**Experiment 5: Interface a sensor with the microcontroller and transmit the data to cloud**

**Aim :** The aim of this Experiment is to send the sensor data from the ESP8266 Wi-Fi module to the Thing Speak Cloud Platform and analyze the data using graphs and charts provided by Thing Speak.

MODULE 2 - HARDWARE

Hardware refers to any physical components/particulars of a system containing ICs, electronics, sensors, and circuit boards. Without hardware, an IoT system cannot exist, and the software developed won't be able to run.

2.1 COMPONENTS REQUIRED

● NodeMCU ESP8266

● USB Data cable

● Soil moisture sensor

● Breadboard

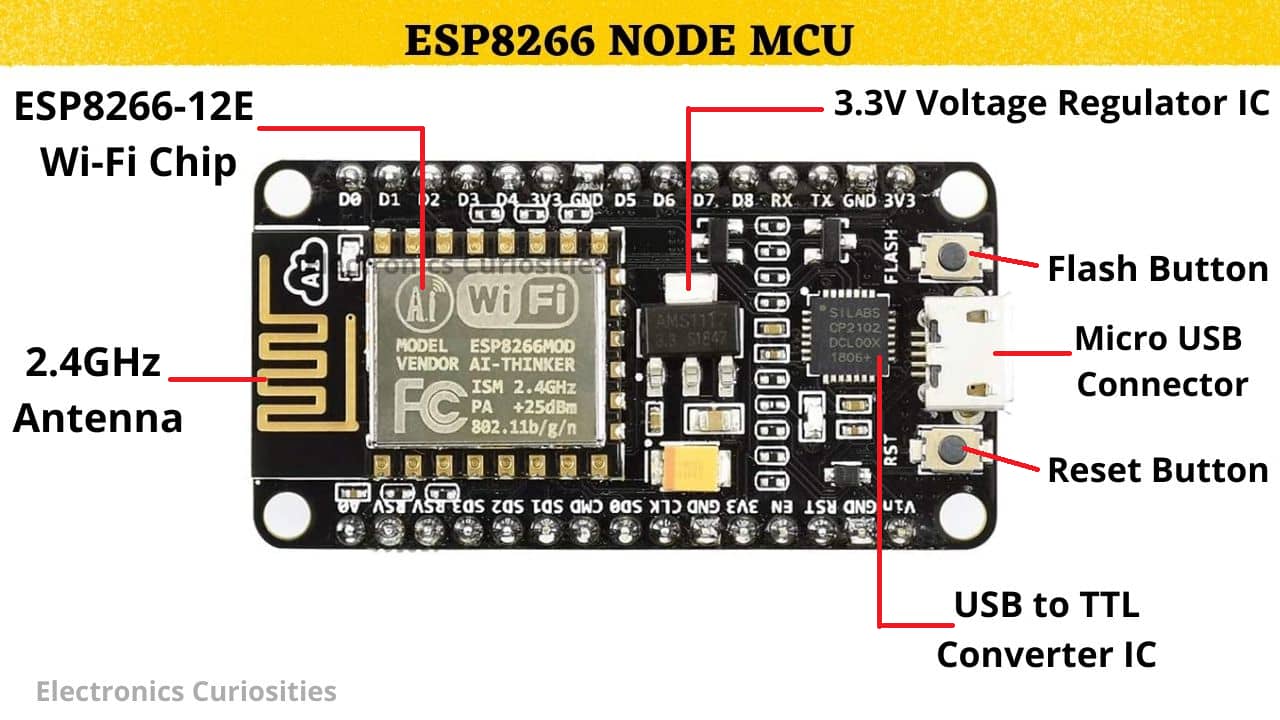
● Jumper wires

2.2 ANNEXURE

A. NodeMCU ESP8266:

The Node MCU ESP8266 is a popular WiFi development board that is based on the

ESP8266 WiFi module. It features a microcontroller, flash memory, and a built-in WiFi module, which makes it ideal for creating IoT devices that require wireless connectivity. The Node MCU ESP8266 is programmable using the Arduino IDE, Lua scripting language, or other programming languages such as Micro Python.



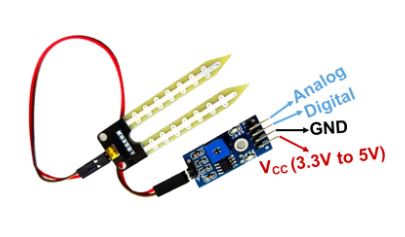
**B. BREADBOARD:**

Breadboards are one of the most fundamental pieces when learning how to build

circuits. Breadboards are commonly utilized while prototyping temporary circuits. It is useful to designers because it allows components to be removed and replaced easily.

C. SOIL MOISTURE SENSOR:

A soil moisture sensor is a device designed to measure the amount of moisture present in soil. It is typically made up of two metal probes that are inserted into the soil, with a small electronic circuit in between them. When the probes come into contact with the soil, the electronic circuit measures the electrical resistance between the probes. The resistance is inversely proportional to the moisture content of the soil, which means that as the soil becomes drier, the resistance between the probes increases.



2.3 WIRING

1.Connect the VCC of the sensor to "VCC" of ESP8266 module -3V,

2 The GND OF the sensor to the "G" of the ESP8266 module and

3.The signal (ANALONG) pin to the "A0" of the Node MCU.

MODULE 3 - SOFTWARE

Software is a generic term to refer to the scripts and programs that run on a microprocessor or microcontroller and execute specific tasks.

3.1 GET START WITH ARDUINO IDE

To set up the Arduino IDE for using ESP8266, follow these steps:

● Download and install the latest version of the Arduino IDE from the official website: https://www.arduino.cc/en/software.

● Open the Arduino IDE and go to File > Preferences.

● In the Preferences window, find the "Additional Boards Manager URLs" field and add the following URL: http://arduino.esp8266.com/stable/package\_esp8266com\_index.json

● Click "OK" to close the Preferences window.

● Next, go to Tools > Board > Boards Manager. In the Boards Manager, search for "esp8266" and install the "esp8266 by ESP8266 Community" package.

● Once the installation is complete, go back to Tools > Board and select "NodeMCU 1.0(ESP-12E Module)" or the appropriate board that you are using.

● Finally, connect your ESP8266 board to your computer using a USB cable and select the appropriate port from the Tools > Port menu.

You are now ready to start programming your ESP8266 board using the Arduino IDE!

3.2 PROGRAM

#include <ESP8266WiFi.h>

#include <WiFiClient.h>

#include "ThingSpeak.h"

const char\* ssid = "ssid"; //WiFi SSID

const char\* pass = "123123123"; //WiFi Passcode

WiFiClient client;

unsigned long channelNumber = 2074614; // Channel ID

const char\* APIwriteKey = "OT1FHJAES32JHLS4"; // API WriteKey

int data = 0;

void setup() {

Serial.begin(9600);

Serial.println("Connecting to the network");

WiFi.begin(ssid,pass);

while(WiFi.status() != WL\_CONNECTED){

Serial.print(".");

delay(150);

}

Serial.println();

Serial.println("Connected to the network");

ThingSpeak.begin(client);

}

void loop() {

data = data + 5;

ThingSpeak.setField(1, data);

ThingSpeak.writeFields(channelNumber, APIwriteKey);

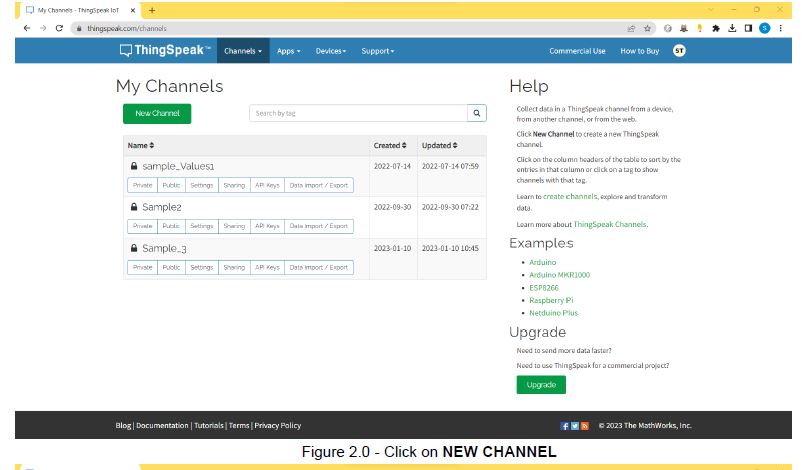
delay(15000);

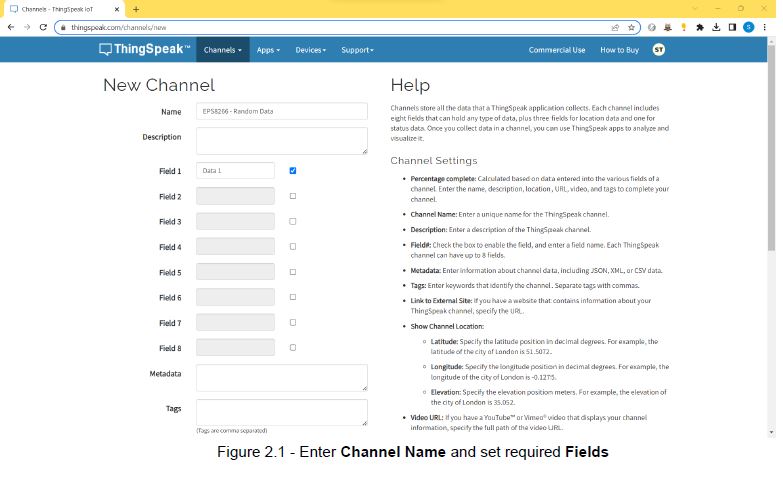
}

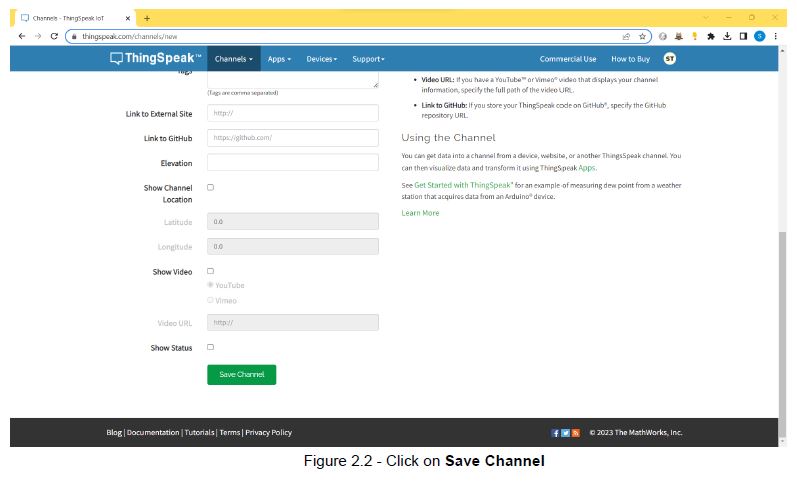
3.3 THINGSPEAK CLOUD PLATFORM SET-UP

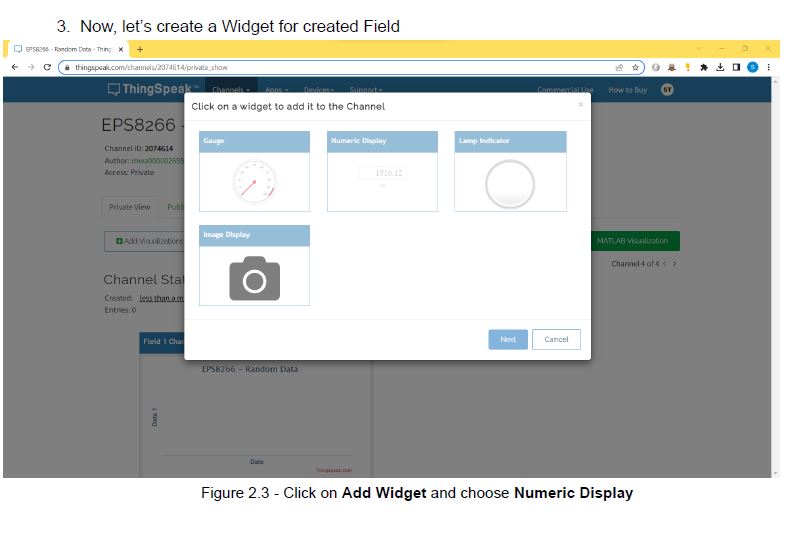
1. Go to https://thingspeak.com/ and create an account.

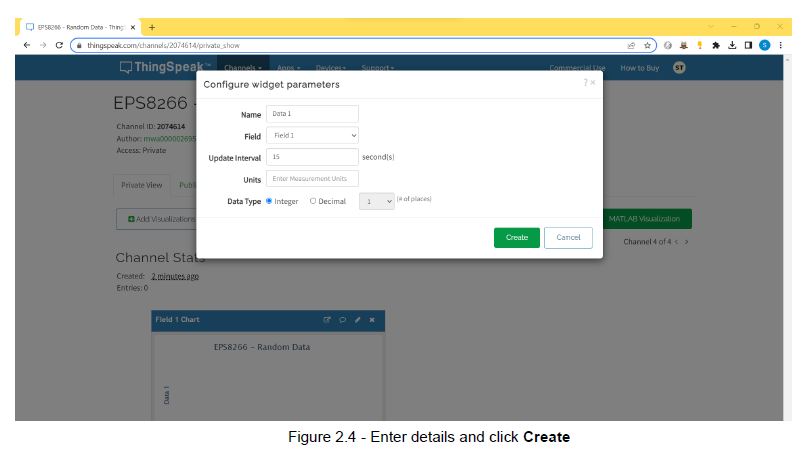
2. After creating the account, create a new channel. In this channel, we will store the data sent by the ESP8266.

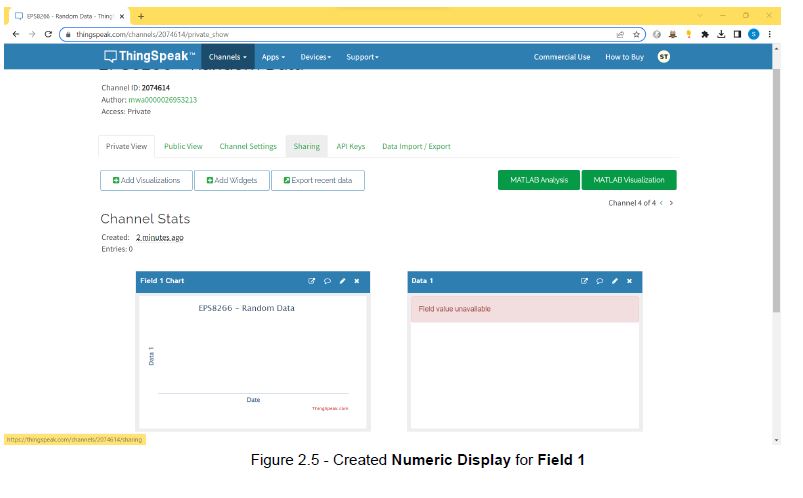


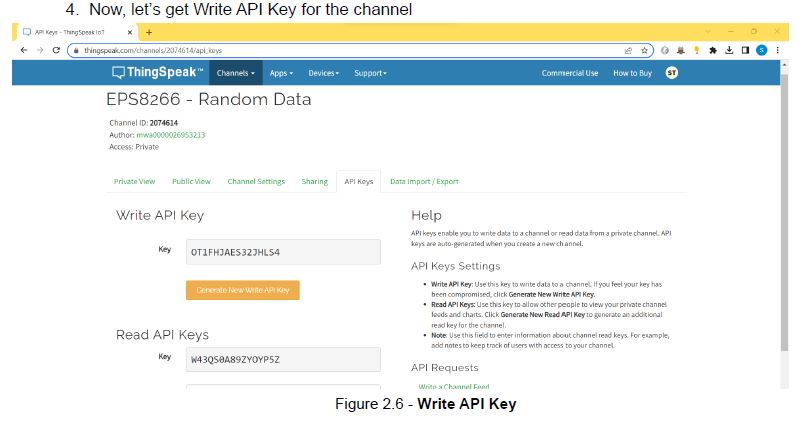












MODULE 4 - METHODOLOGY

● Set-up Thing Speak Cloud Platform

● Install the Arduino IDE software and set-up the environment for ESP8266 module

● Write the program and save the file

● Select respective Board and Port

● Finally, upload the code to the microcontroller

MODULE 5 - RESULT

This Experiment has demonstrated how to send the sensor data from the ESP8266 Wi-Fi module to the Thing Speak Cloud Platform.

