IEEE

# Bootcamp

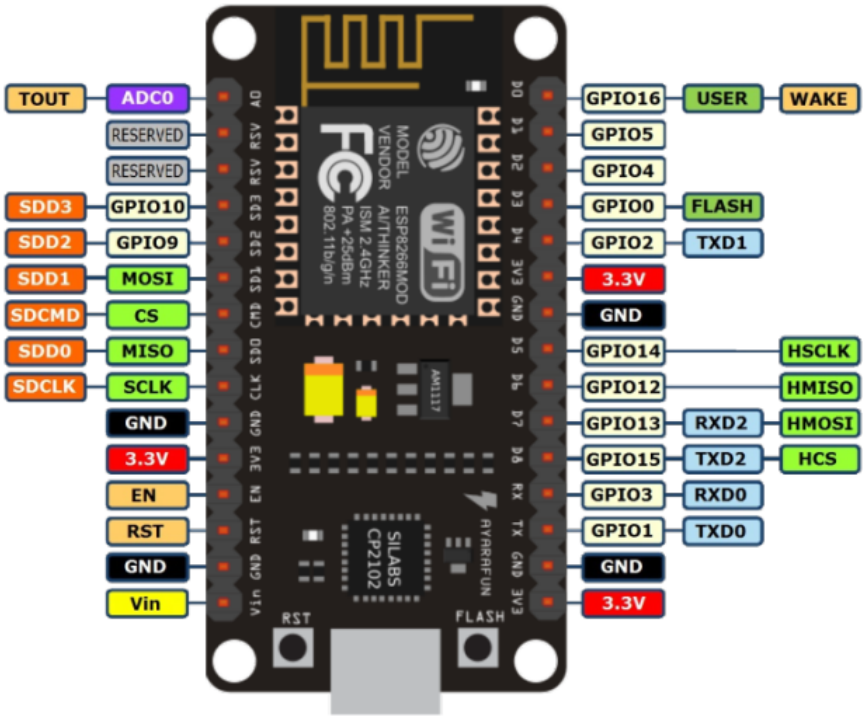
***User Manual***

IEEE PESIT SOUTH CAMPUS Student Branch

# 1. Introduction

## NodeMCU Development Kit

The NodeMCU is a developmental open source IoT platform with a firmware running on the ESP-8266 micro controller unit with a hardware based on the ESP-12 serial Wi-Fi module. The term "NodeMCU" by default refers to the firmware rather than the development boards. The firmware uses the Lua scripting language. The board provided to you is a NodeMCU v1.0 2+ Gen board.




Features:-

- It has a Micro USB port to connect to a computer, for programming the board.
- A hard “reset” button to reset the pins and, a “flash” button to flash the board to a system.
- 13 General Purpose Input Output pins for various operations
- Enable and reset pins for external enable and reset
- 4 ground pins (5 in the 3rd generation boards)
- 3 external voltage supply pins
- 1 Analog to Digital converter pin with 1V maximum input voltage
- 1 main external power source pin
- An on board voltage regulator
- 2 on board LEDs at GPIO 16 and GPIO 02

## Usage instructions:-

- Follow the instructions in section 2 and 3 to install the necessary drivers into your system
- Make sure that the voltages supplied are in optimal 3.3V range
- Do not disconnect your device while uploading a code or while it is in use to avoid corrupting the firmware.

The NodeMCU can be used for a variety of applications ranging from home automation to security systems. However, it cannot be used to control servo motors and similar systems requiring any pulse width modulation. The inexpensive and small board can increase the capabilities of any IoT, owing to it’s wireless connectivity.

# 2. IDE Installation Process

The NodeMCU development board can be programmed using the Arduino 1.6.x and above IDEs. Use of the Arduino IDE does no require any additional flashing. Thus, we use the latest Arduino 1.8.5, with ESP-8266 board version 2.3.0. The steps of installation are as follows:-

1. Log on to https://www.arduino.cc/en/Main/Software and select the link which provides you the Arduino build for your OS.
2. Download and install the Arduino 1.8.5 on your system. The installation steps are provided in the following links:-
    - For Linux Distros (Ubuntu, Fedora, Debian, etc):- https://www.arduino.cc/en/Guide/Linux
    - For Windows OS (Windows 8, 8.1 and 10):- https://www.arduino.cc/en/Guide/Windows
    - For Mac OS X :- https://www.arduino.cc/en/Guide/MacOSX

**Note for Linux users**:- You may need to access the IDE by changing the directory in the terminal to the one which stores the IDE and then type

```
$ ./arduino
```

**[Very Important]** Serial port permissions are necessary to connect to the NodeMCU via USB. Follow the steps below to set serial port permissions.

Change your directory in terminal to the directory which stores the IDE. Enter

```
$ ls -l /dev/ttyACM*
```

You may get something like

```
$ crw-rw---- 1 root dialout 188, 0 5 apr 23.01 ttyACM0
```

Once you get this, you need to link the user by typing

```
$ sudo usermod -a -G dialout <username>
```

Log out of your system and log in again

**Note for Windows and Mac OS X Users**:- The NodeMCU is a COM device, thus your CP2102 driver needs to be updated. To do this, you need to download the latest legacy for CP2102 from the following link:-

http://www.silabs.com/products/development-tools/software/usb-to-uart-bridge-vcp-drivers

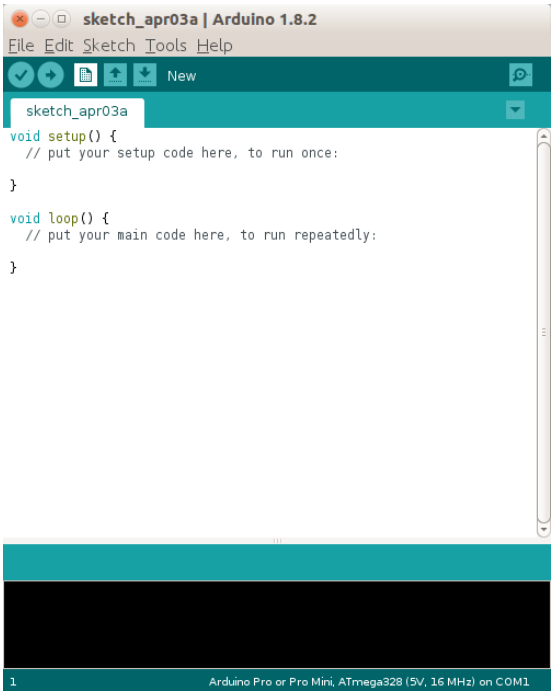
Download and install the specific driver required.

Once the IDE is installed, please proceed with the ESP-8266 board installation. The Board installation steps are same cross-platforms.

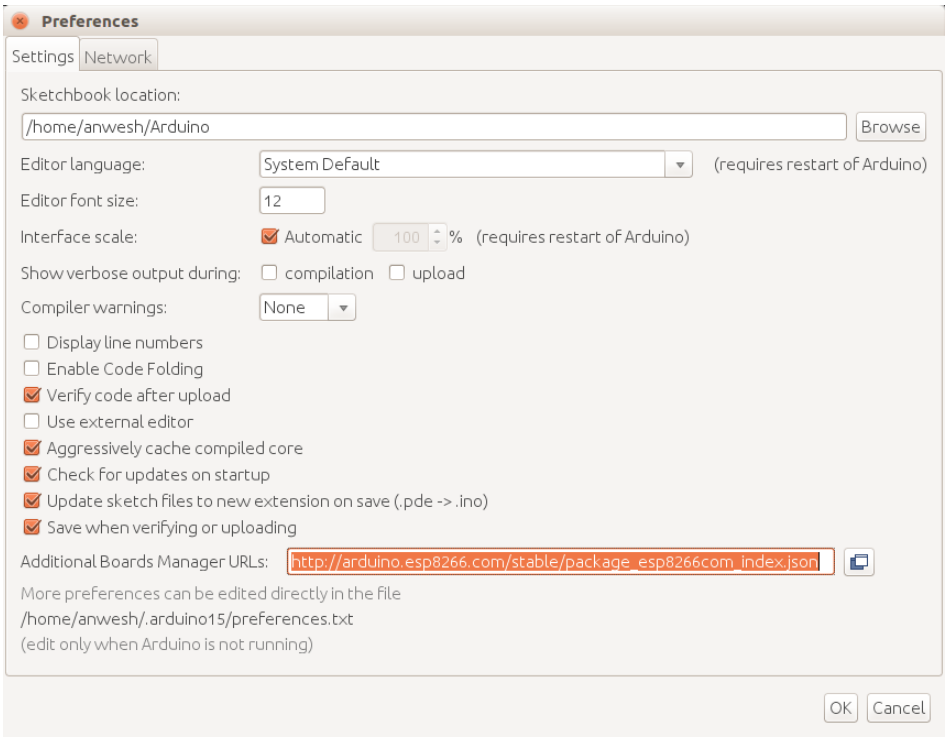
# 3. Board Installation in the IDE

In order to work with the ESP-8266 using the Arduino IDE, you need to have the ESP8266 board setup in the IDE. The step to install the board are (a steady internet connection is necessary):-

1. Open the Arduino IDE




2. Go to File > Preferences. You shall see the following dialogue box

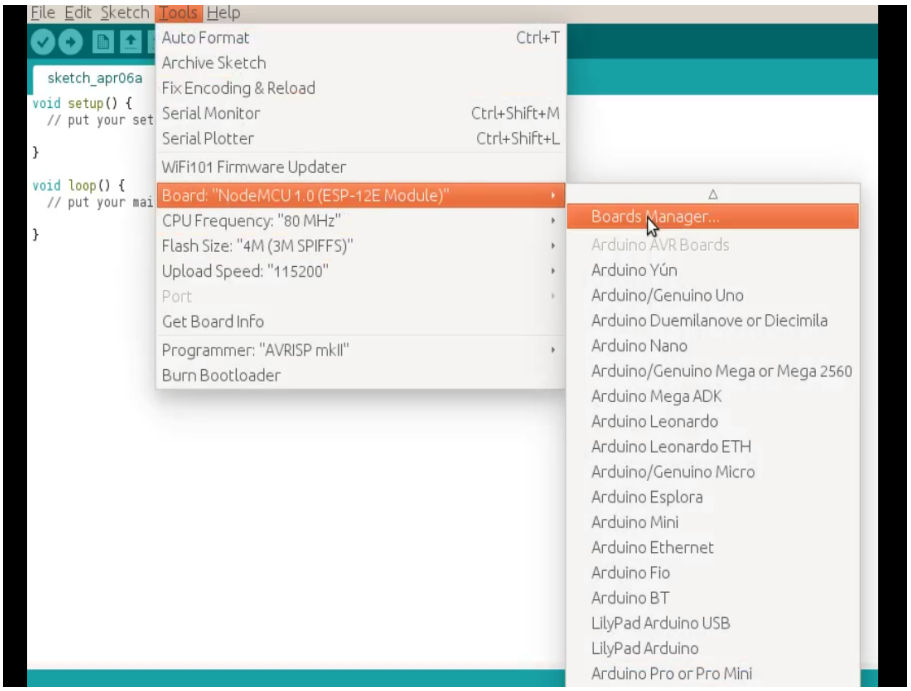


3. In the field which says “Additional Boards Manager URLs”, paste the following link:-

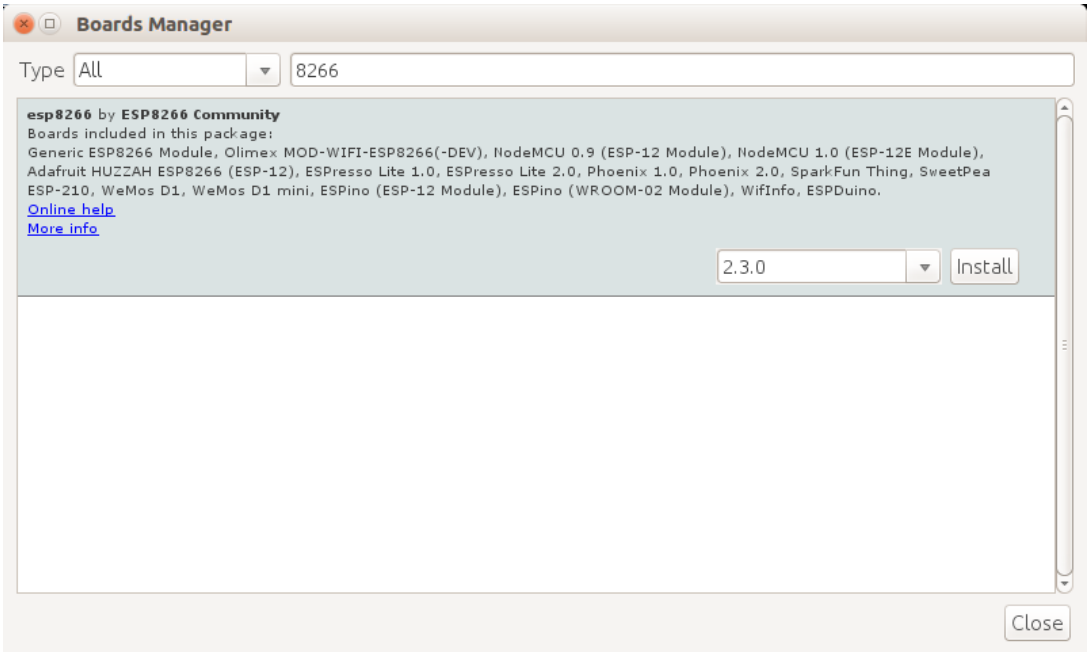
http://arduino.esp8266.com/stable/package_esp8266com_index.json

and press OK

4. Go to Tools > Board and select “Boards Manager”




You should now be able to see this window; type 8266 in the search box and select the 8266 board.



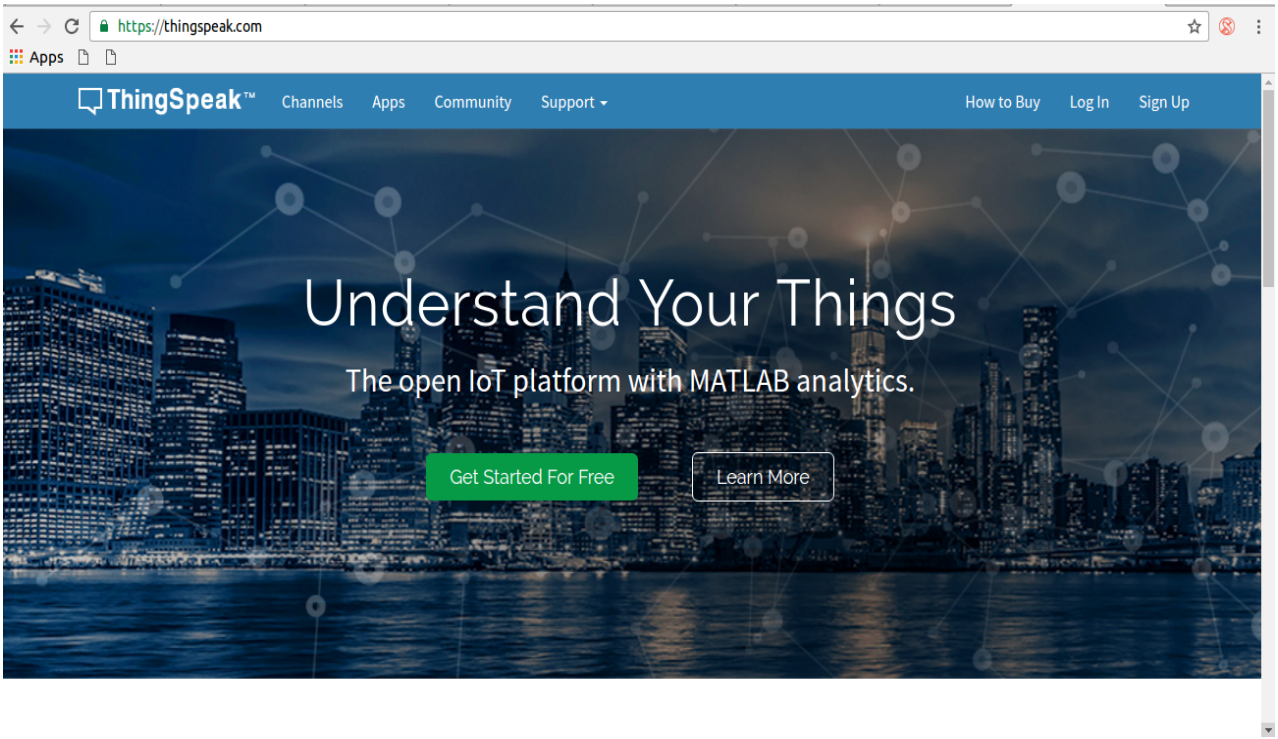

5. Press install and wait for the download to finish.

6. Once the installation is over, go to Tools and scroll down to “NodeMCU 1.0 (ESP-12 E module)” and select it as the preferred board.

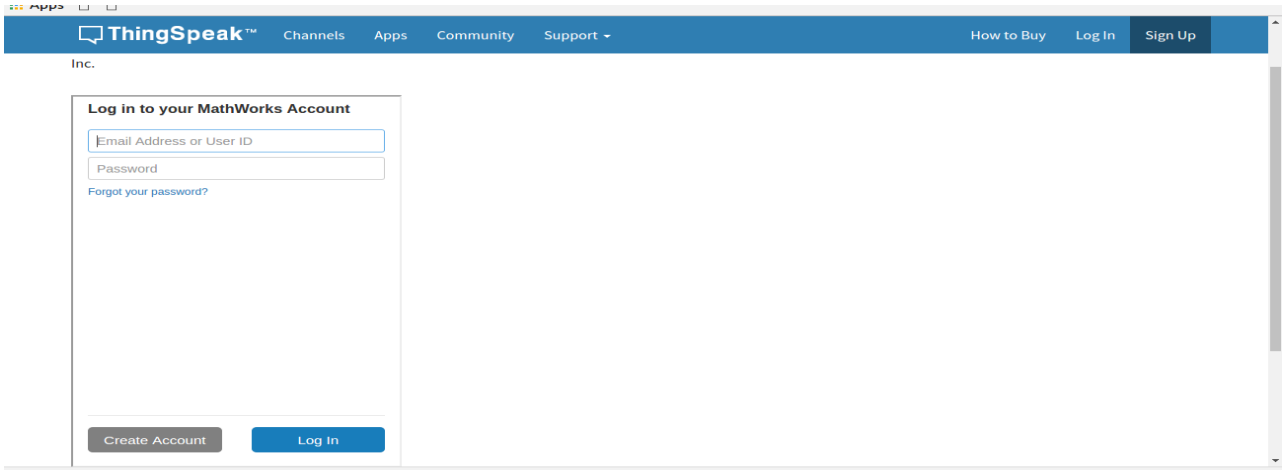
# 4. ThingSpeak

ThingSpeak is an open source Internet of Things (IoT) application and API to store and retrieve data from things using the HTTP protocol over the Internet or via a Local Area Network. The steps to register on ThingSpeak are as follows:

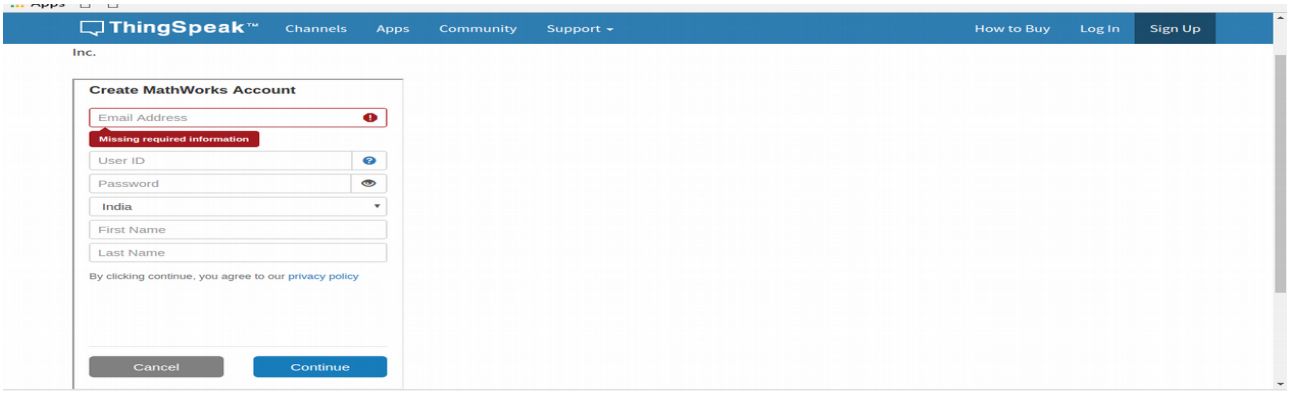
1. Log on to https://thingspeak.com/ and select the get started for free button.



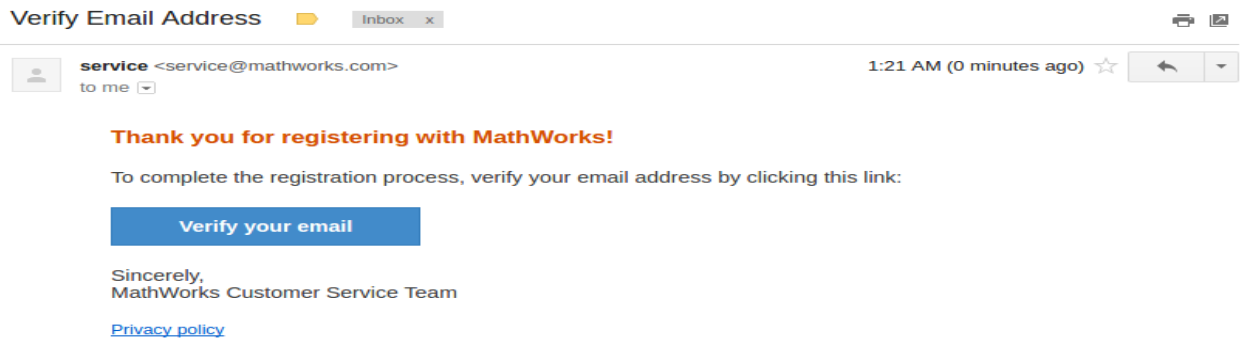

2. Click on the “Create Account” button at the bottom. (If you have a MathWorks Account, skip this step and login directly)



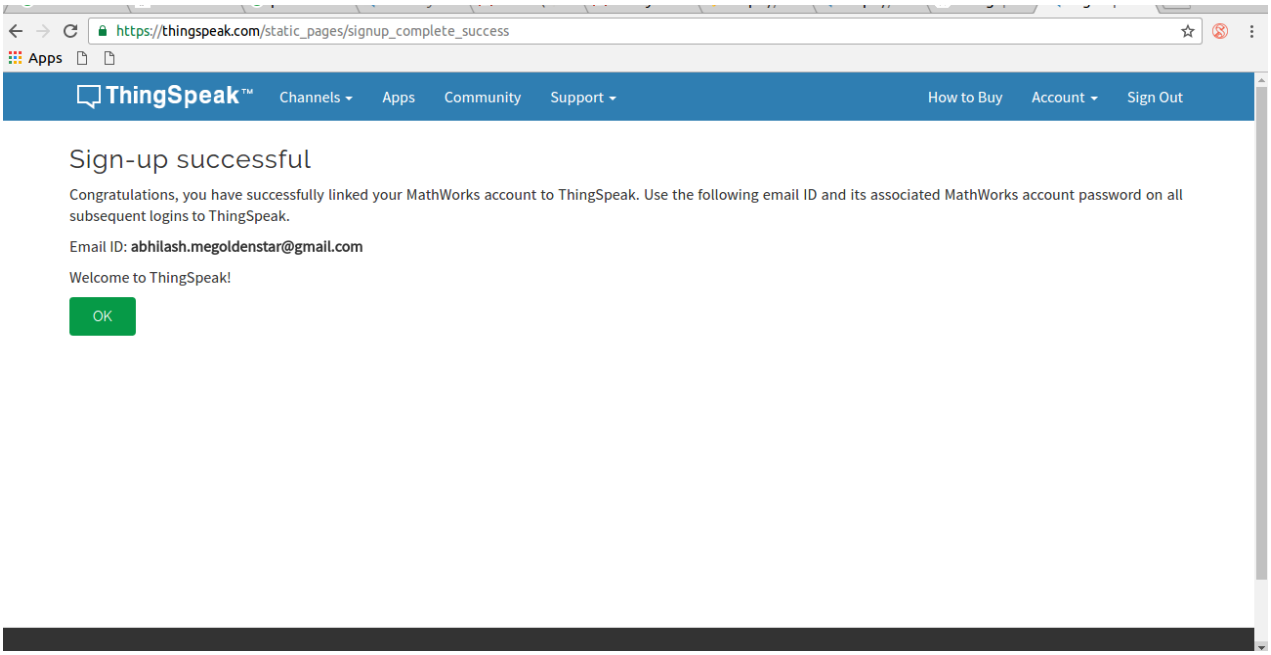
3. Fill in your details and click on “Continue”.



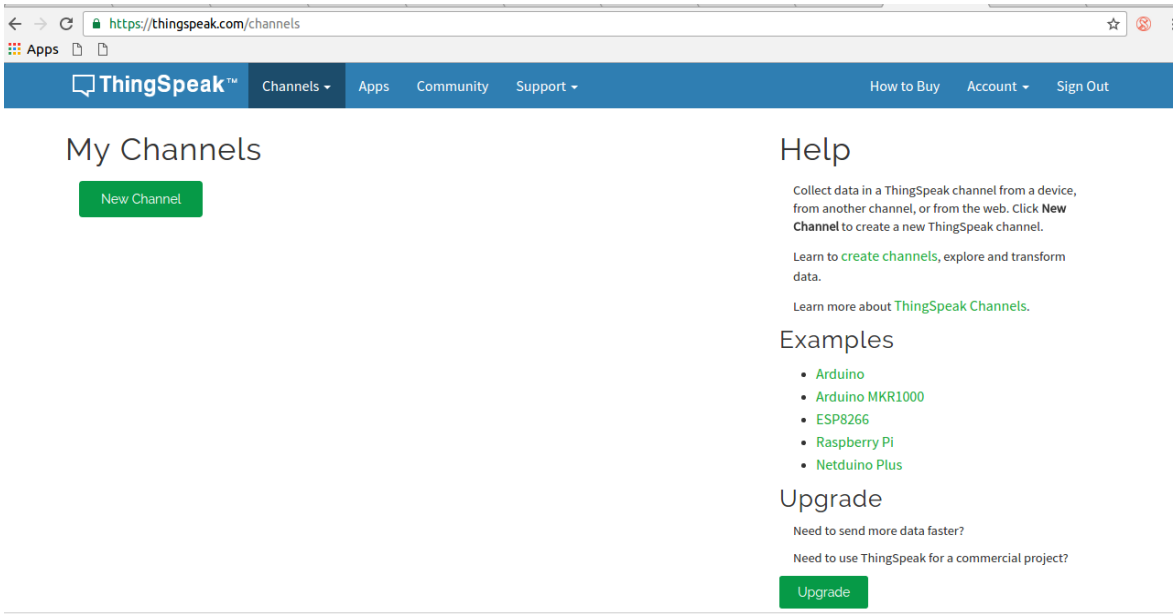

4. A mail will be sent to your email address. Open the mail and click on “verify your email”.



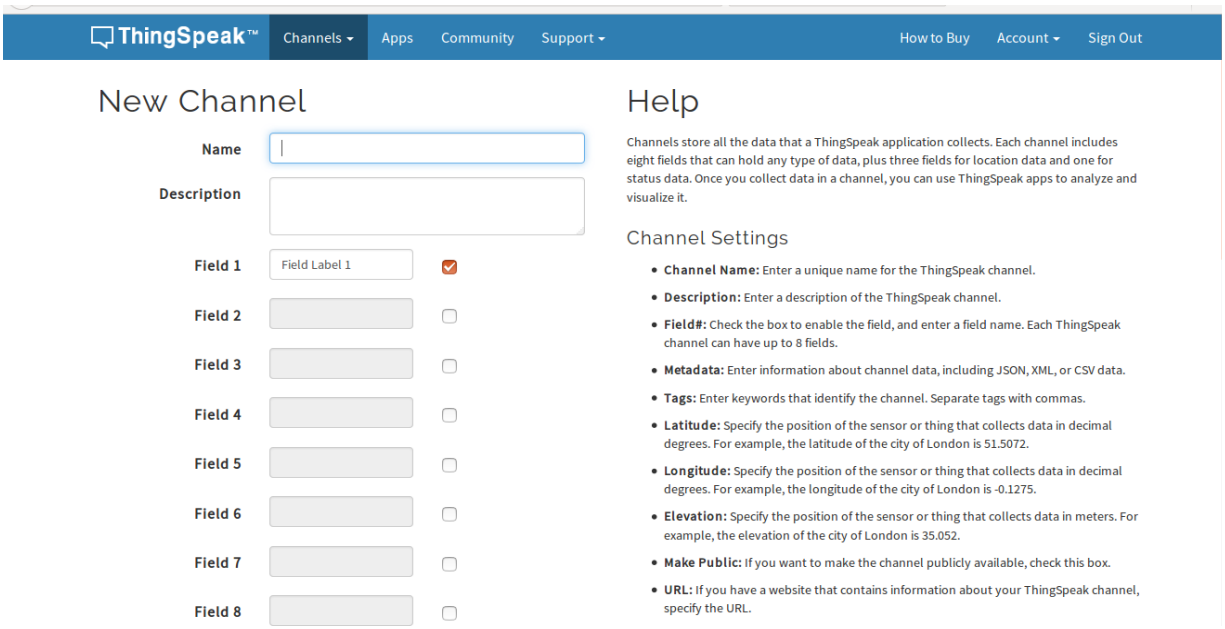

5. Press continue and the following window will appear.




6. Click on “Ok” and “agree to terms” which will lead you to “My Channels” page.




7. Create a new channel by clicking on “New channel”.




The details of this shall be explained in the workshop.

# 5. Common Errors

There are a few human errors which may occur while working with the NodeMCU. We have listed a few of them along with how to fix them to ease your task.

1. Serial Port Permissions or faulty cable:- After physically connecting the NodeMCU, It is possible that your system does not recognize the device. This happens when the permissions for the serial port are not provided or the required drivers are not available. Sometimes it may occur due to a faulty data cable.
    - Check your data cable before using it for connections. A good data cable can transfer a good amount of data from your phone to computer and back without any hassles.
    - **Linux:-** Check if the permissions for port are granted as explained in section 2 of this document.
    - **Windows and Mac OS:-** Check if the CP2102 driver is installed as described in section 2 of this document.
2. Wrong board selection:- There are three types of NodeMCU devices which fall under generations, 1st, 2nd, and 3rd generation. While NodeMCU v1.0 represent the 2nd and 3rd generation boards, v0.9 represent the 1st generation board. It is recommended to select the v1.0 board in the IDE. Refer section 3 of this document.
3. -1 error:- While preparing a new ThingSpeak channel, make sure that the channel is public, unless using it for private purpose. The -1 error occurs when a data is requested in public domain from a private channel. It is highly recommended to click the “Make Public” checkbox in the form explained in section 4 of this doccument.
4. Code 400 error:- Bad Request. The server cannot or will not process the request due to an apparent client error (e.g., malformed request syntax, too large size, invalid request message framing, or deceptive request routing). Make sure that the API keys provided are correct before using it.
5. Error due to a secure link:- The ThingSpeak server works under HTTPS, however, the same protocols cannot be used while using a “thing”. Make sure to change the “https” in your ThingSpeak links to http to avoid such errors.
6. Syntactical errors:- These errors are caused due issues with the syntax of the code. The NodeMCU utilizes Lua script with JSON, and it is necessary that we obey the JSON syntax while linking a NodeMCU to a network. The syntax for Arduino are based upon C, C++, etc.
7. Power supply and external inputs:- As mentioned in section 1 of this document, please obey the maximum voltage limits for the board to avoid accidents.

***