WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

IOT Based Air Quality Monitoring System Using Thingspeak

Dr. Gouri Patil [a], Miss. Masroor Fatima [b], Miss. Nagma Shaheen [c], Miss. Shabnam Fatima [d], Miss. Syeda Rumana Shireen [e]

[a] *Professor, Guru Nanak Dev Engineering College, Bidar-585403, Karnataka, INDIA*
[b,c,d,e] *UG Student, Guru Nanak Dev Engineering College, Bidar-585403, Karnataka, INDIA*

A B S T R A C T

In this extend we are reaching to make an IoT Based Discuss Contamination Observing in which we are going screen the Discuss Quality over a webserver utilizing web. The extend makes a utilize of Arduino, Node MCU module, DHT11 (Temperature sensor, stickiness), Rain sensor and clean molecule sensor. The Arduino Uno may be a microcontroller board based on the ATmega328. It has 14 computerized input/output pins (of which 6 can be utilized as PWM yields), 6 analog inputs, a 16 MHz ceramic resonator, a USB association, a control jack, an ICSP header, and a reset button. It contains everything required to support the microcontroller; essentially interface it to a computer with a USB cable or control it with an AC-to-DC connector or battery to urge started. The primary controlling gadget of the venture is Arduino UNO microcontroller. Temperature, stickiness, clean, rain sensor is interfaces to the Arduino. Arduino continuously perused the information from sensor and handle this information to the Hub MCU microcontroller it has inbuilt Wi-Fi. And Hub MCU microcontroller overhaul them into the net server

Keywords: IoT, Monitoring, Arduino uno, Thingspeak, Air Quality, NodeMCU ESP8266

1. Introduction

Air is the most important of all living things. In this big topic, this project predicts the climate for humans and other creatures on Earth. Information is very important to our life, how safe we are now and how the weather and climate will change because the air will be polluted and in good condition. The system will easily recognize the response to air quality [1]. This project can monitor air quality in terms of dust and ambient temperature via dust sensor and temperature sensor. The information is provided by the Thingspeak platform. Because the high value of the climate index will create a high risk for people. When the sensors detect too much dust in the air or pose a danger to people, the system works and the generator malfunctions and warns people. In addition, the device will be configured to receive media data and will have an affordable price. The device will collect the data and display the output according to the specified value. This project explores healthcare professionals of all ages using an Arduino-based air pollution sensor in their daily lives. Data analysis is the basis of research on almost all subjects [4]. As a design concept, reviewing existing designs is very helpful from the ideas and information about air quality and air quality monitoring available on the market

1.1 Project Overview

This project provides a sensing system for airborne AQI levels and ambient temperature and humidity to determine air quality.

Humidity and temperature are displayed on the ThingSpeak platform, where constantly displays real-time results from rain sensor, temperature and humidity sensors.

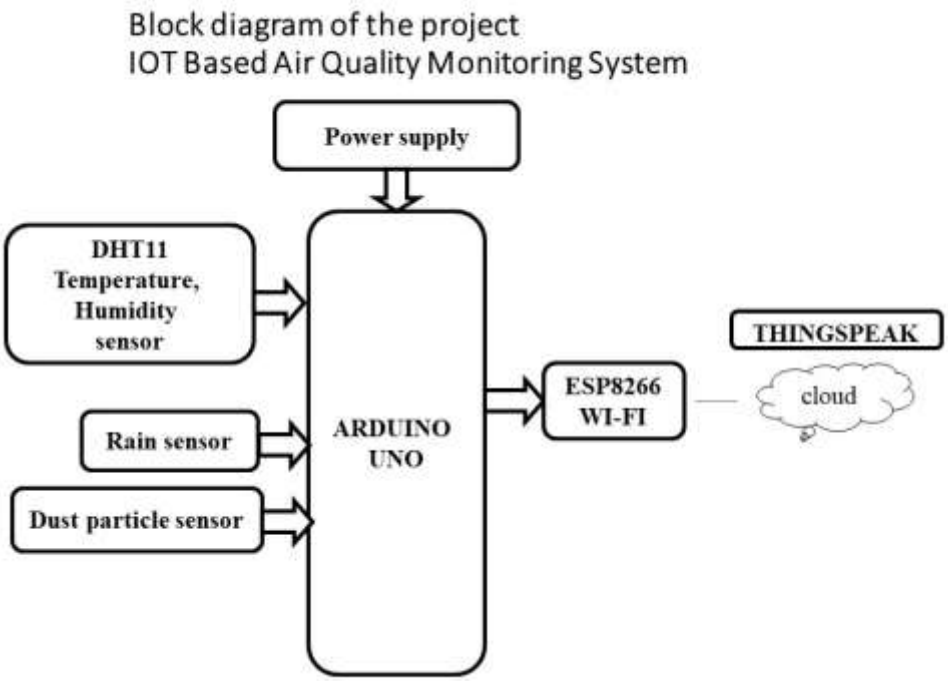
1.2 Purpose Of the project

This project is to implement IoT (Internet of Things) based quality of air monitoring using Arduino. Air pollution is a growing problem and air quality needs to be taken care of so that everyone can lead a better and healthier life. The popularity of IoT is growing and the model is being worked on. Therefore, it is easier to collect good weather data. Analysis of observations allowed us to measure how bad the weather was each day.The Internet of Things is a collection of physical objects, cars, appliances, and other devices with technical, functional, measurement, and usability features that make things happen. This includes the exchange of information. The Internet of Things allows objects to be viewed or controlled. In this article, we propose and test a model for IoT cloud analytics.

2. Methodology

Using the Internet of Things (IoT) technology of applications together with the NodeMCU module, the ESP8266 has LM35 temperature sensor, DHT11 sensor as humidity sensor and MQ-135 sensor as probe. These sensors send feedback signals to the NodeMCU ESP8266 module for processing. The wifi module in the NodeMCU ESP8266 module sends the results read from the sensors to the IoT Thingspeak platform, which records the data in graph form. The system can be used as a home air monitoring system to know the importance of air quality.

2.1 Block diagram

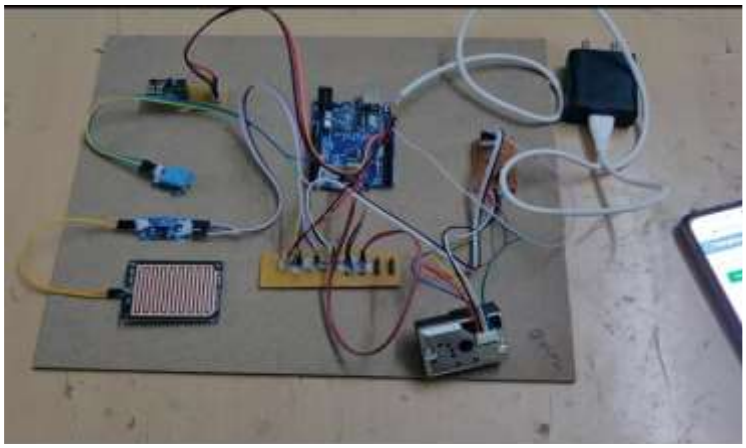


2.2 Components

The main modules of this project are:

- Power supply.
- Arduino UNO.
- ESP8266 WI-FI module.
- Temperature Sensor.
- Humidity Sensor.
- Dust particle sensor.
- Rain sensor

2.3 Project setup



3. Theoretical basis

3.1 Arduino uno

Arduino Uno is a microcontroller board containing ATmega328 from AVR family. It has 14 input/output pins, 6 analog pins and a 16MHz ceramic resonator.

Access the USB connection, power outlet, and reset button. Its software is supported by many libraries that make it easy to work with.

3.2 Humidity senssor

Air humidity refers to the amount of moisture in the air. The water vapor content in the air varies with temperature, the higher the temperature, the more water vapor there is. A hygrometer is a type of hygrometer.

air humidity has the following two types:

1.Absolute humidity (absolute) is a number that indicates the amount of water vapor (in grams) in one cubic meter of air.

2. Relative humidity (relative) is a number expressed as a percentage that shows the actual amount of water vapor in the air and the maximum amount of water vapor the air has. It is found in nature in a certain heat and cold.

3.3 DTH11 sensor

The DHT11 is a sensor that can measure both ambient, temperature and humidity. This sensor has NTC type thermistor.A moisture guard and 8-bit microcontroller that completes the two sensors and sends the results in 1-wire duplex mode (1-wire duplex) to the output pin

3.4 Rain sensor

The Raindrop Sensor is a device to detect rain by comparing rain panel and analog values It consists of two modules, the control module that converts it into digital value. Raindrop sensors can be used to control windshield wipers in cars, to detect rain in agriculture, and in home automation systems.

3.5 NodeMCU ESP8266

ESP8266 is a separate microcontroller like Arduino and is a Wi-Fi module that establishes TCP/IP connection by directly connecting to WIFI [7]. NodeMCU is software whose source code is freely available and can be distributed and modified.

In other words, it is an open source IoT platform. It has hardware and firmware in the form of a System-on-Chip ESP8266 developed by Espressif Systems and uses the Lua scripting language. Basically, the term NodeMCU actually refers to the firmware in use, not the hardware. NodeMCU can be similar to Arduino ESP8266 board.

3.6 P.M.2.5 Dust particle sensor:

This is PM2.5 GP2Y1010AU0F Dust and smoke particle sensor is a cross-arranged infrared emitting diode (IRED) and phototransistor in this product.

The light reflecting off the dust in the air. Especially the quest for cool things like smoke is very good. In addition, it is possible to distinguish smoke and dust in the house by the pulse pattern of the output voltage.

4 Thingspeak

Thingspeak is an IoT platform that collects and stores data and builds IoT applications in the cloud. You can send sensor data to Thingspeak from Arduino, Raspberry Pi, BeagleBone Black, and more. In order to use the Thingspeak platform, users must create an account and provide an account channel. The Thingspeak platform then provides a pinned API key to the microcontroller program so that it can perform operations to send data from the sensor to Thingspeak. [9] The main task of regularly updating data is done by Thingspeak, which has an API to collect data generated by sensors and an API to read data from applications. This is in two parts. Part of a thesis is writing documentation. And the second is that other people need to look at the information. Thingspeak sits in the middle so you can do both easily. Paper can measure air temperature, humidity, moisture, etc., using simple tools to create the concept of IoT. You can also modify it with various sensors or actuators to create something for your personal use. Therefore, after completing the above process, the user will have direct access to all media[11]. The Internet of Things (IoT) is a network of "connected objects". These products often include built-in features and connectivity to the Internet or neighboring products. One of the key elements of an IoT system that connects many “everythings” are IoT services. The true power of the Internet of Things is when everything is connected directly to “services” or through other “things.” In these systems, services act as invisible observers performing tasks ranging from simple data collection and maintenance to complex data analysis. ThingSpeak is a platform that provides various services for IoT application development. It provides real-time data storage, the ability to view data stored in images, and the ability to create plugins and applications that work with web services, social networks, and other APIs. The main feature of ThingSpeak is "ThingSpeak Channels".

5. Software description

Arduino IDE Compiler:

This tutorial adds to all Arduino instructions on the breadboard.

1. We need a microcontroller with pre-installed bootloader, or we need to install by yourself

2. Not all ATmega328s equal (bootloader is a very simple drawing that sits on the chip and controls the chip)

Compile the program, simulate and dump Steps:

Step 1:

Parts 1 x Arduino on breadboard 1 x Arduino UNO

Cable with Arduino IDE installed on your PC

Step 2: Program your Arduino UNO as an ISP

Step 3: Connect your ATmega328

Step 4: ATmega328-PU workaround

Step 5: Bootload the ATmega328

6. Results

The "IoT Based on Quality of Air Monitoring" project aims to create a quality air reporting system that will use sensors to provide information about current temperature, humidity, rain and dust. Then use the ESP8266 W-FI module to provide users with data collection and analysis results via Wi-Fi. This information will be useful for future reference. The recording of was published on the ThingSpeak platform as follows:

Users must log in to the ThingSpeak platform via a registered account to view and monitor sensor data. The Arduino sketch manages to read the sensor data and send AT commands to connect to the IOT platform. Learn about Arduino code from the programming guide.

7. CONCLUSION FUTURE SCOPE

This research provides a unique method for monitoring the environment and air pollution using low-cost, efficient in-house equipment. The functionality of the various sensors and how they work is described in the proposed architecture. How they work, what they are used for, how they store properties and information, and how they compare to known information are also discussed. A weather monitoring system is being tested to monitor gasoline levels across the country. Sensor parameters are also provided to the data server.

Our equipment is proven, inexpensive and equipped with many energy sensors, it will be accurate for all of you and then the data will be the key to any action necessary to improve society as it will help you identify the affected area. so we can do this early to reduce the damage done to future generations.

FUTURE SCOPE

We can expand the project by adding a GPS module, and then using the GPS module, we can provide users with data collection and analysis with the current location over Wi-Fi. It also sends negative thoughts to cloud storage and provides stories. This information will be useful for future reference.

We can connect a wireless camera with which we can record pictures and videos of the place for future use. We can continue the project by adding more sensors such as CO, monitoring sensors, humidity for air monitoring.

We can add a GSM modem to a weather reporter or weather station where we can receive SMS alerts about weather information and location.

References

1] Poonam Paul, Ritik Gupta, Sanjana Tiwari, Ashutosh Sharma, "IoT based Air Pollution Monitoring System with Arduino*", IJART*, May 2005.

[2] Zishan Khan, Abbas Ali, Moin Moghal, "IoT based Air Pollution using NodeMCU and Thingspeak*", IRANS, pp. 11-16,* March 2014.

[3] SaiKumar, M. Reji, P.C. KishoreRaja "AirQuality Index in India", IEEE conference Chennai, August 2014.

[4] Mohan Joshi, "Research Paper on IoT based Air and Sound Pollution monitoring system", *IETS Journal, pp. 11-17,* September 2015.

[5] "Malaya Ranjan, Rai kumar, "Understanding Parts per million in real time air quality index", *Journal of Mathematics and advanced sciences,* pp. 23-29, September 2009

[6] D. Bandyopadhyay and J. Sen, "Internet of Things: Applications and Challenges in Technology and Standardization," *Wirel. Pers. Commun., vol. 58, no. 1,* pp. 49–69, May 2011.

[7] L. Atzori, A. Iera, and G. Morabito, "The Internet of Things: A Survey," Comput. Netw., vol. 54, no. 15, pp. 2787–2805, October 2010.

[8] H. Kopetz, Real-Time Systems: Design Principles for Distributed Embedded Applications. Boston, MA: Springer US, 2011, ch. Internet of Things, pp. 307– 323.

[9] A. Gluhak, S. Krco, M. Nati, D. Pfisterer, N. Mitton, and T. Razafindralambo, "A Survey on Facilities for Experimental Internet of Things Research," *IEEE Communications Magazine, vol. 49, no. 11,* pp. 58–67, November 2011.

[10] J. Kim, J. Lee, J. Kim, and J. Yun, "M2M Service Platforms: Survey, Issues, and Enabling Technologies," *IEEE Communications Surveys Tutorials, vol. 16, no. 1,* pp. 61–76, January 2014.

[11] Jen-Hao Liu, Yu-Fan Chen, Tzu-Shiang Lin, And Da-Wei Lai ,Tzai-Hung Wen, Chih-Hong Sun, And Jehn-Yih Juang,Joe-Air Jiangdeveloped Urban Air Quality Monitoring System Based On Wireless Sensor Networks 2011 IEEE.