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IOT based Weather monitoring System

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1. INTRODUCTION

Climate change and environmental monitoring have received much attention recently. Man wants to stay updated about the latest weather conditions of any place like a college campus or any other particular building. Since the world is changing so fast so there should be the weather stations. Here in this paper we present a weather station that is very helpful for any places. This weather station is based on IOT (internet of things). It is equipped with environmental sensors used for measurements at any particular place and report them in real time on cloud. To accomplish this we used Arduino Uno and different environmental sensors like DHT11, soil moisture sensor and rain drop sensor .The sensors constantly sense the weather parameters and keeps on transmitting it to the online web server over a wifi connection. The weather parameters are uploaded on the cloud and then provides the live reporting of weather information. This paper also focuses on the IOT application in the new generation of environmental information and provides a new paradigm for environmental monitoring in future. The system has

been development particularly in the view of building smart city by giving the weather update of any particular place like a particular office or room.

The internet of Things (IoT) is viewedas an innovation and financial wave in the worldwide data industry after the Internet. The IoT is a wise system which associates all things to the Internet with the end goal of trading data and conveying through the data detecting gadgets as per concurred conventions. It accomplishes the objective of keen recognizing, finding, following, observing, and overseeing things . It is an augmentation and extension of Internet-based system, which grows the correspondence from human and human to human and things or things and things. In the IoT worldview, many articles encompassing us will be associated into systems in some shape . It is a current correspondence paradigm that envisions a near future, in which the objects of regular day to day existence will be outfitted with microcontrollers, handsets for computerized correspondence, and reasonable convention stacks that will make them ready to speak with each other and with the clients,turning into a vital piece of the Internet.

2.LITERATURE REVIEW

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, analyze, and present your measured data on web server. Wireless sensor network management model consists of end device, router, gateway node and management monitoring center. End device is responsible for collecting wireless sensor network data, and sending them to parent node, then 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 analyzing and packaging them into Ethernet format data, sends them to the server.

3.OBJECTIVES

- An IOT application is used to monitor the environment that helps monitor the environmental condition of any local area or a surrounding area, and with the help of the internet everyone can view the condition. This application is more efficient, quicker in offering conditions for the environment
- The existing weather monitoring systems generally use weather stations that use multiple instruments such as thermometers, barometers,

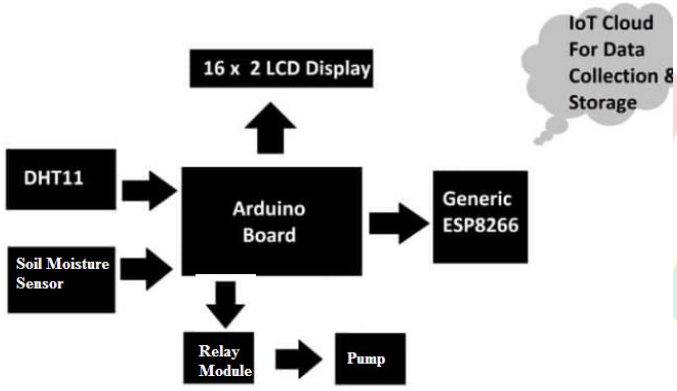
wind vanes, rain gauge etc. to measure weather and climate changes.

- Most of these instruments use simple analog technology which is later physically recorded and stored in a data base. This information is later sent to news reporting stations and radio stations where the weather report is given.
- This system makes it more efficient and convenient.

4. PROBLEM STATEMENT

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

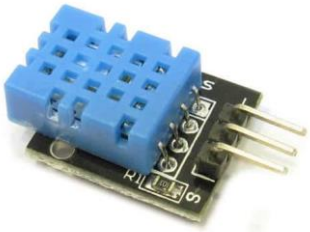
5.BLOCK DIAGRAM



We are going to develop the weather monitoring system using the above illustrated blocks. The brain of the project is an Arduino board and the surrounding blocks are digital and analog sensors for acquiring local weather and environment data.

A generic ESP8266 is used for interfacing the circuit setup with internet via 2.4 GHz Wi-Fi band. The ESP8266 sends the sensor data to a cloud server where the data gets updated in real time and also gets stored for future analysis. We are utilizing a 16 x 2 LCD display to showcase the sensor data, so that we can observe real-time data locally.

DHT11 temperature and humidity module:



DHT11 Sensor

DHT11 is a digital sensor responsible for collecting temperature and humidity data from your surroundings. It has three terminals namely:

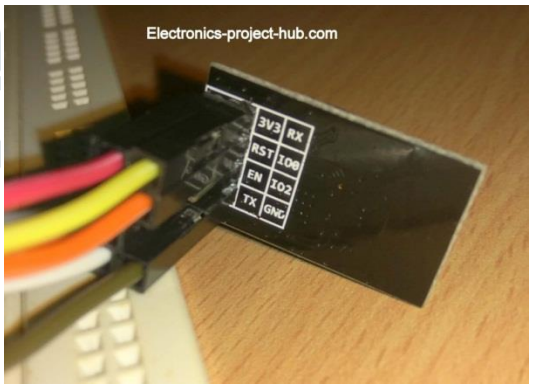
- Vcc
- GND
- Data

Vcc connects to 5V supply, GND connects to GND and data pin connects to 9 of Arduino.

Generic ESP8266 module:

generic ESP8266 which is responsible for connecting the weather monitoring system to internet. This module is inserted on a breakout board adapter so that ESP8266 can be interfaced on a breadboard.

Pin diagram of ESP8266:

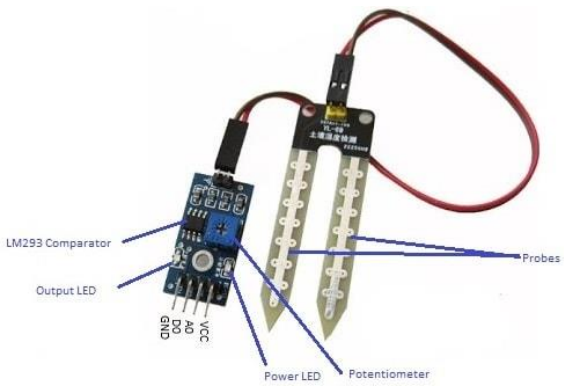


Pin Diagram of ESP8266

ESP8266 is not a just another ordinary module, it has a full-fledged 32-bit microcontroller which requires a program code to function. We will be using a programmer to upload the code to this ESP8266 module which we will see in the later part of this article. It operates on 3.3V and communicates on serial interface with Arduino.

Resistive Soil Moisture Sensor

The soil Moisture sensor FC-28 consists of two probes that are used to measure the volumetric content of water. The sensor works between the input voltage range of 3.3V to 5V. The output voltage given by it is 0 – 4.2V. The output signal appears both in analog form and in digital form.



The soil Moisture sensor FC-28 has four pins

VCC: For power
A0: Analog output
D0: Digital output
GND: Ground

The Module also contains a potentiometer that will set the threshold value and then this threshold value will be compared by the LM393 comparator. The output LED will light up and down according to this threshold value.

Working of Resistive Soil Moisture Sensor

The soil moisture sensor consists of two probes that are used to measure the volumetric content of water. The two probes allow the current to pass through the soil and then it gets the resistance value to measure the moisture value.

When there is more water, the soil will conduct more electricity which means that there will be less resistance. Therefore, the moisture level will be higher. Dry soil conducts electricity poorly, so when there will be less water, then the soil will conduct less electricity which means that there will be more resistance. Therefore, the moisture level will be lower.

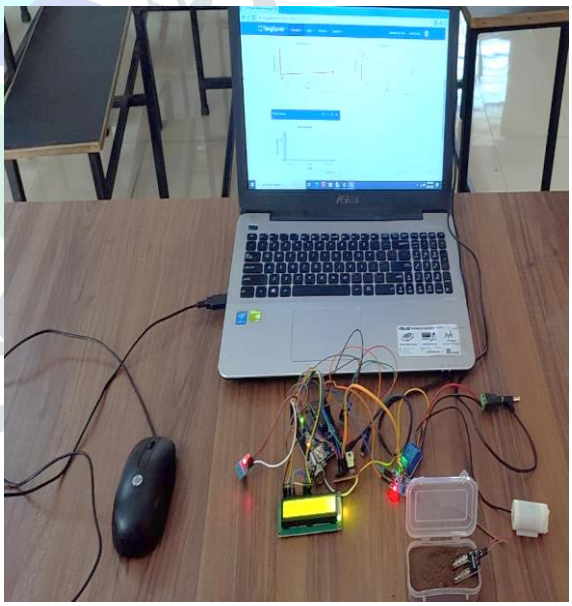
Web-Connection

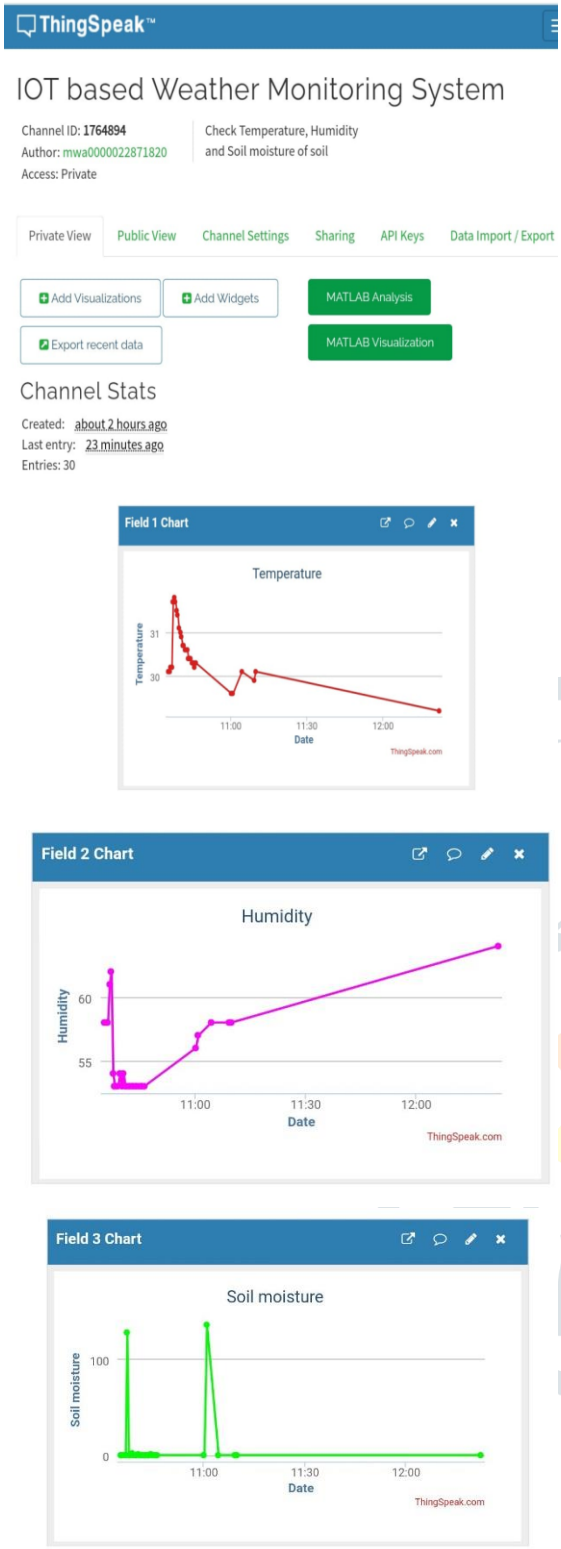
ThingSpeak provides very good tool for IoT based projects for Arduino. By using ThingSpeak site, we can monitor our data over the Internet from anywhere, and we can also control our system over the Internet, using the Channels and webpages provided by ThingSpeak. ThingSpeak **'Collects'** the data from the sensors, **'Analyze and Visualize'** the data and **'Acts'** by triggering a reaction.

6.WORKING

- Make sure that you have connected all the wirings properly and all the modules are connected.
- Plug a 9V to 12V DC adapter to the power supply module's DC socket and press the ON switch.
- You will see sensor data on the LCD cycling between sensors.
- It will display connection with wifi is established if not then it will wait for connection.
- Initial Values of temperature,Humidity and soil moisture is displayed.
- When the soil moisture is below 10 Value the pump will automatically gets on and will suplly water to the soil.
- After soil retain moisture upto 60 value the pump turn's off.
- All the values will be displayed on Thingspeak channel after every 30 sec it get updated.
- All the data is stored on thingspeak channel and can be available on Excel sheet.

5. RESULT





6. APPLICATIONS

- IOT weather reporting system has an application for farmers as well.weather forecasting plays a very important role in the field of agriculture.
- IOT weather monitoring project proofs really helpful for monitoring weather at places like volcano, and rain forest.
- You get prior alert of weather.
- The cloud data can be used for parameter analysis and continuous monitoring.
- It can be used in solar power plant and solar project.
- It is helpful for environmental education, disaster mitigation, fire station water management and wind plant.

7. CONCLUSION

By keeping the embedded devices in the environment for monitoring enables self protection (i.e., smart environment) to the environment. 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, we can bring the environment into real life i.e. it can interact 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 embedded system is presented with different models in this paper. In the proposed architecture functions of different modules were discussed. The temperature, humidity and CO value can be monitored with Internet of Things (IoT) concept experimentally tested for monitoring three parameters. It also sent the sensor parameters to the cloud (Google Spread Sheets). This data will be helpful for future analysis and it can be easily shared to other end users. This model can be further expanded to monitor the developing cities and industrial zones for weather monitoring. To protect the public health from pollution, this model provides an efficient and low cost solution for continuous monitoring of environment.

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