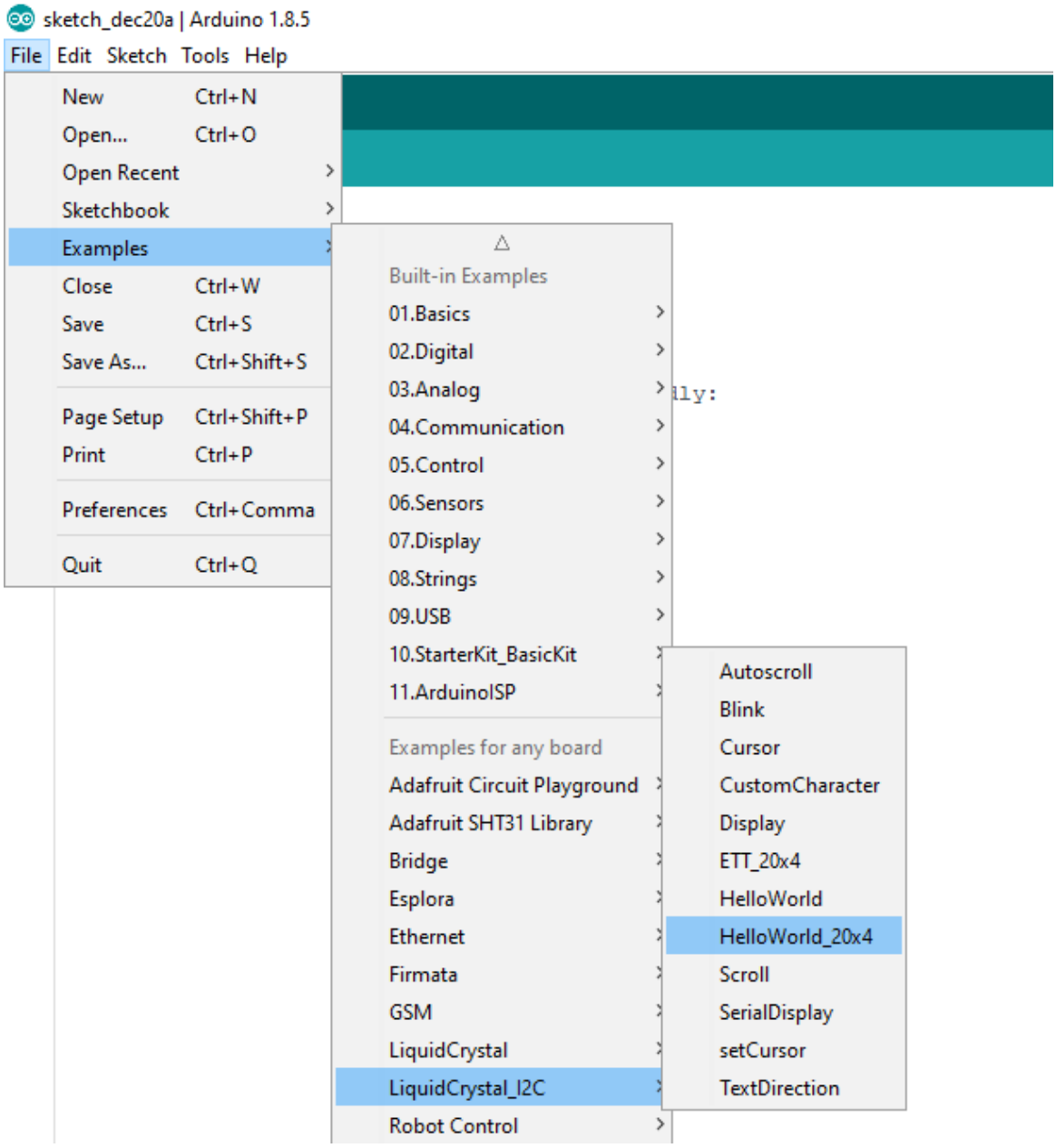
Example of using LCD 20x4 I2C

1. This example uses Arduino. First of all, it has to install Library of LCD 20x4 I2C; copy Folder **LiquidCrystal_I2C** in CD and then paste it in the Folder **libraries** of Program Arduino. In this case, this example shows how to install the Library at the location **C:\Program Files (x86)\Arduino\libraries** as shown in the picture below;





2. Connect Pin GND, VCC, SDA, and SCL of LCD with Board Arduino; and then connect to computer.
3. Open Program Arduino; choose board and Port that is actually connected.
4. Click Menu **File---Examples**, user will see the example **LiquidCrystal_I2C** is added in the folder as shown in the picture. Next, choose the example **HelloWorld_20x4** to test the operation.



HelloWorld_20x4 | Arduino 1.8.5

File Edit Sketch Tools Help

HelloWorld_20x4

```
#include <Wire.h>
#include <LiquidCrystal_I2C.h>

// Set the LCD address to 0x27 (PCF8574 address 0x20-0x27) for a 20 chars and 4 line display
// Set the LCD address to 0x3F (PCF8574A address 0x38-0x3F) for a 20 chars and 4 line display
LiquidCrystal_I2C lcd(0x27, 20, 4);

void setup() {
  // initialize the LCD
  lcd.begin();

  // Turn on the blacklight and print a message.
  lcd.backlight();

  // Print a message to the LCD.
  lcd.print("hello, world!");
  lcd.setCursor(0, 1);
  lcd.print("hello, world!");
  lcd.setCursor(0, 2);
  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, 3);
  // print the number of seconds since reset:
  lcd.print(millis() / 1000);
}
```

5. Upload Program into Board Arduino. When uploaded successfully, user will see the message shown on the LCD Display.

NOTE: If connected many LCD 20x4 I2C at the same time, it might fail in communication because Pin SCL and Pin SDA of every LCD Display is connected with 4.7K Pull-Up Resistor (R8,R9). In this case, it should remove Resistor R8 and R9 and there is only one board left that is connected with the Resistor.