IOT based Weather Monitoring System using Arduino UNO

Project report submitted in partial fulfilment of requirement of the degree of bachelor of technology

In

Computer science and engineering / information technology

By

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Under the supervision of

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to

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Certificate

Candidate's Declaration

I hereby declare that the work presented in this report entitled **"IOT Based Weather Monitoring System using Arduino UNO** in partial fulfillment of the requirements for the award of the degree of **Bachelor of Technology** in **Computer Science and Engineering**submitted in the department of Computer Science & Engineering **,** Jaypee University of Information Technology Waknaghat is an authentic record of my own work carried out over a period from August 2018 to May 2019 under the supervision of **Dr. ShailendraShukla** (Assistant Professor (SeniorGrade))Computer Science & Engineering and Information Technology.

The matter embodied in the report has not been submitted for the award of any other degree or diploma.

(Student Signature)

Abhay Sharma, 151318

This is to certify that the above statement made by the candidate is true to the best of my knowledge.

(Supervisor Signature)

Dr. Shailendra Shukla

Assistant Professor (Senior Grade)

Information Technology

JUIT, Waknaghat

Dated:

Acknowledgement

I take this opportunity to express my profound gratitude and deep regards to my guide Dr. Shailendra Shukla for his exemplary guidance, monitoring and constant encouragement throughout the course of this project. The blessing, help and guidance given by his time to time shall carry me along way in the journey of life on which I am about to embark.

The in-time facilities provided by the Computer Science department throughout the project development are also equally acknowledgeable.

At the end I would like to express my sincere thanks to all my friends and others who helped me directly or indirectly during this project work.

ABHAY SHARMA

151318

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ABSTRACT

This project predominantly combines by the two-study fields-based control systems and data gathering technique, to create a large database system depending on the employed attributes to generate the presented data. The main things here have been chosen based on the sensors that are used wildly to build the system to design an efficacious weather monitoring project. The recommended sensors are used here to measure and gather the Temperature and Humidity data.

• Weather Monitoring proposes of a system that monitors weather in real time over a mobile application.

• This very low cost or cheaper platform for joining all these electronic devices and different types of sensors by using the internet network is provided by Arduino UNO.

• Recording weather which can be easily monitored remotely with the help of Arduino UNO via Internet of Things is the main intention of the work.

This will provide users a simpler, reliable and speedy way to monitor weather and other parameters of the environment.

CHAPTER 1
INTRODUCTION

The Internet of Physical Things is a network where all physical objects connect to the Internet via network equipment and exchange data. The Internet of Things can be managed remotely via an existing network infrastructure. IoT is a good, highly intelligent technology that reduces human effort and allows easy access to physical devices. This method also has a special control function, which allows you to control devices without any interaction with people.

The "Internet of Things" is a work of art that became clear in 2009. The Internet of Things is actually changing our world. It helps to renew our life and society as a whole, creating different things that make our lives run smoothly. By 2020, an estimated 50 billion devices will be connected to the Internet and networks and the market will be $14 trillion.

The Internet of Things is a growing theme of certain things, social and monetary, linked to gigantic dimensions. Customer items, different types of goods, cars and trucks, modern and modern spare parts, sensors and other conventional products are combined with the Internet and the exceptional data search capabilities that promise to change the way we work, live and play. The impact of the Internet of Things on the Internet of Things and the economy is significant: according to some estimates, the number of IoT devices will reach $100 billion by 2025 and total revenues will exceed $11 trillion.

By 2013, the Internet of Things has evolved into a variety of systems that use different technologies, from wired Internet networks to wireless communications, from micro-electromechanical systems to integrated systems. Traditional areas of automation, such as building automation, wireless networks, GPS, various operating systems and much more, support the Internet of Things.

Internet of Things, consisting of several on/off devices connected to the Internet. This includes almost everything you can think of, from mobile phones to building maintenance and jet engines. Medical devices such as a heart rate monitor or farm animals can send data over the network and are members of the Internet of Things. They also assist in environmental matters and in the department of agriculture.

1.1 General introduction

Nowadays importance of climate monitoring is great in many ways. Climate monitoring is necessary to maintain good crop growth, to ensure safe working conditions in industry, etc. Constant growth in Technological made the process of scanning environmental parameters much easier than in the past. These sensors are Electronic devices that are widely used to compute different normal physical and environmental parameters. By using sensors to study climatic conditions, the results will be accurate and the whole system consume less energy and faster response will be there. The newly generated system here describes the power of the weather observing station. It includes wireless technology, which is also connected to Wi-Fi. Here, the system monitors the weather conditions and updates the data on the website. The reason the data on the website is updated is because the weather conditions of a particular location we can measure anywhere . The system consists of a temperature sensor, a humidity sensor and a light-sensitive resistor. All these sensors are capable of measuring the corresponding meteorological parameters. The system is designed for use in large buildings and multinational companies, but also wherever we want to know the temperature and humidity.

The system is supplied with a microcontroller for all sensor control. In our system, the wireless standard has been chosen, which analyses the requirements of the application, so that the climatic conditions are constantly monitored and updated. There are many network standards for communication, but these are not just fully localized communication processes. In our case, we need to ensure that the weather conditions in a particular place are informative everywhere. Other communication technologies, such as ZigBee, can do the communication in almost the same Wi-Fi range, but they can't send information, they can only exchange data with each other. The (www) must have a client-server configuration to communicate. The client must be connected to a server with an available IP address. The system is consisting of all the sensor equipment that the client must be to send data to the web server. To establish a connection between the touch network and the Internet, we use a Wi-Fi module, which acts as another communication interface and is controlled by a microcontroller. The Wi-Fi module work as wireless connection to function. After configuring the Wi-Fi module with an Internet source, it acts as a client and transfer the data of sensor back to Microcontroller. The most important thing here is the idea of connecting different electronic element, Sensors and various devices via the Internet.

1.2 Problem Statement

The Problem found in most weather Stations recently all the weather Stations Consists of their Own Data Centre to Access and send the information to Display devices. Each and every data centre needs Crores to build their own data centre in the particular place. IoT Based Weather System acts as Weather Station and it update the Data Centre in Cloud. So, by using IoT Based Weather monitoring System we can solve the cost of equipment problem and also, we can also access the information remotely through internet Devices and Websites.

The weather monitoring system provides only the present condition of a particular field which will not provide the exact condition of thea particular city or particular place. The main problems in ordinary method were that devices are very much expensive and don't have that much data measuring accuracy. In case of any divergent there is no such device to give the alert signal about current situation hence it's very hard to control that kind of abnormality.

The existing weather monitoring systems normally use weather stations that use various kind of instruments such as thermometers, barometers, wind vanes, gauge etc. to measure weather and climate changes. Most of these used instruments use simple analog technology which is later physically recorded and stored in a data base. This information is later forward to news reporting stations and various stations where the weather report is given.

Limitations of the existing Weather Monitoring System

a.) Existing weather monitoring systems that are used generally consist of unconventional and heavy machinery that consists of number of moving parts that require constant maintenance and need to be monitored and changed frequently.

b.) Power requirements are one of many major constraints as these instruments are generally sited far from main power supply. This made instruments costly.

c.) Thermometers to measure external Temperature; But accurate is still not updated and continuously needs to be checked regularly for any change in temperature.

d). Data collected by the instruments needs to be manually transferred from the system to a Laptop or computer via a cable.

f.) Existing systems occupy a lot of space hence making it difficult to install them in remote location and places where space is limited.

g.) The instruments used are expensive and already have high cost of installation and maintenance.

h.) The current system faces problems like delay in caution people about worst condition of weather and instant overcast weather.

1.3 OBJECTIVE

The main objective of this project is to originate electronic device or network that can capture and restore temperature and humidity and after that send data to the cloud or website for its analysis.

Here we can use the Arduino Unoas a microcontroller for the simple brain of the system. When we use the Arduino as a microcontroller, we need a Wi-Fi module to establish your Internet connection. And the DHT sensor, which (digital humidity sensor) can detect differences in temperature, humidity and humidity at a certain location, must be integrated into the system. The sensor continuously monitors temperature changes and sends data to the microcontroller. The microcontroller transfer the data for its storage and visualization to cloud.

We can also use IOT platforms such as ThinkSpeak IoT to collect data into the cloud for analysis. This system can then be customized to create good animations such as tweets or phone calls, or turn on a device when the temperature/humidity or other parameters are below a certain threshold.

1.4 Methodology

Step 1. Block Diagram

The most basic step for the formation of the monitoring system is to deduce a block diagram for the system on which all further actions are performed.

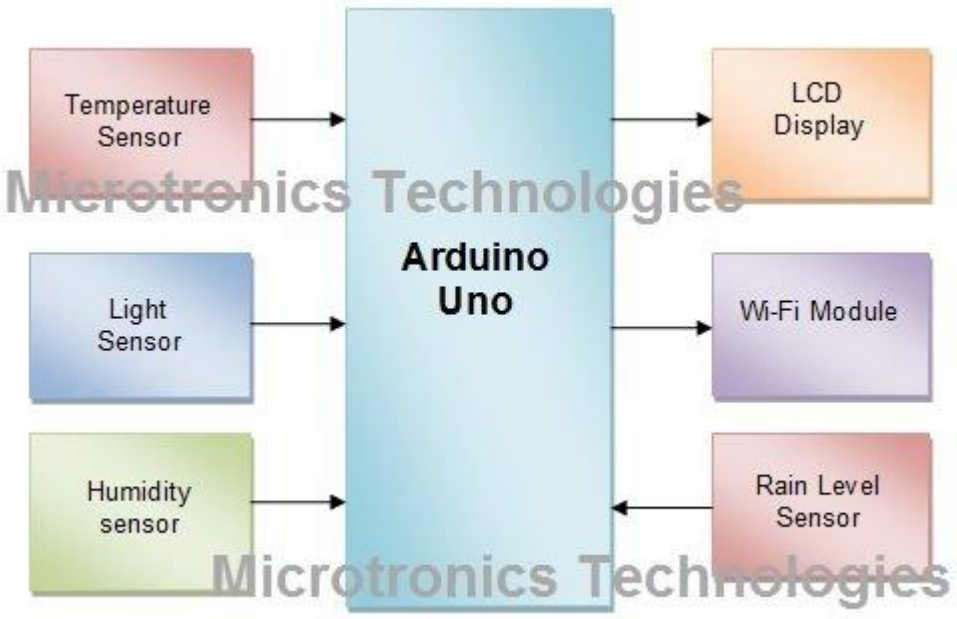


Figure 1

Step 2: Circuit Diagram

The Block diagram is followed by the construction of the circuit diagram in which all the components i.e., different sensors, Wi-Fi module etc. are mounted over the microcontroller and the breadboard.

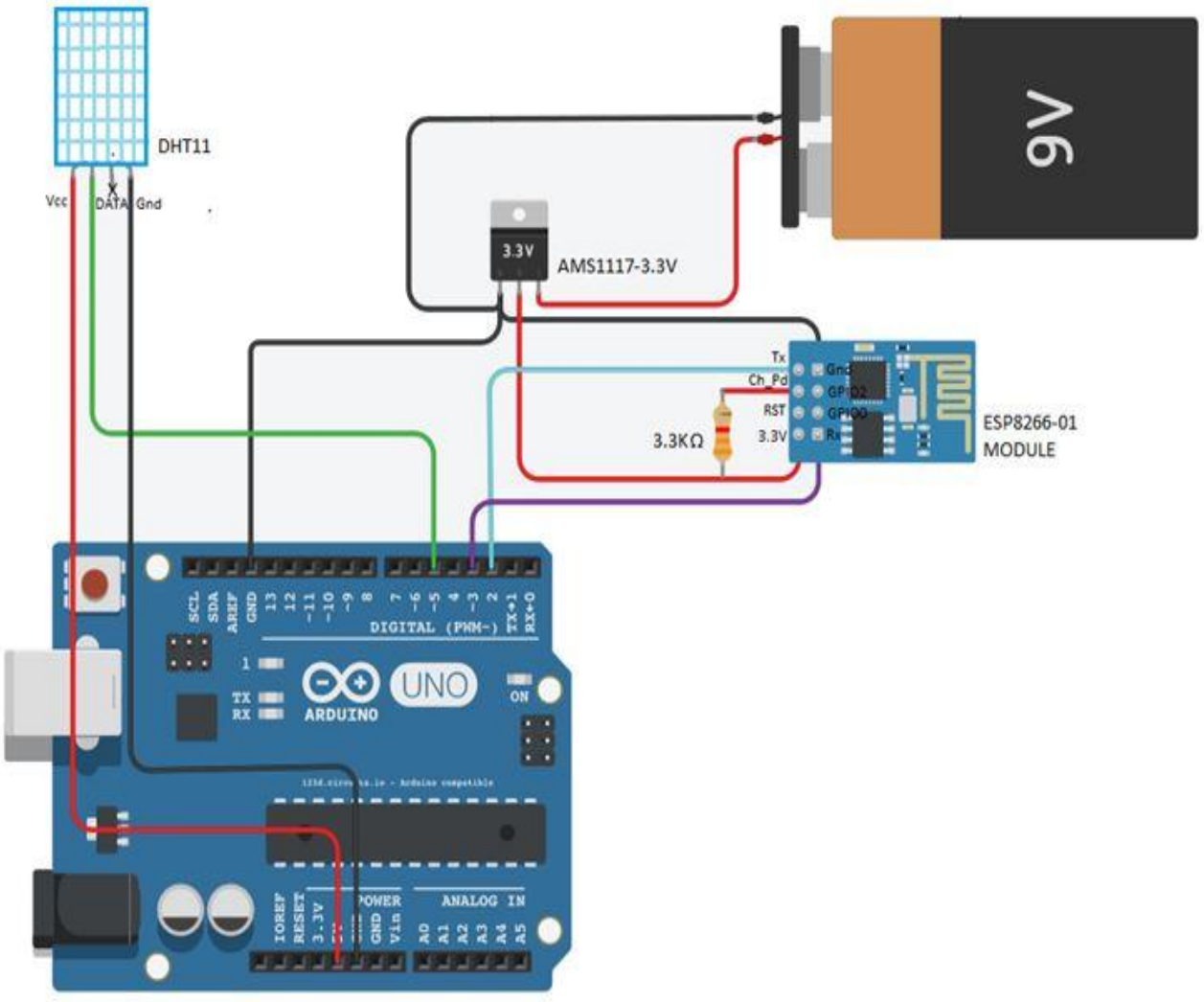


Figure2

Step 3: Temperature & Humidity Sensor

DHT11 temperature and humidity sensor will be used which is best model for measurement. In this Temperature will display in Celsius.
Humidity(H) will display in %

The sensor tells 20 % - 80% readings which is 5% accurate and -40 - 80-degree Celsius temperature that is +-0.5 accurate, it can be decrease or increase.

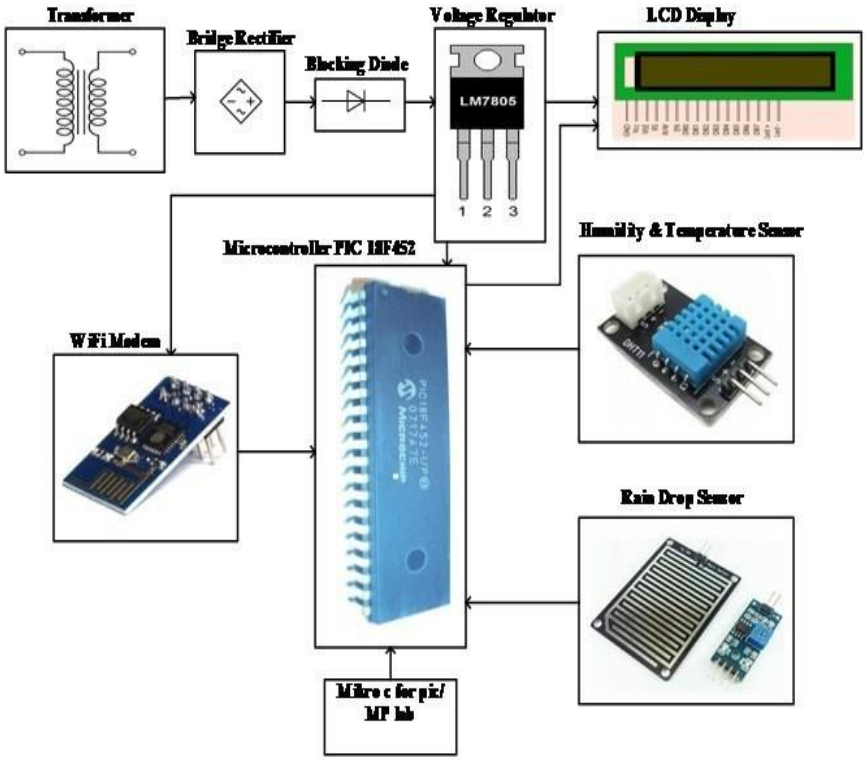


Figure3

Block Diagram

(DHT 11) Sensor senses for the surroundings Temperature and Humidity and send the information to the Arduino uno microcontroller device.

The Arduino UNO further uploads this information of the recorded parameters to the thingspeak cloud using the ESP8266 wifi module.

User uses this Thingspeak server and it acts as an front end of the whole system.

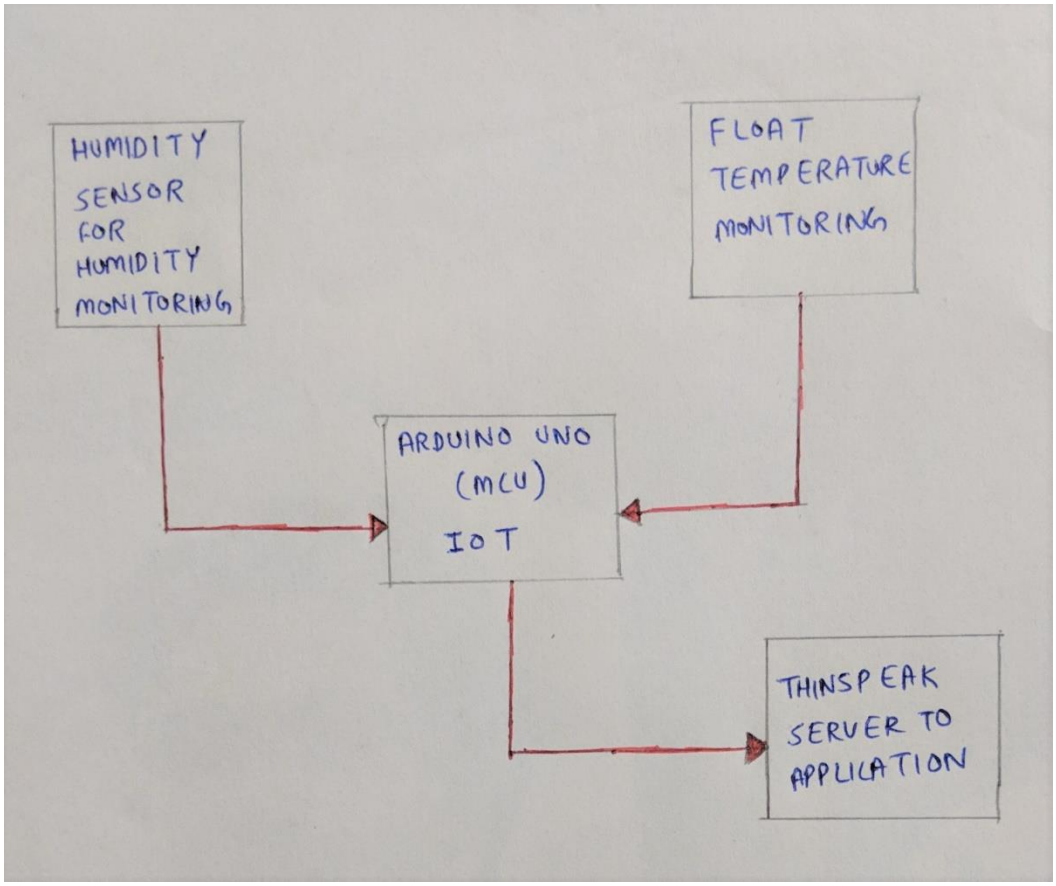


Figure4

THINGSPEAK SERVER WITH DATA:

Below diagram shows the change in humidity after regural interval of 2 days .

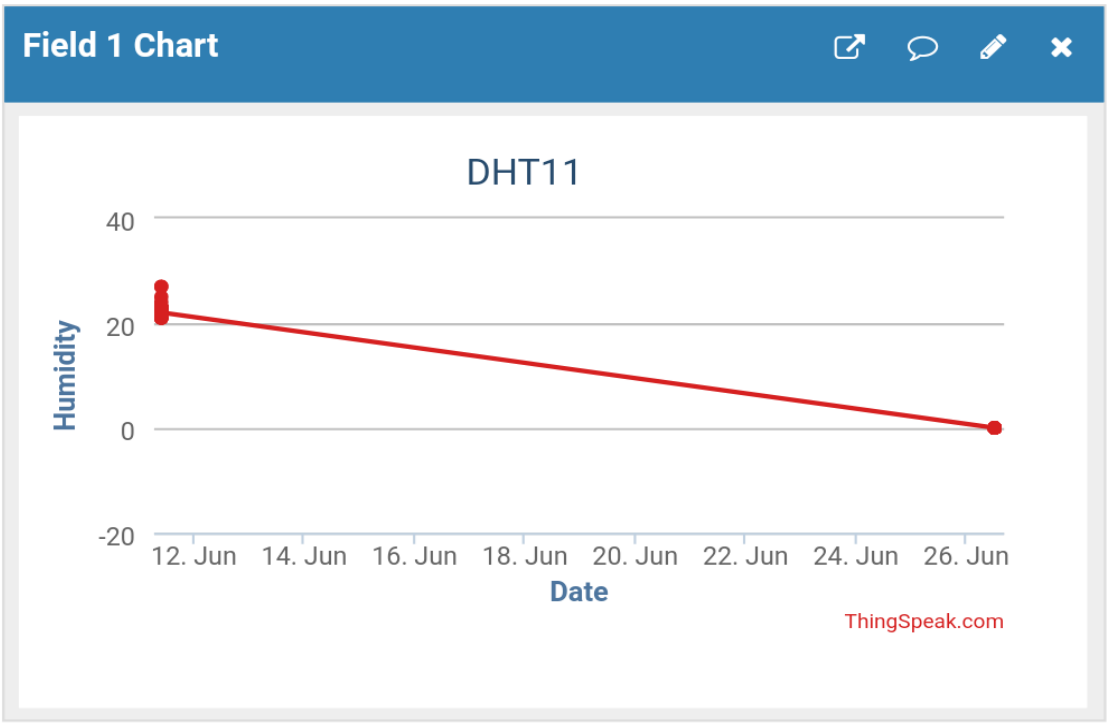


Figure5

CHAPTER 2
LITERATURE SURVEY

Through the meteorological system, we can collect data on humidity and Temperature, as well as data on pollution and, taking into account current and previous data, we can graphically modify the results in any system. After reviewing many articles, there are currently far fewer articles that mention monitoring the combination of temperature, lighting and humidity in a small integrated system and have actuators to change these settings. There is a research paper that discussed the monitoring of these three environmental conditions; however, there was no mention of having actuators to modify. Thus, the main idea was to create a system that could detect the main components that make up the climate and be able to predict time without human error. Existing weather forecasting methods were generally based on observed patterns of events, and can be called pattern recognition. For example, one could observe that if the sunset was red and normal, the next day often brought a very nice weather. This experience gathers more than and generations to produce the tradition of the time. However, not all of these predictions are reliable and since then many of them have not been able to withstand rigorous statistical testing. The simplest way to predict time, persistence, depends on today's conditions to predict tomorrow's conditions. This can be a good way to predict weather when it is in a stationary state, such as during the summer in the tropics. This method of forecasting depends on the presence of a stationary weather pattern. It can be useful for both short- and long-range weather forecasts. Pressure measurements and pressure variations over time have been used in forecasts since the 19th century.

2.1RELATED WORKS

Most scientific documents and research in this field do not prioritise the storage of sensor data and outputs using data-based microcontrollers. In this article, data obtained by the system can be stored and mapped synchronously with the meteorological station monitoring system. This means that information can be presented and viewed using two methods, direct and indirect. The direct term means that weather conditions can be displayed directly on the LCD (16×2) without creating a soil database area. Indirect technology means that weather conditions are recorded and stored on the computer as long as the sensors measure the weather conditions. The main purpose of this work is to show and confirm that microcontrollers with energy sensors can be linked to a data acquisition system to create a database based on meteorological station attributes. The proposed concept makes it possible to predict the possibilities on the basis of data from microcontrollers' sensors, and not direct control of the system. In order to reduce costs, the proposed system uses a sensor defined as

a HS sensor to obtain readings of temperature and humidity used to construct the heretical structure of the climate database. Weather forecasting issues depend entirely on the weather conditions of the last day to determine to what extent the weather may change in the future. The articles presenting the idea of renewable solar systems and hybrid power plants discuss several factors that significantly influence the assessment of weather conditions, such as the color of solar radiation as a result of environmental reactions and reflections changing the temperature situation, and thus the relative humidity of the air. Furthermore, wind speed is considered to be another factor that has a huge impact on climatic conditions such as air speed, density, direction and cold. The proposed conditions and factors therefore have a significant impact on the daily weather forecasts for people. The article presents a simple way of local monitoring / storage, i.e. the user can equip the system with a specific location and automatically (day/night) start recording and monitoring data.

2.2 PROPOSED SYSTEM

Many high-end systems are now available for 24-hour weather observation. But these systems are being plotted on a Large scale to monitor real-time Weather in a state or an entire state. The implementation of such a system for a small area is not possible because they are not set for it and the effort for the maintenance of such systems for a small area is very high. The new system uses 3 sensors to measure atmospheric and environmental factors such as temperature, humidity, light intensity, dew point and thermal index. The values read by the sensors are processed by the Arduino microcontroller and stored in a text file that can be processed for analysis. The readings are also displayed on an integrated LCD screen for quick viewing. All these measurements can be analyzed to determine the weather characteristics of a particular region and record the weather profile. These saved settings are essential and vary from place to place. All these requirements are entered into the database and these values are essential and are recorded over time. With these input values, we can draw a weather map for a particular region in time.

The system proposed is an advanced solution for weather monitoring that uses IoT to make its real time data easily accessible over a very wide range. The system deals with monitoring weather and climate changes like

1.Temperature, humidity by using the DHT11 sensor
2.Wind speed using an Anemometer
3. Light intensity using an LDR
4. UV radiation using a GY8511 solar sensor
5. Carbon monoxide levels in the air using MQ7
6. Soil moisture using Hygrometer
7. Ultrasonic sensor for rain water level
8. Raindrop sensor for detecting rainfall or snow fall.

2.2.1 Feature and advantages of the proposed system

1.Our proposed 'Smart weather monitoring system' unlike conventional weather monitoring instruments is very small and compact allowing it to be installed easily on rooftops.

2. It is light and portable; this advantage allows us to easily carry it to remote location for installation. Due to its design it can be easily be carried by a weather balloon to measure atmospheric changes at high altitudes

3. The power requirements for our system (sensors and boards) is much less compared to the existing instruments in the market hence enabling us to use solar cells as power supply. This not only cuts down on cost but allows us to leave the monitoring system in remote, areas where power is not easily available, for long periods of time. Addition of solar panels also helps our design be eco-friendly.

4. The sensors used in our product are much cheaper compared to the ones that are used in the existing weather monitoring systems making our design more cost effective.

5. These sensors send the data to a web page and the sensor data is plotted as graphical statistics. The data uploaded to the web page can easily be accessible from anywhere in the world. The data gathered in these web pages can also be used for future references. Unlike the existing system where data has to be physically transferred.6. Due to the presence of fewer moving parts less amount of maintenance will be needed cutting down on maintenance charges.

7. The product even consists of an app that sends notifications as an effective alert system to warn people about sudden and drastic weather changes. This works as an efficient warning system for bad weather and storms.

8. For predicting more complex weather forecast that can’t be done by sensors alone we use an API with the help of a Raspberry pi that analyses the data collected by the sensors and predicts an accurate outcome. This API can be used to access the data anywhere and at any time with relative ease and can also be used to store data for future use.

2.3GOALS

Weather monitoring offers different kind of measurements to provide various important information about temperature, soil, some of them are:

1.Air and soil temperature

2. Humidity

3.Moisture

4.Rainfall level

5.Wind speed

6.Evapotranspiration

7.Air pollution

CHAPTER 3

SYSTEM DEVELOPMENT

3.1 System Overview

This system is designed for monitoring weather temperature, humidity intensity of light in the atmosphere or at particular place to make interactive environment through wireless network. Designed system is more adaptable and distributive in nature to examine the environmental parameters. The architecture designed is discussed in a 4-tier model. The working of particular modules developed for weather monitoring. Given model has 4-tiers. The tier 1 consist of overall environment, tier 2 contain all sensors, retrieving data and decision making held in tier 3 and acute environment present in tier 4. The architecture is shown in figure also.

The tier 1 gives information about the parameters and particular place which is to be monitored for weather parameters. Tier 2 deals with sensor devices havingdifferent characteristics, features and each of these sensors' devices arecontrolled based on their range of sensing and their sensitivity as well.

In between tier 2 and tier 3 sensing and controlling based upon the conditions, like threshold value fixed by us, periodicity, messages like alarm or LED etc. Based on the analysis of the data performed in two layers and also from past experiences the parameter threshold values in normal working conditions are examined.

Tier 3 defines about data acquisition from implemented sensor devices and also decision making

.

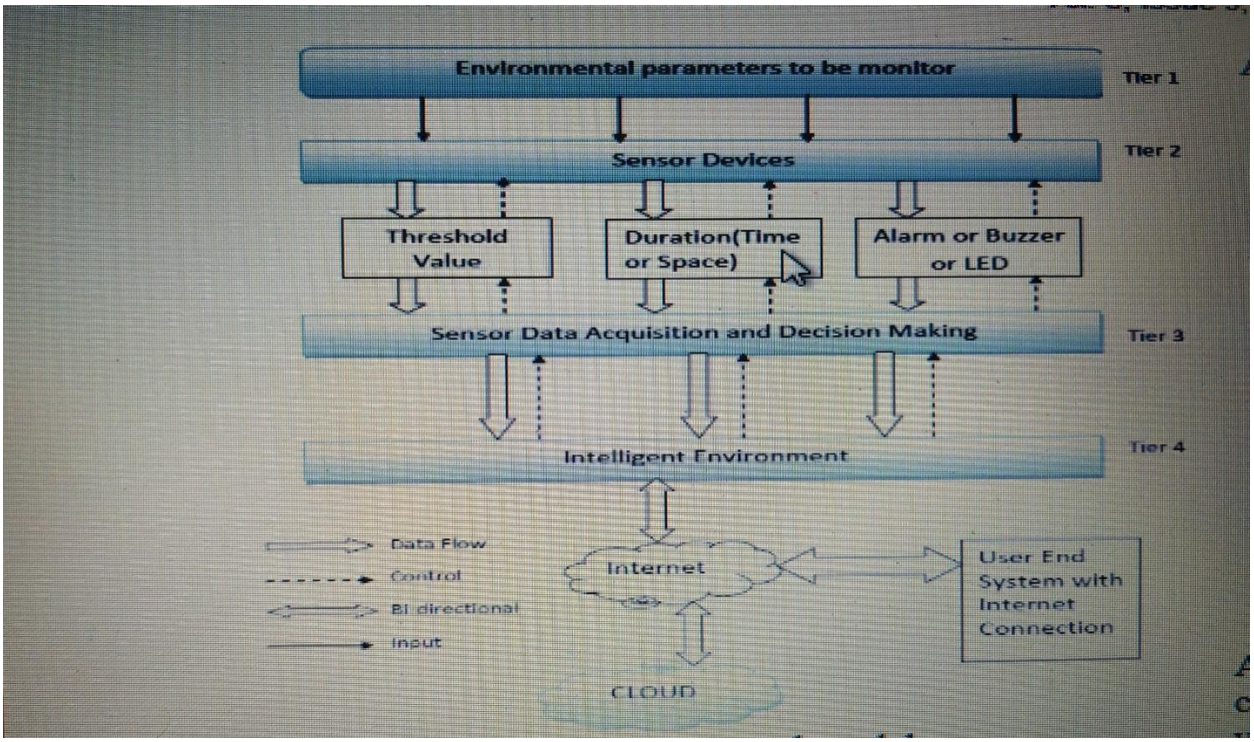


Figure6

3.2 SystemArchitecture

Whole system consists of a microcontroller which is a main unit of processing for the entire system and all other sensors and other devices will be connected with microcontroller.

All sensors are operated through microcontroller to retrieve the data from the sensors and do the analysis with the sensor data and updates data to the internet using Wi-Fi module which is connected to it.

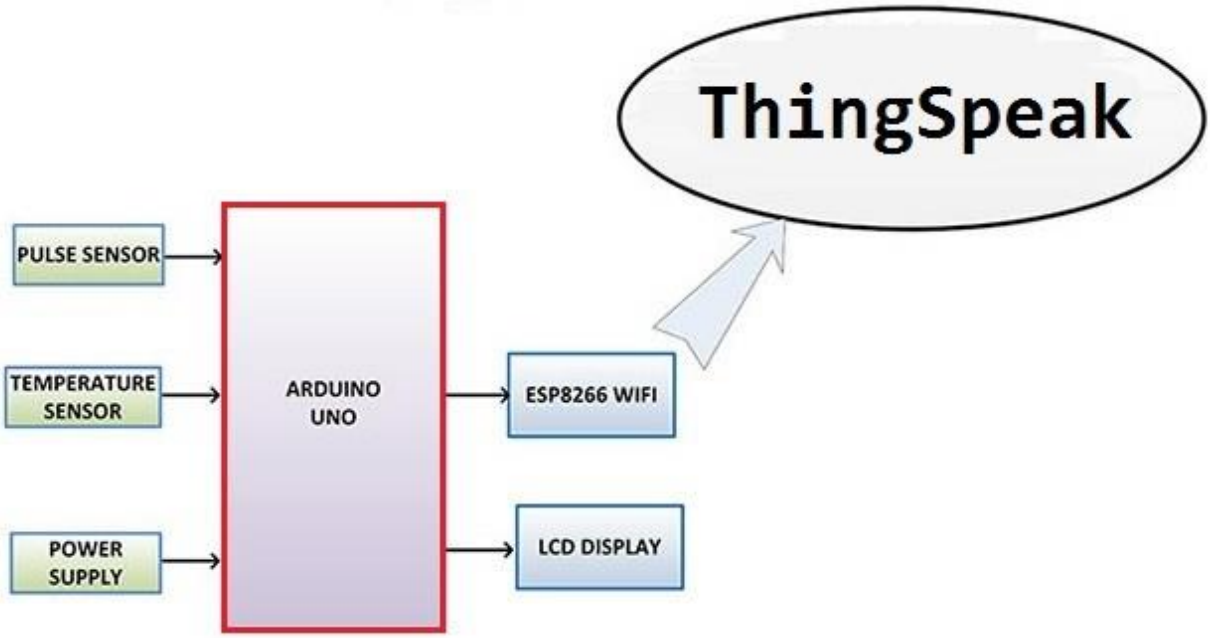


Figure7

3.3 System Requirement

These are the system, hardware and software required:

3.3.1 Hardware Used

Microcontroller:
Microcontroller is an system used within project.
Behaves like a little computer.
One or more than one CPU along with this Microcontroller are used to have the Input and Output in the system.
Microcontrollers are used mainly in automated products and devices, i.e. electronic devices such to control TV, Fans etc.
Very first microcontroller was built with the Intel 4004 in 70s.

Figure8

Arduino UNO:

Arduino UNO is an open source microcontroller and a tool to connect hardware and sensors over internet of things (IOT).
Based on the Microchip ATmega328P.
Developed on Arduino.cc
Massimo Manzi along with his other colleagues David mellis and David cuartielles after working on ATmega8 and doing some minor changes and thus forked the project and replaced it to Arduino

1.Microcontroller: MicrochipATmega328P
2.Oper Volt: 5 Volt
3.Inp Volt: 7 to 20 Volts
4.I/O Digital Pins: 14 (6PWM output)
5.Input Pins Analog: 6
6. I/O Pin DC current: 20 mA
7.Curr for 3.3V Pin: 50 mA
8. Storage: 32 KB
9.SRAM: 2 KB
10. EEPROM: one KB
11. Speed of clock: 16MHz

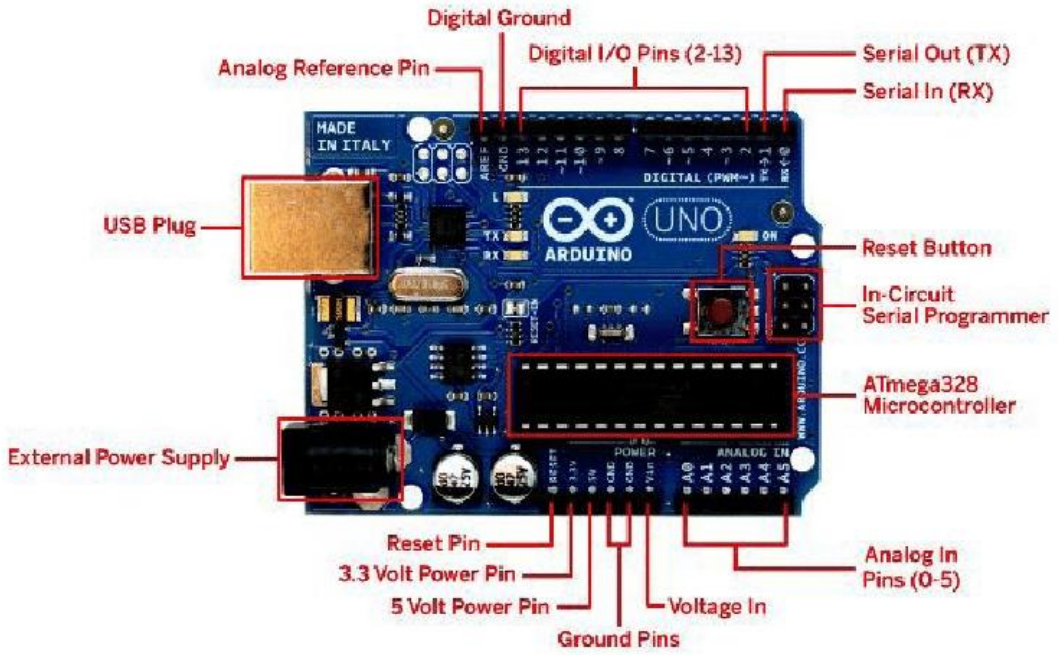


Figure9

COMPONENTS USED:

DHT11

DHT examine the values of temperature and humidityafter a particular time period based on the adjusted digital signal output. Due to the digital signal and data visualization Temperature as well as Humidity(H) sensing module The sensor is stable and reliable. DHT is constructed of of element having resistivity that reads humidity and also a-ve Temperature coefficient element which reads temperature. DHT distributed with 8–bit microcontroller which display reliability, sensitivity, stability, very elevating response, no interference, and found in very less cost. The deployed (DHT) is given by 3-pins known as VCC connected with 5V of arduino, GND connected with arduinoGROUND, and DATA pin is connected to the digital pin ofarduino board

DHT11 Specifications:

- Voltage is b/w 3.5V to 5.5V
- Operating current: 0.3mA
- O/p: Serial Data
- Range of Operating Temperature- 0°C to 50°C
- Range of Humidity- 21% to 91%
- Temp and Humidity both 16-bit
- Accuracy(±1.5°C and ±1.5%)

Figure10

How to use DHT11 Sensor in case of MCU:

The connection diagram for this sensor is shown below.

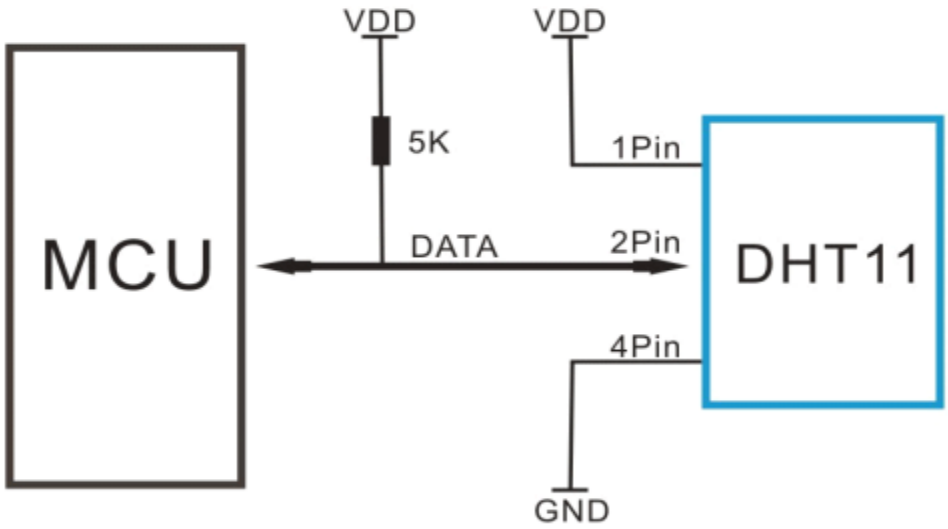


figure11

As we have pin which Is connected to an I/O pin of the node MCU and a 5K resistor is there. This pin outputs the value of both Temperature and Humidity as serial. If we try to interface DHT11 with Arduino then there are ready-made libraries for it which will give us a better start.

Applications:

- Temperature and Humidity
- Local Weather forecasting station
- Automatic control of climate
- Monitoring of environment

Wi-Fi Module (ESP8266)-

ESP8267 wi-fi module which have TCP/IP Protocol stack and integrated on the chip. Such that it could provide any microcontroller to connect with Wi-Fi network. The ESP8267 is capable of both loading all Wi-Fi networking functions from another type of application processor and hosting an application. Every ESP8267 module comes pre-programmed with an (AT) command set firmware, meaning, we can simply attach it with our Arduino device and get Wi-Fi-ability as a WIFI shield offers to it. The ESP8267 module is an growing, community and cost effective.

High degree on chip integration allow for minimum external circuitry, which includes the front end module, which is designed for occupying minimum PCB area. The ESP8267 support applications and bluetooth interface, also contain self-calibrated RF which allow it to workable under possible operating conditions.

- Module Wi-Fi Direct
- Stack of TCP/IP protocol
- Integrated Switch(LNA), matching network power Amplifier
- power management units and integrated PLLs, DCXO ,regulators
- +16.8dBM Output power with 800.11b Mode
- leakage I <10uA
- 1MB flash memory
- Low power (32-bit) CPU can be used as processor
- Exchange of packets in < 2.5ms
- Power consumption of < 1.0mW

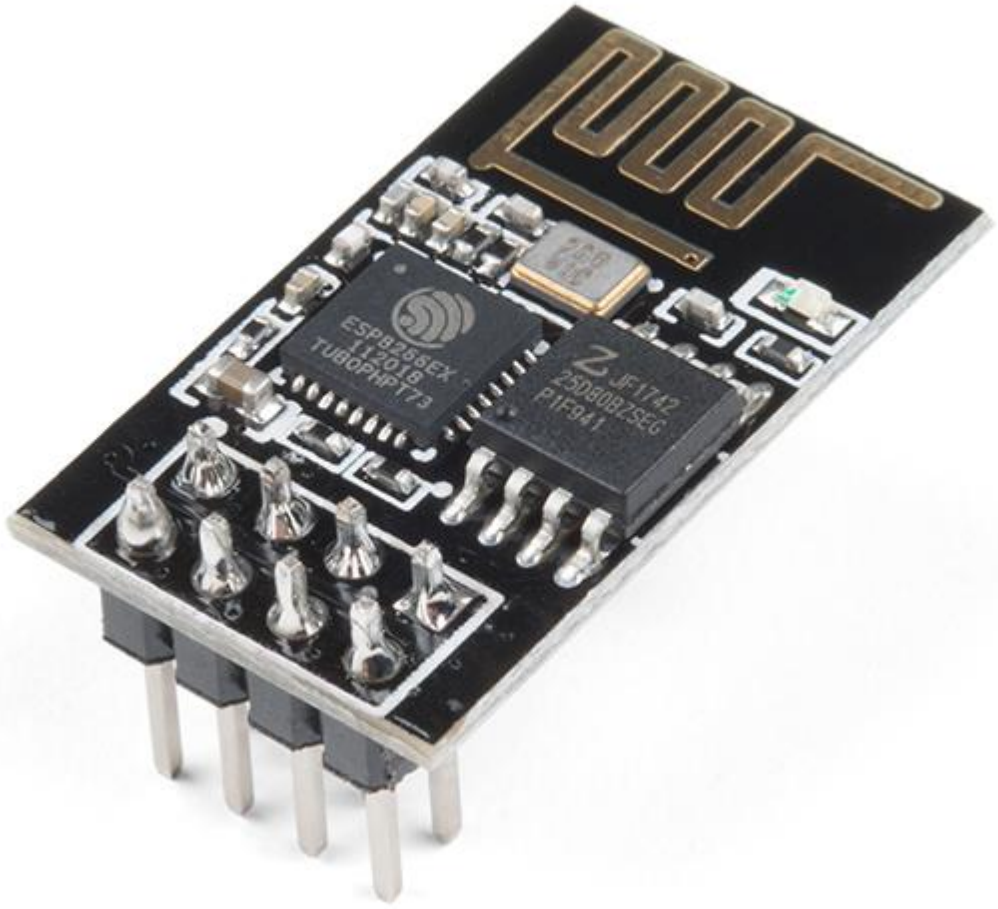


Figure12

Light-Dependent Resistor (LDR)-

An LDR changes its resistance when the light intensity is fall upon it.
It allows them to be use in light sensing circuit.

The given sensor provide four input pins indicated by VCC,digital pin D0, GND, and analog pin A0. In this project we use digital pin (D0) which is capable of transferring the signal between the sensor and the microcontroller for immediate signalling. This connection scheme relates photocell sensor based arduino microcontroller is put into account so that (Vcc) will be

connected to the 5V of Arduino, GROUND of thesensor connected to the GND of Arduino, and D0 is attached to pin 2.

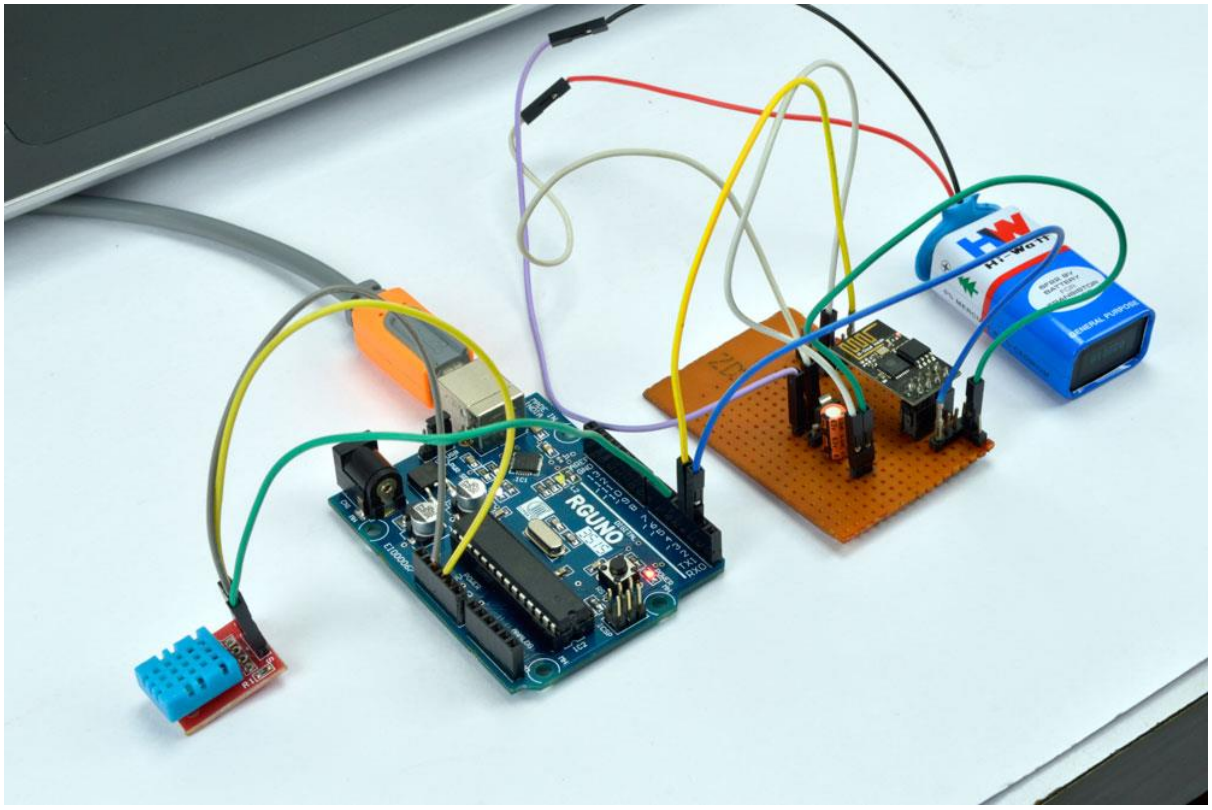


Figure13

3.3.2 Software Used In the project: -

1-Arduino IDE:

Arduino IDE is an integrated development environment.

Can be used over different operating systems or platforms i.e. Windows, macOS, Linux.
IDE is used for writing and uploading the code of the hardware for programming the microcontroller accordingly.
The IDE consists of the different software libraries from the previous wiring project.

Features:
1.Both Analog and digital signal can be read by the IDE.
2.Directly connected to the microcontroller over a USB.
3. Arduino IDE supports different languages for writing the code
-C, C++, JAVA

Working:

Step 1. Connecting the Arduino device with the computer using a USB.

Figure14

Step 2. Writing the code in the preferred language.

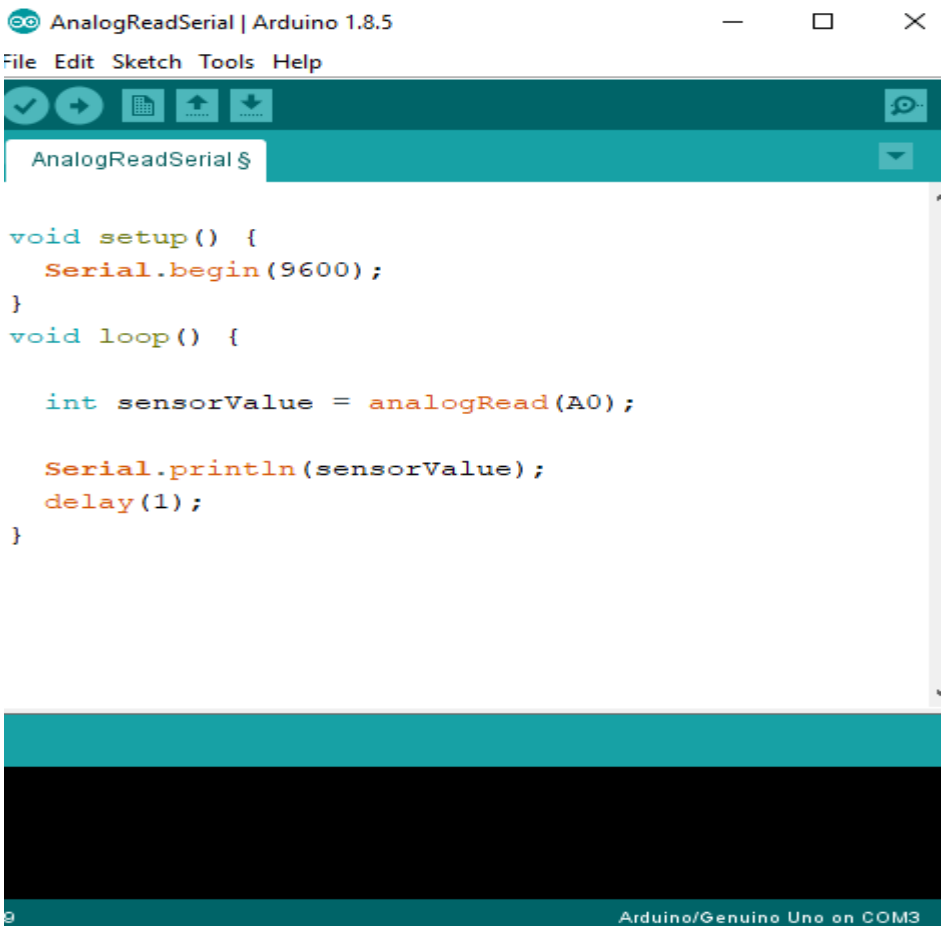


Figure15

Step 3. Selecting the port from the list of ports.

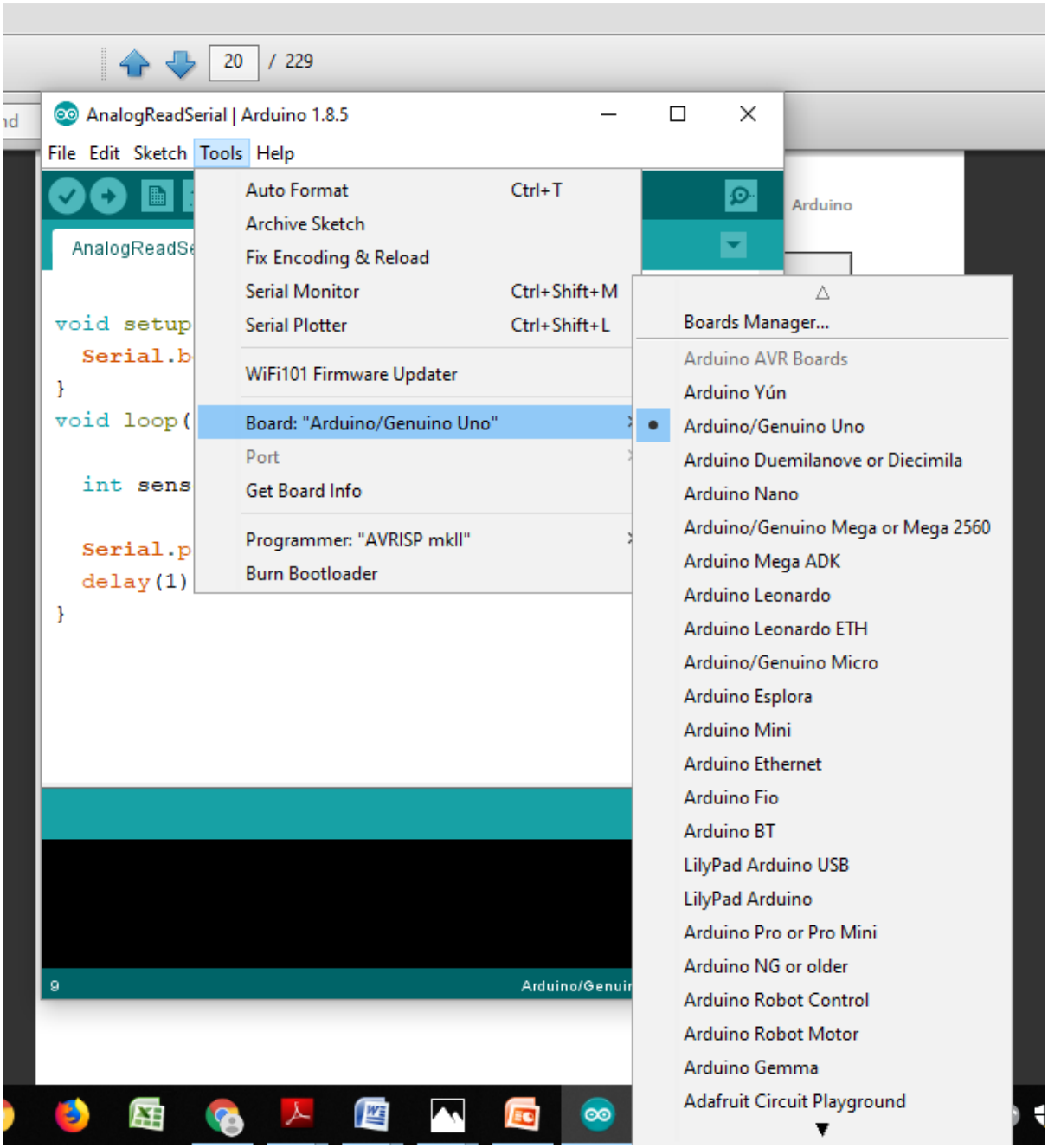

20 / 229
AnalogReadSerial | Arduino 1.8.5
File Edit Sketch Tools Help
Auto Format Ctrl+T
Archive Sketch
Fix Encoding & Reload
Serial Monitor Ctrl+Shift+M
Serial Plotter Ctrl+Shift+L
WiFi101 Firmware Updater
Board: "Arduino/Genuino Uno"
Port
Get Board Info
Programmer: "AVRISP mkII"
Burn Bootloader
Boards Manager...
Arduino AVR Boards
Arduino Yún
Arduino/Genuino Uno
Arduino Duemilanove or Diecimila
Arduino Nano
Arduino/Genuino Mega or Mega 2560
Arduino Mega ADK
Arduino Leonardo
Arduino Leonardo ETH
Arduino/Genuino Micro
Arduino Esplora
Arduino Mini
Arduino Ethernet
Arduino Fio
Arduino BT
LilyPad Arduino USB
LilyPad Arduino
Arduino Pro or Pro Mini
Arduino NG or older
Arduino Robot Control
Arduino Robot Motor
Arduino Gemma
Adafruit Circuit Playground
void setup
Serial.b
}
void loop(
int sens
Serial.p
delay(1)
}
Arduino

Figure16

Step 4. Uploading the code over to the Arduino UNO microcontroller.

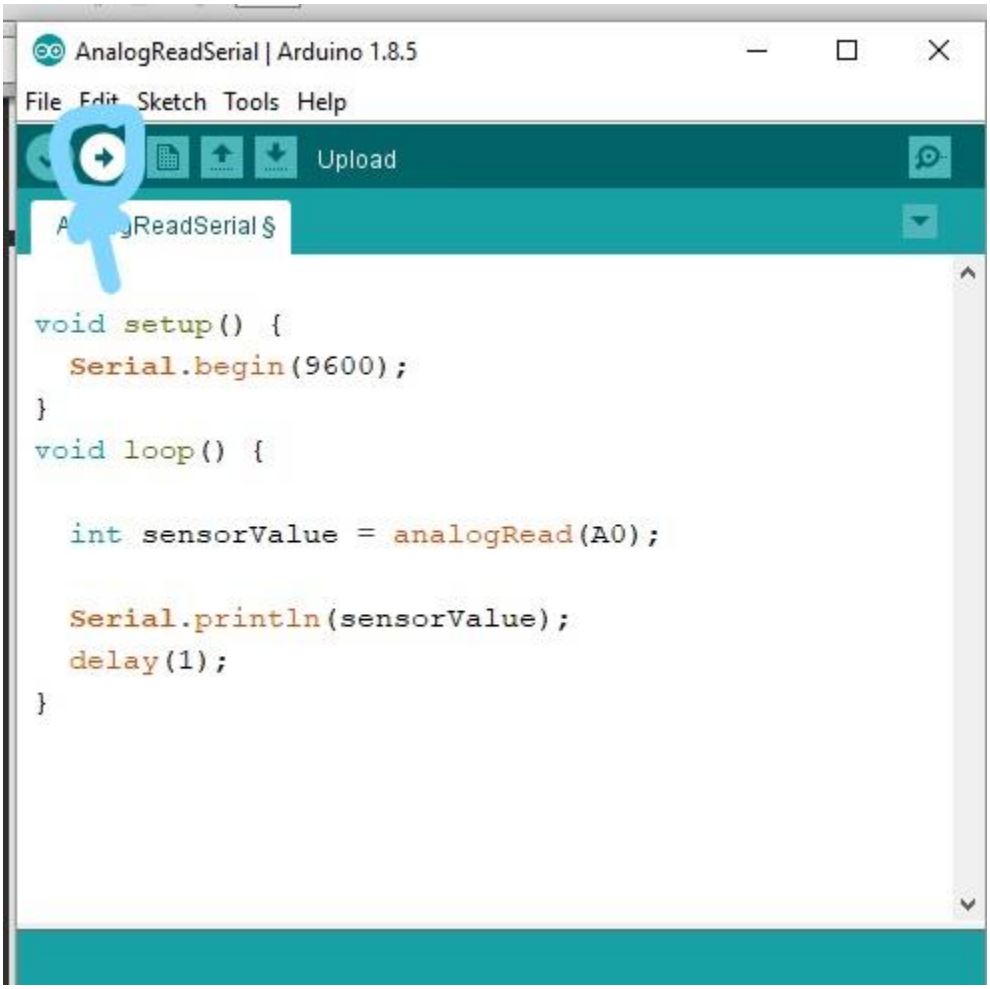


Figure17

2-ThingSpeak

ThingSpek is an application which is open source used for the purpose of mail of Internet of things (IOT)
API used for storing the information gathered from the internet of things system.
Data can also be retrieved using different protocols i.e. HTTP protocol or LAN.
ThingSpeak primary service at the time the time of launch in 2010 by ioBridge in 2010 was in support of IoT applications.
ThingSpeak make us able to createthe sensor logging applications, as well as location tracking applications, and a status updates with social network of things".
ThingSpeak has major support from MATLAB which is a software of numerical computing fromMathWorks which allowThingSpeak users to analyze and retrieve uploaded data using MATLAB without wastingmoney on its licenses.

Working:

Step1: Click on the **New Channel** to create a new ThingSpeak channel. On this channel we will get the visualization of our data.

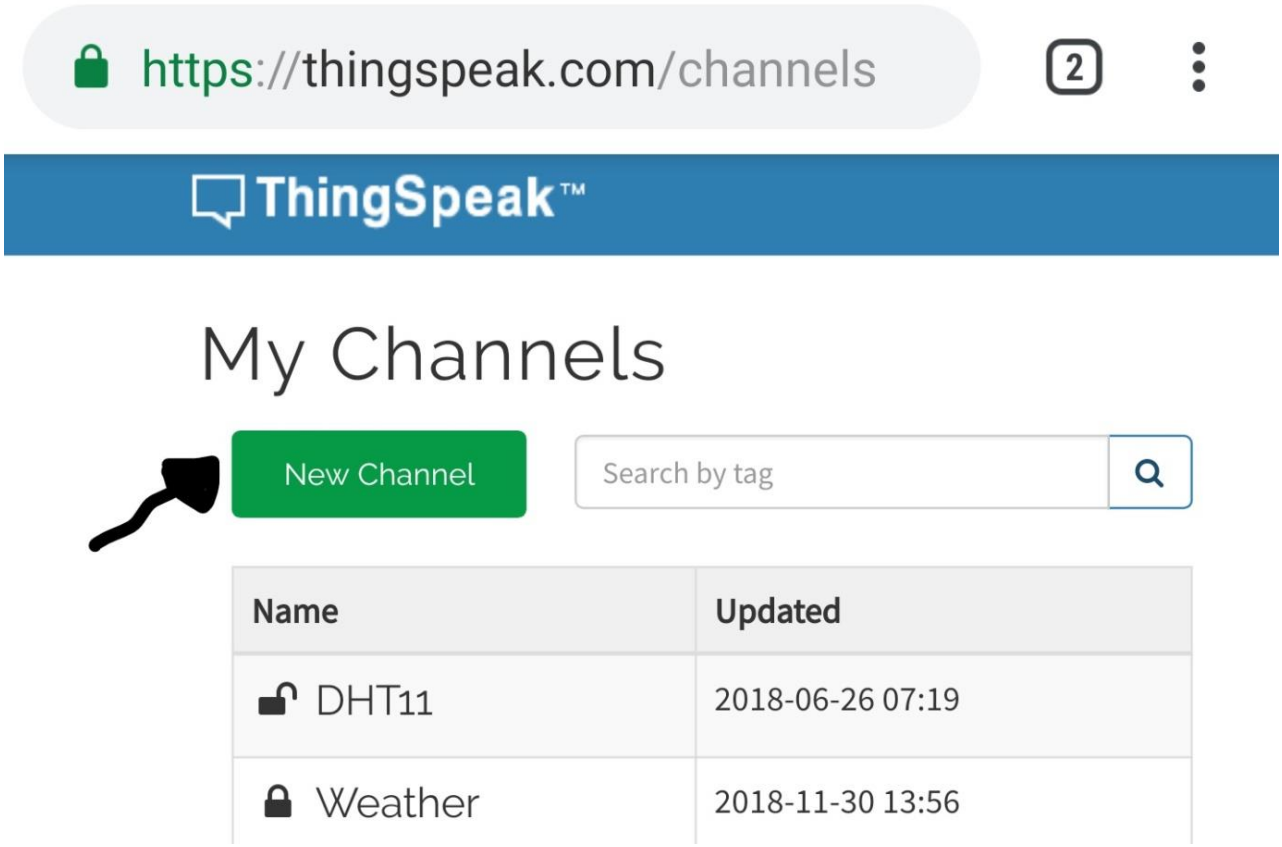


Figure18

Step 2: Fill the channel setting accordingly to the requirements. Channels are used to store the different kind of data that is collected by the ThingSpeak application. There are total 8 fields in a channel that are used to contain any type of data, location field and status data.

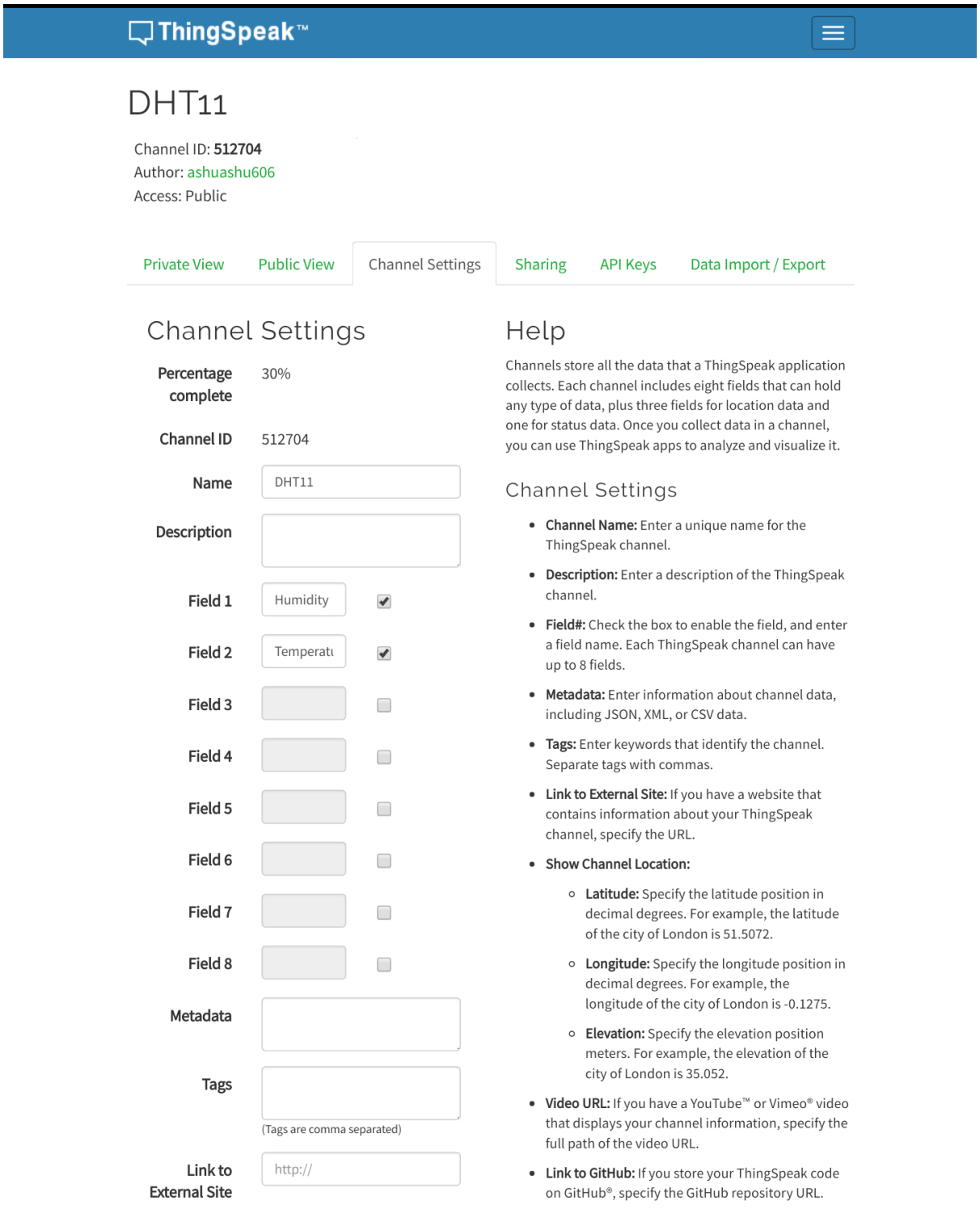
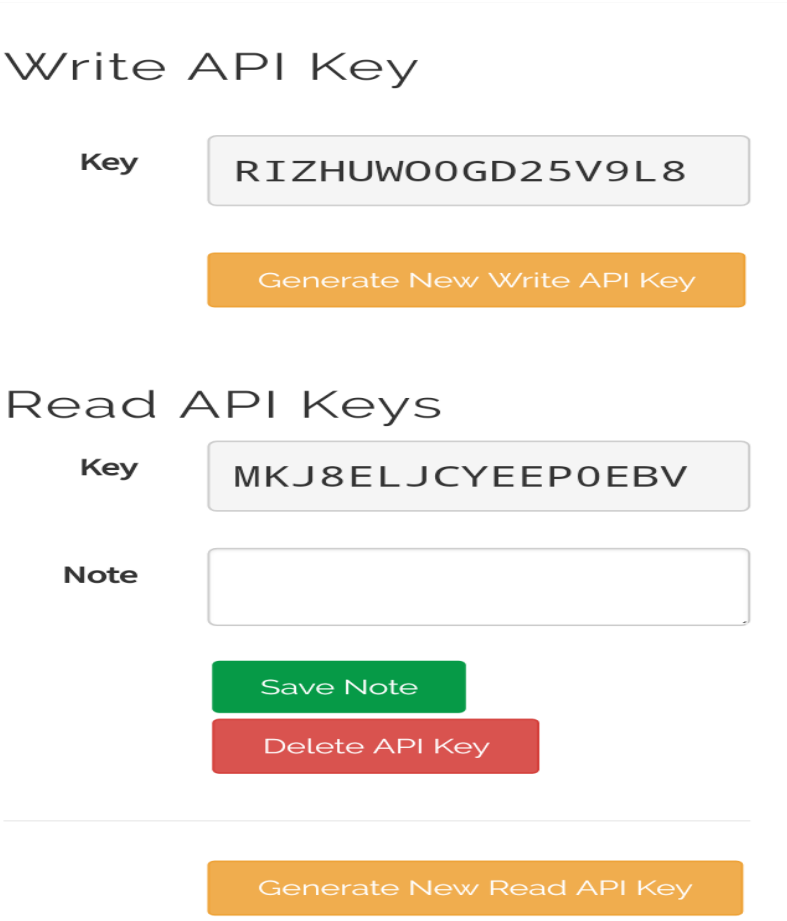

ThingSpeak™
DHT11
Channel ID: 512704
Author: ashuashu606
Access: Public
Private View
Public View
Channel Settings
Sharing
API Keys
Data Import / Export
Channel Settings
Percentage complete
30%
Channel ID
512704
Name
DHT11
Description
Field 1
Humidity
Field 2
Temperatı
Field 3
Field 4
Field 5
Field 6
Field 7
Field 8
Metadata
Tags
(Tags are comma separated)
Link to External Site
http://
Help
Channels store all the data that a ThingSpeak application collects. Each channel includes eight fields that can hold any type of data, plus three fields for location data and one for status data. Once you collect data in a channel, you can use ThingSpeak apps to analyze and visualize it.
Channel Settings
Channel Name: Enter a unique name for the ThingSpeak channel.
Description: Enter a description of the ThingSpeak channel.
Field#: Check the box to enable the field, and enter a field name. Each ThingSpeak channel can have up to 8 fields.
Metadata: Enter information about channel data, including JSON, XML, or CSV data.
Tags: Enter keywords that identify the channel. Separate tags with commas.
Link to External Site: If you have a website that contains information about your ThingSpeak channel, specify the URL.
Show Channel Location:
Latitude: Specify the latitude position in decimal degrees. For example, the latitude of the city of London is 51.5072.
Longitude: Specify the longitude position in decimal degrees. For example, the longitude of the city of London is -0.1275.
Elevation: Specify the elevation position meters. For example, the elevation of the city of London is 35.052.
Video URL: If you have a YouTube™ or Vimeo® video that displays your channel information, specify the full path of the video URL.
Link to GitHub: If you store your ThingSpeak code on GitHub®, specify the GitHub repository URL.

Figure19

Step:3 Noting the API key for further purpose key is used by the ESP8266 for the transmission of the data from the Arduino Uno microcontroller over to the cloud.



Step:4 Given String API Key-RIZHUWOOGD25V9L8

Write the Name of Host and passwd with Wi-Fi Name and Wi-Fi passwd
(String Host_Name = "PIXEL" and String Password = "ashu123")

CODE:

This code is written in Arduino IDE and then uploaded over to the respective port over which the UNO microcontroller is mounted.

```
#include  <DHT.h>

#include<software_Serial.h>

#Define DHTPIN 6

#define DHTTYPE DHT11

String APIKey=  "RIZHUWGD2V9L8";

String host_name= "Pixels";

String Password = "abh523";

Software _serial ser(2, 4);

int I =1;

DHT(DHT_pin,DHT_type);

void _setup()

{

Serial.Begin (8600);

Ser_begin (8600);
Ser _println("AT+RST");

DHT.bgin();

char  inv = “ “;

string_cmd = "AT+cajwp";

cmd+= "=";

cmd+= inv;

cmd+=H_name;
```

```
cmd  == inv;
cmd+=  pass;
cmd+= inv;
ser.println (CMD);
  }

void loop()
{
  int HUMIDITY=  dht.readHUMIDITY  ();
  int TEMPERATURE= dht.readTMPERATURE ();
  String_State1=String (HUMIDITY);
String state2=String(TEMPERATURE);

String _cmd = "AT+STARTCIP=\"TCP\",\"";
Cmd  += "184.106.153.149";
cmd  +=  "\" ,85";
seri_println (cmd);
Serial_println(cmd);
 if(ser_find("ERROR")){
Serial_Println("AT+STARTCIP error");
Return;
}
String get_Str = "GET /update?api_key=";
```

```
Get_Str += api KEY;
Get_Str +="&FIELD1=";
Get_Str += S tring (STATE1);
Get_Str +="&FIELD2=";

Get_Str += String(STATE2);

Get_Str += "\r\n\r\n";
Cmd = "AT+CIP_SEND=";
Cmd  += string(getStr.length());
ser_println(cmd);
Serial_println(cmd);

if(SER_FIND(">")){
ser_print(getStr);
Serial_ print(getStr);
  }
else{
ser.println("AT+CLOSECIP");
Serial.println("AT+CLOSECIP");
  }
delay(1200);
}
```

CHAPTER 4
PERFORMANCE ANALYSIS

We have designed all the modulesas well as each and every component were assembled. The main thing that is testing of each module carried out successfully. The readings of every sensor were effectively retrieved in a easy environment and stored in files. The files updated automatically to cloud. Then we plot Graphical charts using the data which provide a nice analytical pattern of weather based on readings of sensors. In this way the phase of testing completed. This carries out in a very disciplined manner. So,we have to conduct some more same kind of experiments to real weather conditions.

Here we havean IOT based project, which is a weather monitoring system that help in accessing different weather parameter remotely over Thingspeak website or using an mobile application while connected to internet.

In this modern time, we are highly dependent on growing technology.

Our project uses microcontroller (Arduino UNO), WIFI module and different sensors i.e. DHT11, light sensor etc. The system was at the first time when different sensors were mounted over to the Arduino Uno and breadboard. The code upload time was also comparatively higher at the beginning than in the last phases.

DHT humidity sensoris good in passingsignals.

Readings of DHT11 on LCD shown below:

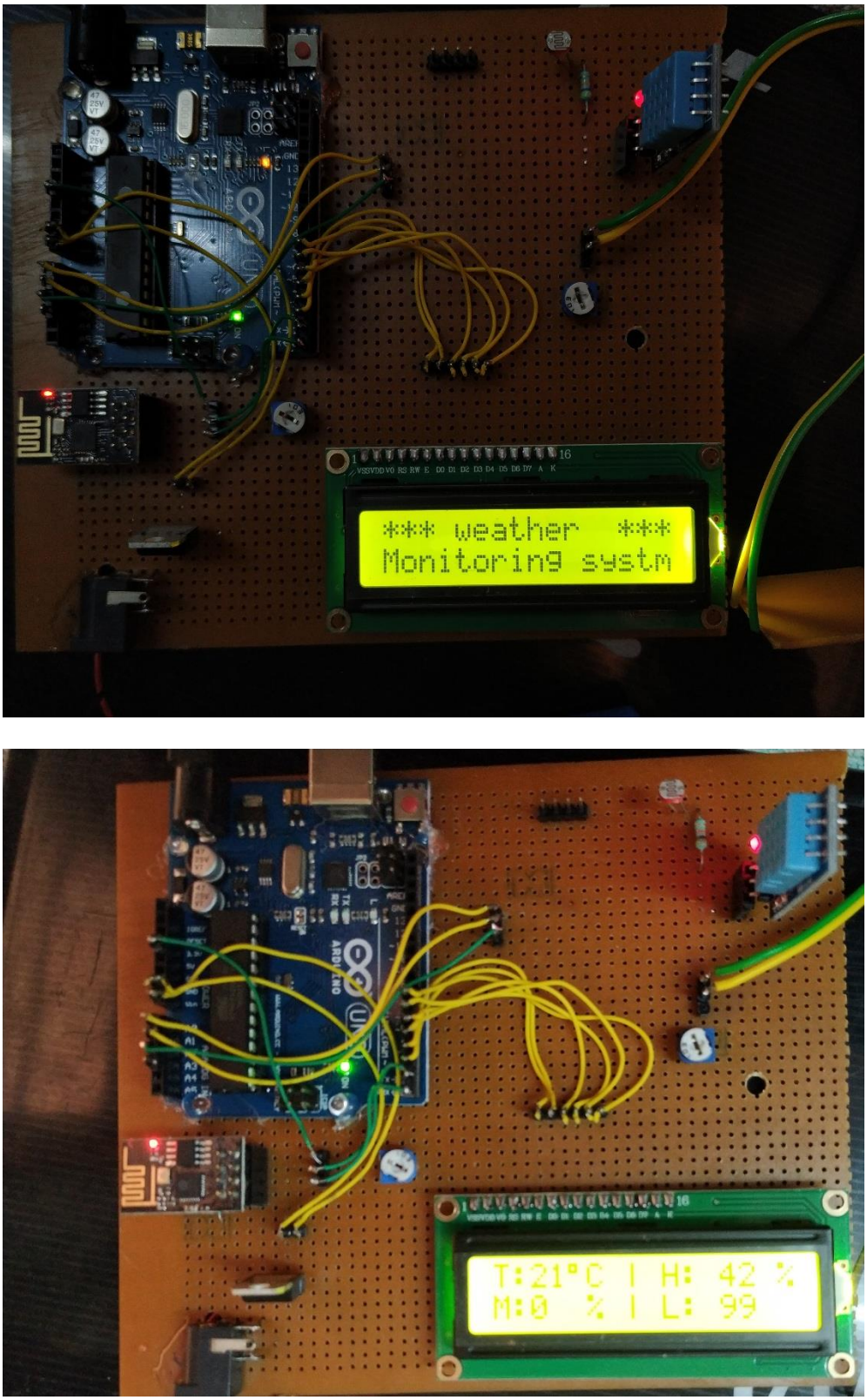


Figure20

Result of DHT11 in Thingspeakis :

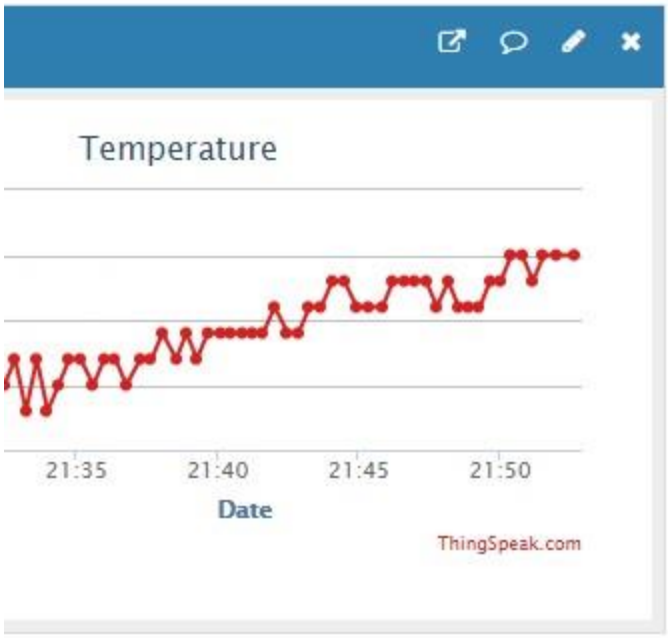


Figure21

Figure22

CHAPTER5
CONCLUSIONS

5.1Conclusions

Here we learnt that how present system isbetter and also more efficient than the other systems. It is exceptionally compatible.It reduces human efforts.

This terminate that present project work is a huge success and will provide a considerable way for saving weather parameters of real time and will help farmers, industries, normal people as well as others whose daily life is related with weather and its parameters. It can be used to getrequired information about for each or particular area for many years. The collected information will used to determine the best conditions required for plants to grow if we talk about agriculture and the farmer can modify the environment conditions which is more suitable for the plan growth. This, will have a large effect on agriculture and also on farmers everywhere.

This system will help in monitoring the condition of particular area and help individuals to work accordingly. Suppose a farmer want to grow a crop or tree which grows only in particular type of conditions. So, by this system he can see the temperature and humidity or wind direction as well as other parameters from any place. He will install this system only once and further work will be done automatically.

Limitations

- Work for Small or particular area
- Not a web-oriented system.

5.2 Future Scope

Present model can beupdated to monitor the cities and industries for pollution related data gathering. To shield the public health from pollution, model will provide an efficient and very cheaper solution for constant monitoring of environment and its conditions. We can do lots of additions in this system such as adding pressure sensor, gas sensor like CO, soil and moisture retrieving sensor which will able to tell us water content present in soil etc.

- **Other sensors like soil moisture sensor, gas sensor, pressure measuring sensor can also be interfaced with existing system to get data about a particular place.**

- **In case of irrigation of plants or fields can be control by having moisture sensor we get information or data related presence of water content and will turn on or off the pump automatically.**

- **We can use this system as pollution monitoring system by adding gas sensor which will give information about toxicity level of gas present in our environment and that particular area.**

- **We can power the device by solar energy.**

- **We can use silica gel to minimise the condensation which effect sensors in positive manner.**

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