**WEATHER MONITORING SYSTEM USING NODE MCU**

**A PROJECT REPORT**

***Submitted by***

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**DECEMBER 2021****KUMARAGURU COLLEGE OF TECHNOLOGY**

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**BONAFIDE CERTIFICATE**

Certified that this project report **“WEATHER MONITORING SYSTEM USING NODE MCU”** is the Bonafide work of

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Internal Examiner External Examiner

**DECLARATION**

We affirm that the project work titled **“WEATHER MONITORING SYSTEM USING NODE MCU AND DHT 11 SENSOR”** is being completed for the Course ENGINEERING CLINICS – V . It has not formed the part of any other project work submitted for any other course.

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I certify that the declaration made above by the candidates is true.

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**Abstract**

The system proposed is an advanced solution for monitoring the weather conditions at a particular place and make the information visible anywhere in the world. The technology behind this is Internet of Things (IoT), which is an advanced and efficient solution for connecting the things to the internet and to connect the entire world of things in a network. Node MCU, sensors and automotive electronic equipment. The system deals with monitoring and controlling the environmental conditions like temperature, relative humidity and CO level with sensors and sends the information to the web page and then plot the sensor data as graphical statistics. The data updated from the implemented system can be accessible in the internet from anywhere in the world.

**CHAPTER - 1. INTRODUCTION**

Present day innovations in technology mainly focus on controlling and monitoring of different devices over wirelessly over the internet such that the internet acts as a medium for communication between all the devices. Most of this technology is focused on efficient monitoring and controlling of different. An efficient environmental monitoring system is required to monitor and assess the weather conditions in case of exceeding the prescribed level of parameters (e.g., noise, CO and radiation levels) and for gathering data for research purposes (amount of rainfall, windspeed etc.).

A system is considered as a smart system when the device equipped with sensors, microcontrollers and various software applications becomes a self-protecting and self-monitoring system. The recent changes in climate have increased the importance of environment monitoring. The current advance in the field of technology and economy are hardly a significant impact over the environment, have led to serious concern regarding pollution and climate change. The intergovernmental panel on climate change (IPCC) in the report confirms that human activities are having an unequivocal and continuously increasing influence on the climate system, with recent changes that are unprecedented over decades of millennia.

In this contest, environmental monitoring represents a fundamentals instrument for gathering relevant information about the ecosystem, leading to new knowledge and understanding and for ultimately adaptation and mitigation actions that address the degradation of the biosphere. Event Detection based and Spatial Process Estimation are the two categories to which applications are classified. Initially the sensor devices are deployed in environment to detect the parameters (e.g., Temperature, Humidity, Pressure, LDR, noise, CO and radiation levels etc.) while the data acquisition, computation and controlling action (e.g., the variations in the noise and CO levels with respect to the quantified levels). Sensor devices are positioned at different locations to collect the data to forecast the behavior of a particular area of interest. The main aim of this paper is to design and implement a resourceful monitoring system through which the required parameters are monitored remotely using internet and the data gathered from the devices are stored in the cloud and to project the predictable trend on the web browser. A solution for monitoring temperature and CO levels i.e., any parameter value crossing its threshold value ranges, for example CO levels in air in a particular area exceedingly the normal levels etc., in the atmosphere using wireless embedded computing system is proposed in this paper. The solution also provides an intelligent remote monitoring for a particular area of interest. In this paper we also current results of collected or sensed data with respect to the normal or specified ranges of particular parameters. The embedded system is an integration of sensor devices, wireless communication which enables the user to remotely access the various parameters and store the data in cloud.

**CHAPTER - 2. LITERATURE REVIEW**

[1] Weather monitoring and forecasting system using IoT

Balakrishnan Sivakumar and Chikkamadaiah Nanjundaswamy(GJETA)

This Paper says that in today’s world many pollution monitoring systems are designed by different environmental parameters. Existing system model is presented IOT based Weather monitoring and reporting system where you can collect, process, analyses, and present your measured data on web server. Wireless sensor network management model consists of and device, router, gateway node and management monitoring center. End device is responsible for collecting wireless sensor network data, and sending them to parent node, the data are sent to gateway node from parent node directly or by router. After receiving the data from wireless sensor network, gateway node extracts data after analysing and packaging them into Ethernet format data, sends them to the server. Less formally, any device that runs server software could be considered a server as well. Servers are used to manage network resources. The services or information provided through the Internet that are connected through LAN and made available for users via smart phones, web browser or other web browser devices to make the system more intelligent, adaptable and efficient.

[2] Smart weather monitoring and real time alert weather and climate changes like system using IoT

Yashaswi Rahut , Rimsha Afreen, Divya Kamini, SRM Institute of Science and temperature, humidity, wind Technology. IRJET - vol. 05, issue 10, Oct 2018.

This paper says that IOT Based Weather Monitoring System is the network of physical devices that allow the devices to communicate with each other. IOT allows remote sensing and control over the devices. It is an advanced automation and analysis system which uses its sensors to deliver advanced and automated products and services. These systems allow greater transparency, control, and good performance. IOT has several automation applications like smart home, smart parking, smart roads etc. Weather is the day-to-day state of the atmosphere that is hard to predict which affects the activities of mankind and has great significance in many different domains. However, the current weather station in the market is expensive and bulky which cause inconvenience. The aim of this project is to design a weather station with real time notifications for climatology monitoring, interface it to a cloud platform and analyse weather parameters. Existing system: The existing weather monitoring systems generally use weather stations that use multiple instruments such as thermometers, barometers, wind vanes, rain gauge etc. to measure weather and climate changes. Most of these instruments use simple analog technology which is later physically recorded and stored in a database.

[3] Development of IoT Based Weather Reporting System

A F Pauzi and M Z Hasan, International Conference on Technology, Engineering and Sciences (ICTES) 2020

This paper says that End gadget is liable for gathering remote sensor network information, and sending parent hub straightforwardly or by switch. Subsequent to getting the information from remote sensor organization, entryway hub extricates information in the wake of dissecting and bundling them into Ethernet design information, sends them to the worker. Less officially, any gadget that runs worker programming could be viewed as a worker also. In IOT empowered climate checking framework project, Arduino Uno estimates four climate boundaries utilizing four separate sensors. Arduino has inbuilt Analog to computerized converter. Arduino figures and shows these climate boundaries on LCD show. At that point the client needs to visit a specific site to see the climate information.

**3. PROBLEM DEFINITION**

The satellite weather reporting system provides the current condition that does not give the exact location condition. The drawbacks are in conventional approach where the devices are costly and have no visualization of information. There is no such automatic tool to offer the alert signal in case of any abnormalities, so it is difficult to regulate this abnormality***.***

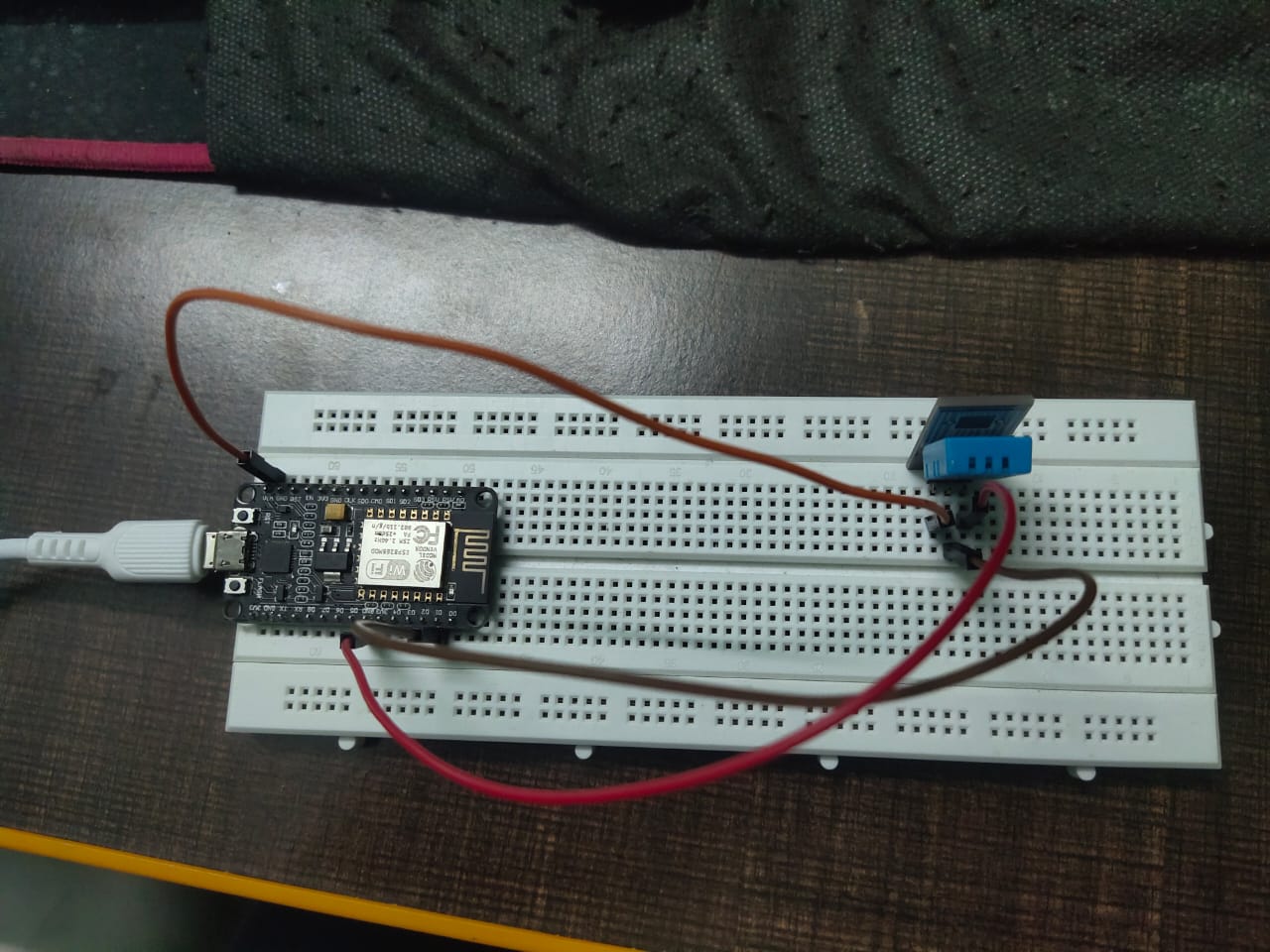
**CHAPTER - 4. PROPOSED SYSTEM**

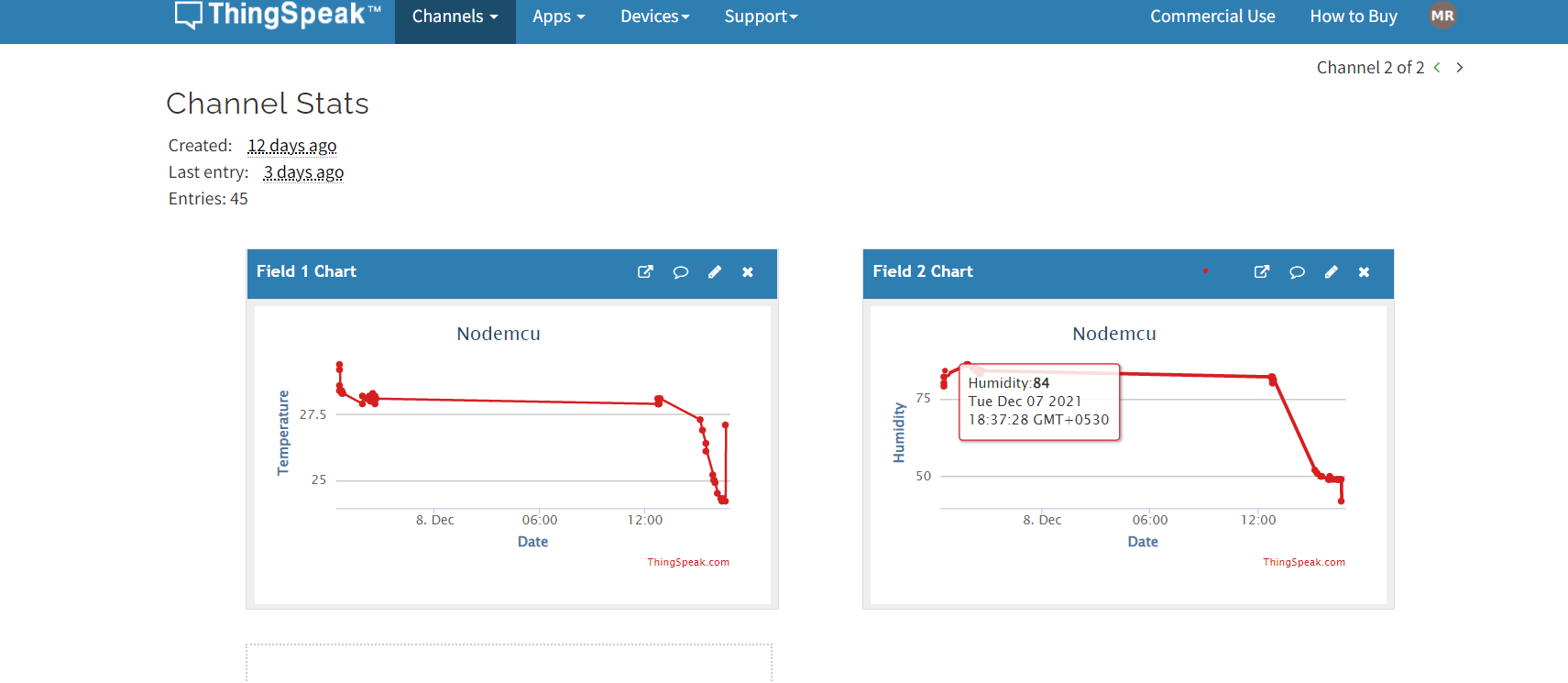
This IoT based project has four sections. Firstly DHT11 sensor senses the Humidity & Temperature Data.

Secondly Node MCU reads the DHT11 sensor module’s output by using single wire protocol into a suitable number in percentage (humidity), Celsius scale (temperature).

Thirdly, these values are sent to ThingSpeak server by using inbuilt Wi-Fi of Node MCU. And finally ThingSpeak analyses the data and shows it in a Graph form.

In Arduino (Version1.8.16) Software we have installed a Port (COM5) for displaying the weather Conditions

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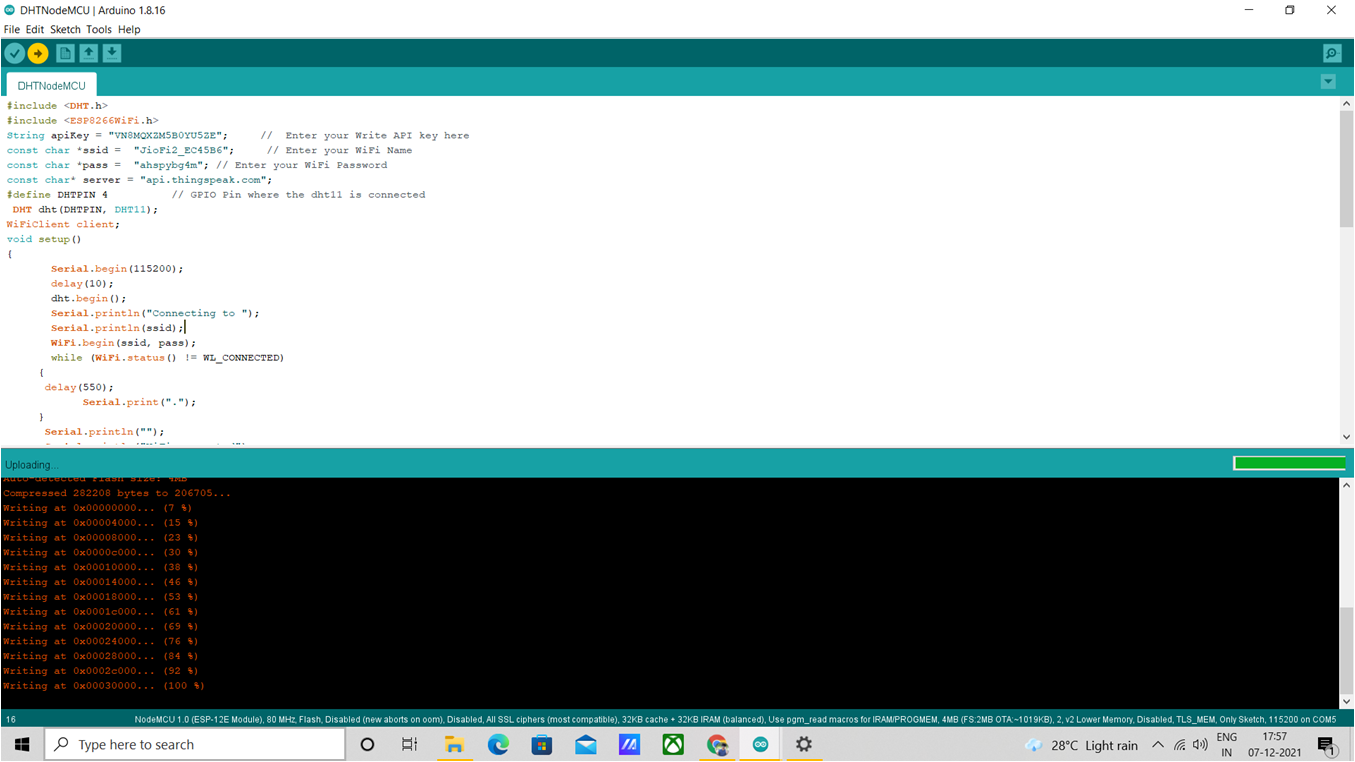
**NODE MCU AND DHT 11 SENSOR ARE INTEGRATED WITH THINGS SPEAK SERVER.**

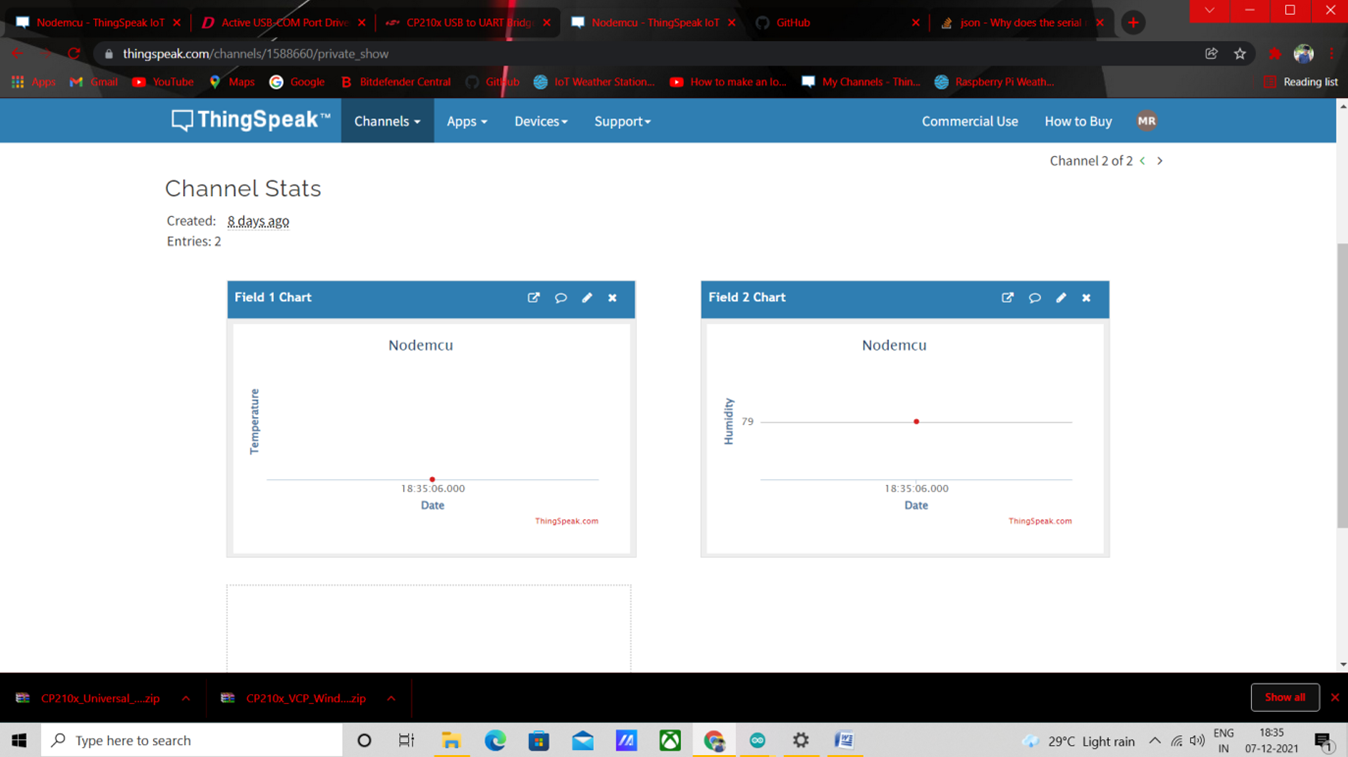
**IMPLEMENTATION**

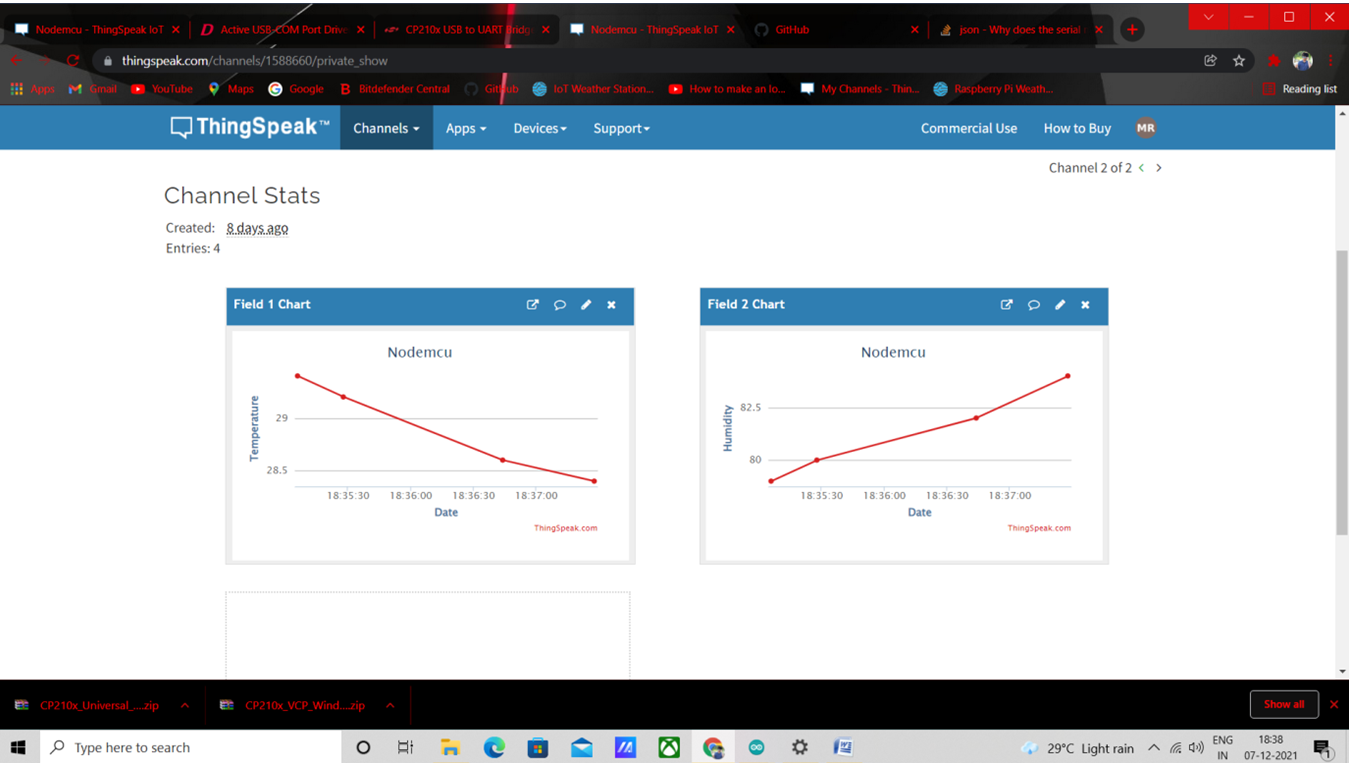
**CHAPTER - 4. 1. INSTALLING THE REQUIREMENTS**

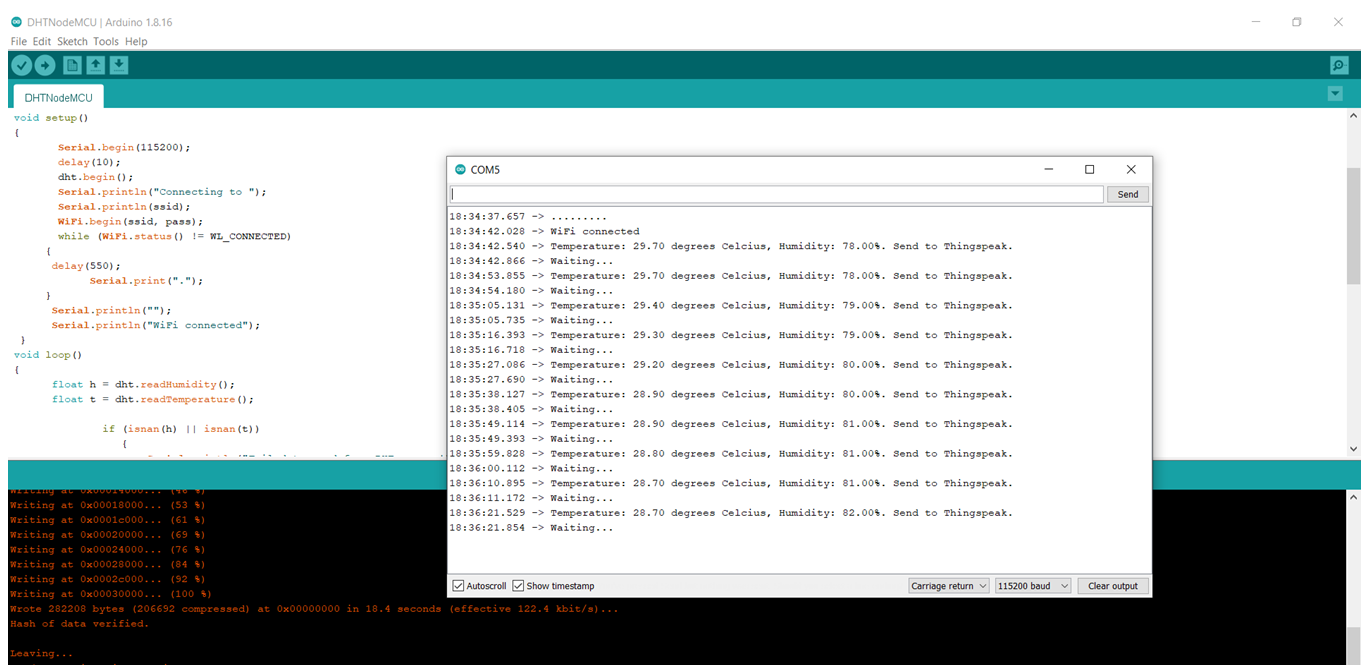
* Arduino IDE 1.8.16 - The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. This software can be used with any Arduino board.
* Embedded C - It is a set of language extensions for the C programming language by the C Standards Committee to address commonality issues that exist between C extensions for different embedded systems.
* DHT.h – It’s a library has all the functions needed to get the humidity and temperature readings from the sensor.
* ESP8266.h - This library provides ESP8266 specific Wi-Fi routines that we are calling to connect to the network. The actual connection to Wi-Fi is initialized by calling: begin("network-name", "pass-to-network").

**CHAPTER - 4.2 IMPLEMENTATION RESULTS**

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**CHAPTER - 5. SYSTEM REQUIREMENTS**

**CHAPTER - 5.1.Hardware Requirement:**

NODE MCU

Humidity & Sensor(DHT 11)

BREADBOARD

JUMPER WIRES

Internet connection

**CHAPTER-5.2.Software Requirement:**

THINGS SPEAK(API GENERATOR WEB.WE CAN INTEGRATE IT WITH NODE MCU)

PROGRAMMING LANGUAGE:EMBEDDED C

**CHAPTER - 6. CONCLUSION**

**In this paper, we proposed an approach that to implement this need to deploy the sensor devices in the environment for collecting the data and analysis. By deploying sensor devices in the environment, it will record real time data. It can cooperate with other objects through the network. Then the collected data and analysis results will be available to the end user through the Wi-Fi. The smart way to monitor environment and an efficient, low-cost entrenched system is presented with different models in this paper.**

**Weather station is a form of application of science and technology to know and predict the weather condition at a particular body. The weather station is designed to collect quantitative data about the weather condition of a region in order to be able to known and predict weather conditions in a region . Human activities depend on whether factors.**

**Additions that can be made to improve the system**

**1)Powering the device using solar panels.**

**2) Using silica gel to prevent condensation on the exterior cover as condensation might affect the sensors readings.**

**CHAPTER - 7.REFERENCES**

[1] Weather monitoring and forecasting system using IoT

Balakrishnan Sivakumar and Chikkamadaiah Nanjundaswamy(GJETA)

[2] Development of IoT Based Weather Reporting System

A F Pauzi and M Z Hasan, International Conference on Technology, Engineering and Sciences (ICTES) 2020

[3] Internet of Things (IOT) based Weather Monitoring System

Girija C, Andreanna Grace Shires, Harshalatha H , Pushpalatha H P , International Journal of Engineering Research & Technology (IJERT) 2018

[4] Smart weather monitoring and real time alert weather and climate changes like system using IoT

Yashaswi Rahut , Rimsha Afreen, Divya Kamini, SRM Institute of Science and temperature, humidity, wind Technology. IRJET - vol. 05, issue 10, Oct 2018.

[5] Environment Monitoring System using Node Mcu / Raspberry Pi

Gaurav Jadhav, Kunal Jadhav, Kavita Nadlamani , R.H. Sapat College of Engineering, Management Studies and Research. IRJET - vol. 3, issue 4, Apr 2016.

**CHAPTER – 8. SAMPLE CODE:-**

#include <DHT.h>

#include <ESP8266WiFi.h>

String apiKey = "VN8MQXZM5B0YU5ZE"; // Enter your Write API key here

const char \*ssid = "vivo 1818"; // Enter your WiFi Name

const char \*pass = "rajaraja"; // Enter your WiFi Password

const char\* server = "api.thingspeak.com";

#define DHTPIN 4 // GPIO Pin where the dht11 is connected

DHT dht(DHTPIN, DHT11);

WiFiClient client;

void setup()

{

Serial.begin(115200);

delay(10);

dht.begin();

Serial.println("Connecting to ");

Serial.println(ssid);

WiFi.begin(ssid, pass);

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

{

delay(550);

Serial.print(".");

}

Serial.println("");

Serial.println("WiFi connected");

}

void loop()

{

float h = dht.readHumidity();

float t = dht.readTemperature();

if (isnan(h) || isnan(t))

{

Serial.println("Failed to read from DHT sensor!");

return;

}

if (client.connect(server,80))

{

String postStr = apiKey;

postStr +="&field1=";

postStr += String(t);

postStr +="&field2=";

postStr += String(h);

postStr += "\r\n\r\n";

client.print("POST /update HTTP/1.1\n");

client.print("Host: api.thingspeak.com\n");

client.print("Connection: close\n");

client.print("X-THINGSPEAKAPIKEY: "+apiKey+"\n");

client.print("Content-Type: application/x-www-form-urlencoded\n");

client.print("Content-Length: ");

client.print(postStr.length());

client.print("\n\n");

client.print(postStr);

Serial.print("Temperature: ");

Serial.print(t);

Serial.print(" degrees Celcius, Humidity: ");

Serial.print(h);

Serial.println("%. Send to Thingspeak.");

}

client.stop();

Serial.println("Waiting...");

delay(10000);

}

**OUR GITHUB REPOSITORY:**

https://github.com/maharajan456/WEATHER-MONITORING-SYSTEM