

DATA COMMUNICATION

LAB 7: INTERFACE I2C LCD

I. Introduction

In this manual we will learn how to interface an LCD (Liquid Crystal Display) to the NodeMCU board. These 16x2 LCDs are very popular and broadly used in electronics projects as they are good for displaying information like sensor data from your project, and also they are very cheap.



Figure 1: 16x2 LCD

Connecting LCD to I2C and then interfacing it to NodeMCU is very simple (see Figure 2):

1. GND pin of I2C is connected Ground pin (GND) of the NodeMCU.
2. VCC pin of I2C is connected 3.3V pin (or Vin) of the NodeMCU
3. SDA pin of I2C is connected D4 of the NodeMCU.
4. SCL pin of I2C is connected D3 pin of the NodeMCU.

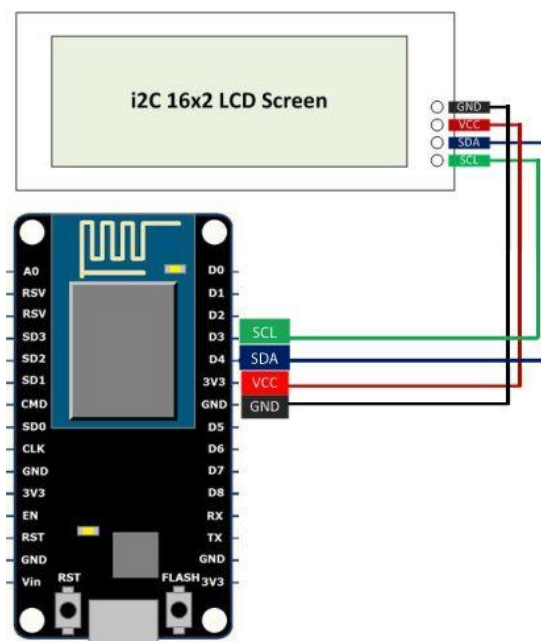


Figure 2: Wire connection for I2C interface

II. Getting Started

First thing we need to do is to insert the Liquid Crystal Library. We can do that like this: **Sketch > Include Library > Manage Libraries > LiquidCrystal_I2C LCD**

Snip code to display on this LCD can be found bellow:

```
#include <Wire.h>

#include <LiquidCrystal_I2C.h>

LiquidCrystal_I2C lcd(0x3F, 16, 2);

void setup()
{
    Wire.begin(2,0);

    lcd.init();    // initializing the LCD

    lcd.backlight(); // Enable or Turn On the backlight

    lcd.print(" Hello World "); // Start Printing
}
```

III. Exercise

1. Figure out library for this I2C LCD and explain the value 0x3F used in the source

```
LiquidCrystal_I2C lcd(0x3F, 16, 2);
```

Giao tiếp I2C (Inter-Integrated Circuit) là chuẩn giao tiếp nối tiếp 2 dây. Nó sử dụng 2 đường truyền tín hiệu là:

- SCL là đường xung nhịp đồng hồ do Master phát đi
- SDA là đường dữ liệu theo 2 hướng.

Có thể có nhiều thiết bị có thể kết nối vào một bus I2C do mỗi thiết bị sẽ được nhận ra bởi một địa chỉ duy nhất trong suốt thời gian kết nối. 0x3F là số chỉ địa chỉ đó.

2. Implement the shift-left animation for the string Hello World.

```
1. void scrollleft (int line, char str1[]) {
2.     i = strlen(str1);
3.     for (j = 16; j >= 0; j--) {
4.         lcd.setCursor(0, line);
5.         for (k = 0; k <= 15; k++) {
6.             lcd.print(" "); // Clear line
7.         }
8.         lcd.setCursor(j, line);
9.         lcd.print(str1);
10.        delay(delayTime);
11.    }
12. }
```

```
1. void loop() {  
2.   lcd.clear();  
3.   scrollLeft(0, "Hello World");  
4. }
```

IV. Extra Exercise

Connect 2 LCDs and consider them as one bigger screen. Implement a shift-left animation of a string in this bigger screen.