Weather Monitoring System

Prof. Ashutosh Marathe, Udayan Gaikwad, Mukta Patil, Prishita Jhamtani, Akash Bhagwat, Saniya Inamdar

Abstract - **The weather monitoring system is an interesting solution for weather monitoring and analysis that uses IoT to make data easily accessible over a very wide range. The system deals with monitoring weather and climate changes like temperature, humidity, wind speed, moisture, light intensity and can be used for rain sensing using multiple sensors. These sensors send the data to the thingspeak API and the sensor data is plotted as graphical statistics on the display. We can use this API to access the data anywhere and at any time with relative ease and can also be used to store data for future use.**

Keywords: API; IoT; Monitoring; Weather; Forecasting; Sensor

1. Introduction

Weather is an ever changing phenomenon. It can change within seconds or milliseconds. Weather was quite difficult to monitor in the days when technology was still primitive.

But now it is easy as there are various sensors and computing techniques to not only monitor weather but predict it with high accuracy as well. The main aim of this to design and implement a resourceful monitoring system through which the required parameters are monitored

remotely using the internet and the data gathered from the devices is stored and used to project the trend on the thingspeak or serial monitor. A solution for monitoring temperature, pressure, humidity ,barometric pressure, wind speed and various other parameters in the atmosphere using a wireless embedded computing system is proposed in this paper.

The solution also provides 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, wire monitoring system through which the required parameters are monitored remotely using internet.

2. Literature Review

1.ESP8266 Node Node based Wether Monitoring System.

This paper primarily blends two-study fields based on control systems with data acquisition methodology and builds a database system to produce the data according to the chosen attributes[4]

2.IOT based wether monitoring system using Arduino and Node MCU.

Arduino is used with other sensor to monitor the weather. The data from the sensor is uploaded to an open source web-server. The open server can be used both to get real time data as well as download the data for the prediction process. rediction is done using machine learning algorithms and training the detected datasets. [5]

3.Microcontroller based wether monitoring system

This study proposed a remote weather monitoring system that is based on Arduino UnoMicrocontroller that have the ability to monitor, measure and display the temperature, relative humidity andlight intensity of the atmosphere, using analogue and digital components. [6]

2. Existing System

In today's world many pollution monitoring systems are designed by different environmental parameters. Existing system model is an IOT based Weather monitoring and reporting system where you can collect, process, analyses, and present your measured data on web server.

4. Proposed System

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 [1] and climate changes like Temperature, humidity by using the DHT11 sensor.This sensor is capable of mesuring barometric speed,latitude,longitude and various other paramerters.Raindrop sensor is used primarily for rain sensing in the system.
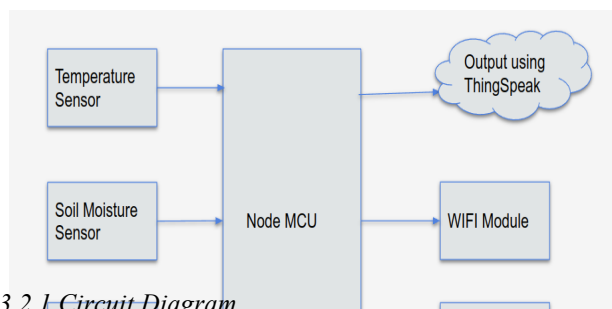
3. Methodology/Experiement

3.1 Theory

Proposed 'Smart weather monitoring system' unlike conventional weather monitoring instruments is very small and compact allowing it to be installed easily on rooftops.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 [2]. 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. The data sent to the thingspeak api can easily be accessed from anywhere in the world and used for future referrance also [3].

3.2 System Architecture

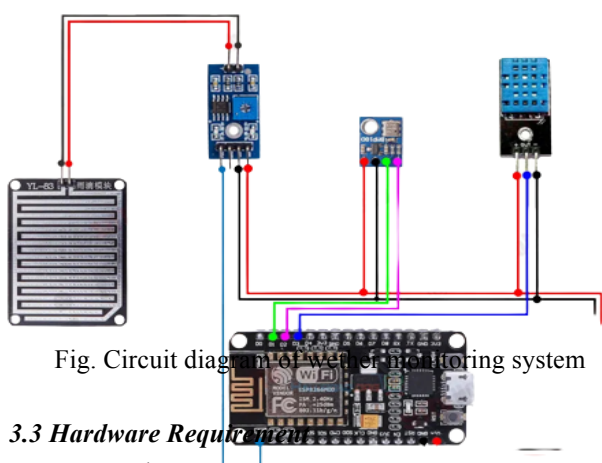### 3.2.1 Block Diagram

3.2.1 Circuit Diagram

Fig. Circuit diagram of weather monitoring system

3.3 Hardware Requirement

- Node Mcu
- BMP180
- Rain sensor
- DHT11
- Breadboard
- Jumper wires

3.4 Software Requirement

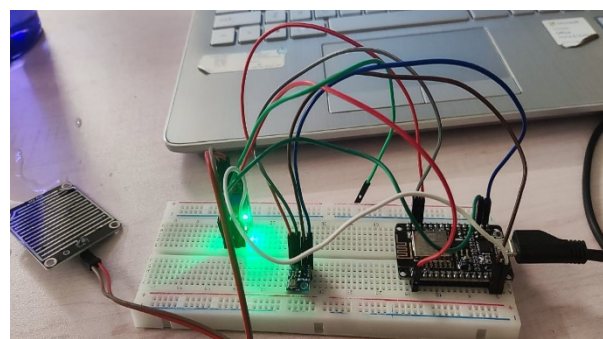- Arduino IDE
- ThingsSpeak API

4 .Implementation

The proposed system can be implemented in a 3-tier model with the functions of every module developed for a specific purpose. The tier 1 is the environment, sensor devices in tier 2, sensor data acquisition and decision making in tier 3. Here, tier 1 provides information about the parameters under the region which is to be monitored. Tier 2 deals with the sensor devices with suitable characteristics, features. Each of these sensor devices are operated and controlled based on their sensitivity as well as the range of sensing.
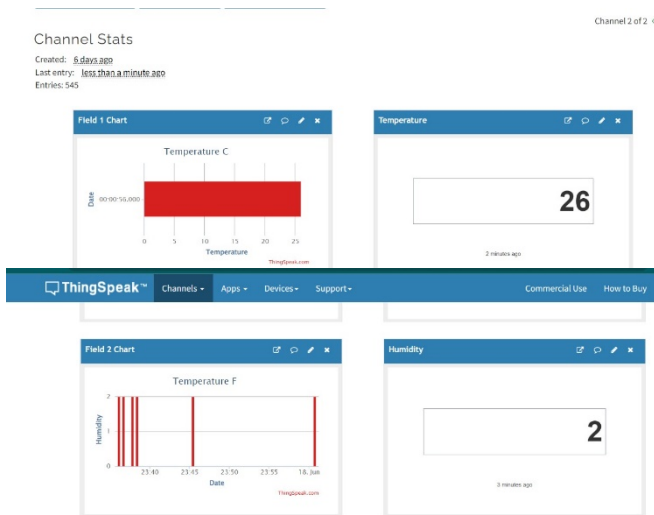
In between tier 2 and tier 3 necessary sensing and controlling actions will be taken, depending upon the conditions, like fixing the threshold value, periodicity of sensing, messages etc. Tier 3 describes the data acquisition from sensor devices and includes the decision making, which specifies the condition the data is representing in accordance with the parameter that is being measured.

The plan also included the addition of another module: tier 4, that will deal with the intelligent environment. Which means it will identify the variations in the sensor data and fix the threshold value depending on the identified levels [5]. In this tier, sensed data will be processed, stored in the cloud and accordingly the notification will be sent. Based on the framework we have identified a suitable implementation model that consists of different sensor devices and other modules. In this implementation model we use a Node MCU for sensing and storing the data in cloud. Inbuilt ADC and Wi-Fi module attaches the embedded device to internet. Sensors are connected to Node MCU board for monitoring, ADC will convert the corresponding sensor reading to its digital value and from that value the corresponding environmental parameter will be evaluated.

5. Output

IOT Based Weather Reporting System Using Arduino and Node MCU. 10.3233/APC210038.

[6]Microcontroller based wether monitoring system Emmanuel G. Dada*, Stephen B. Joseph, Digima Mustapha, Birma I. Hena Department of Computer Engineering, University of Maiduguri, Maiduguri, Borno State, Nigeria.

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8. Limitations

I. Requires a device (pc/mobile)
II. Requires internet connection
III. Applicable only for specific domain

9. Conclsion

The proposedsystem incorporates the uses of sensors and thinspeak api in developing a low-cost, high-accuracy weather monitoring system, using analogue and digital components. The proposed system has been tested through experiments and the results have proven the accuracy and reliability of the proposed system. The proposed system can be helpful in monitoring the temperature, lightintensity and relative humidity of industrial, and home processes application that have various parameters. We develop this project all by ourselves and tested it accordingly requires very low cost and effort thereby making the approach to be economical.

10. References

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