

3.0 READING SENSOR DATA

It can be very useful on IoT projects to display your local data, debug your programs on site, etc. The model used on this tutorial is the **OLED 128 x 64 SSD 1306 I2C**.

In this lab, you will learn how to connect and read sensor data in to the **OLED** display.

In this Lab, you will need to install some libraries: **All the instructions are found on the “Quick Start to NodeMCU (ESP8266) on Arduino IDEFile”**

On Moodle download the following file (located in the libraries folder)

- Adafruit_Sensor-master.zip
- esp8266-oled-ssd1306-master.zip
- DHT-sensor-library-master.zip

3.2 CONNECTING THE NODEMCU WITH OLED DISPLAY

This task will show you how to program NodeMCU (ESP8266) to display on 0.96-inch 128X64 I2C OLED (base on SSD1306), using Adafruit SSD1306 and Adafruit GFX Libraries.

The Task:

- Upload the code (SSD1306) to NodeMCU and observe the OLD display-- Look at the code and try to analyse the different parts.
- Write a code to print the word hello world to display-- For your code, Use the empty file called (**exercise_3.2.ino**) --

As usual, you will need to:

Initialise and begin the serial link to (115200) in the setup function

Library File

Before you use the OLED 128 x 64 SSD 1306 I2C with NodeMCU, you need to install the Adafruit SSD1306 and Adafruit GFX libraries (name is given to you in the empty sketch on Moodle).

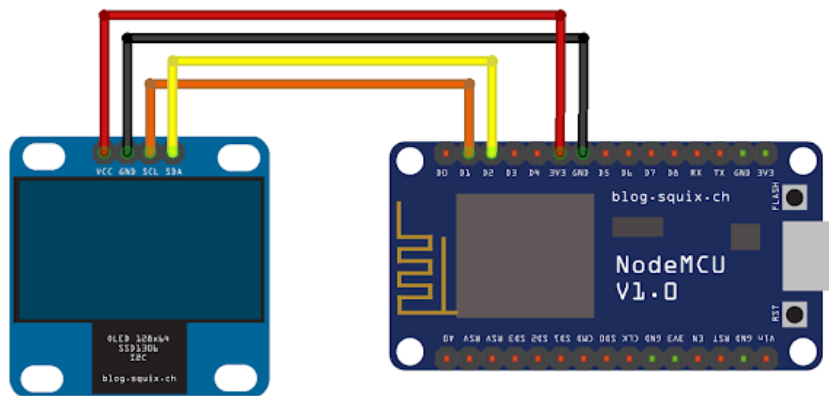
- Open Library Manager in Arduino IDE, search SSD1306. You can find Adafruit SSD1306 library, SSD1306 OLED driver library for 'monochrome' 128x64 and 128x32 OLEDs. Install it.
- Also Install Adafruit GFX Library also and ACROBOT Library.

3.1. UNDERSTANDING OLED DISPLAY

OLED display has as some main characteristics:

- 128 pixels at horizontal and 64 pixels at vertical. So, if you use 8x8 characters, we will get a "16X8" Display (8 lines of 16 characters each).
- It is a I2C display, so we will connect it to the NodeMCU I2C pins, using:
 - o OLED VCC - NodeMCU 3v3
 - o OLED GND - NodeMCU GND
 - o OLED SCL - NodeMCU D1 (any digital pin)
 - o OLED SDA - NodeMCU D2 (any digital pin)

Connect the hardware as follows: you can use any D pin as long it is referenced in your code. The thumb rule is GND→ GND; VCC→ VCC; Data → D pin



In order to work with the OLED, display you need to follow the following rule of thumb:

- Initialize i.e., `SSD1306 OLED display oled.init();`
- Clear screen i.e., `oled.clearDisplay()`
- Set cursor position, start of line 0 i.e., `oled.setTextXY(0,0);`
- OLED have other functions to print and display text on the screen.

NOTE:

- If you get error of "Height incorrect, please fix Adafruit_SSD1306.h!":
Open Adafruit_SSD1306.h file, in the path like
"C:\Users\user\Documents\Arduino\libraries\Adafruit_SSD1306\Adafruit_SSD1306.h".
Un-comment "#define SSD1306_128_64", and comment "#define SSD1306_128_32".

Make sure the I2C address is correct: your I2C OLED have address 3D, correct the code

`display.begin(SSD1306_SWITCHCAPVCC, 0x3C);`

Compile and then upload it to the NodeMCU.

3.2 CONNECTING NODEMCU WITH DHT11 SENSOR

The DHT11 is chosen because it is lab calibrated, accurate and stable and its signal output is digital. Most important of all, it is inexpensive for the given performance. Below is the pinout of the sensor.

The Task:

You need to read the DHT sensor data and display the readings in:

- The serial Link
- OLED display

For your code, use the empty file provided in Moodle (**Exercise_3.1.2_E.ino**)

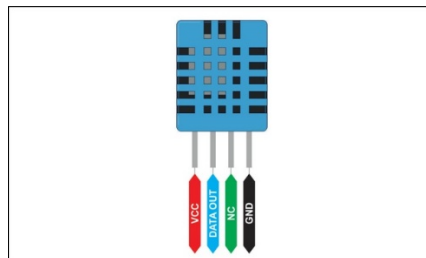
As usual, you will need to, initialise and begin the serial link to (115200) in the setup function.

Library File

Before you use the DHT11 with NodeMCU, you need to install the **DHTLib** library (the “include statement” is given to you in the empty sketch on Moodle).

3.2.1 UNDERSTANDING DHT11 SENSOR

DHT11 sensor gives humidity and temperature data. It has got following pin interface.



Please note that the sensor's pins labelled for your convenient, follow the labels.

Make the following connections – the D pin can be any pin of your choice as long as you use
The thumb rule is GND → GND; VCC → VCC; Data → D pin

