An IOT Based Weather Monitoring System

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Abstract: The proposed system 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 temperature, humidity, moisture and even carbon monoxide levels in the air; using multiple sensors. These sensors send the data to the 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. The project even consists of a notification LED that is used for alert system, notifications as an effective alert system to warn people about the any parameter goes to high level and drastic weather changes. For predicting more complex weather forecast that can't be done by sensors alone we use an API 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.

Index Terms – IOT (INTERNET OF THINGS), LED (LIGHT EMITTING DIODE), API (APPLICATION PROGRAMING INTERFACE), Arduino Nano, DHT11.

I. 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. So that we can predict the weather conditions more accurately. For this purpose we use different types of technology. In the world of technology there are various sensors which can be used for our purpose. These sensors are very sensitive to changes and sense the situations correctly.Sensor devices are positioned at different locations to collect the data to forecast the behaviour 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 rain possibility that can be predict by using humidity sensors, here 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

II. 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 data base [5]. This information is later sent to news reporting stations and radio stations where the weather report is given.

III. LIMITATION OF EXISTING SYSTEM

1. Existing weather monitoring systems that are used in the field generally consist of unconventional and heavy machinery that consist maintenance and need to be manually monitored and changed frequently.
2. Power requirements are one of major constraints as these instruments are generally sited for from main power supply.
3. The use of thermometers to measure external temperature; however accuracy is still outdated and constantly needs to manually check for any change in temperature.
4. Data is collected from instruments manually to be transferred from logger to the computers.
5. Existing systems contains large and heavy instruments that occupies a lots of space which makes it difficult to shift it from one location to other location.
6. The current system always face problems as delays in warning people about bad weather and sudden change in weather.

IV. LITERATURE REVIEW

The technology communicates with the different sensors like Temperature, Humidity, Pressure, Light intensity, carbon monoxide and pollution gases. The all environmental parameters are carried out by the Arduino nano which is connected to the computer through the USB2.0 cable. Internet connection is given to the device to a client can get access. The MQTT (Message Queuing Telemetry Transport) protocol to communicate between the sensor node and clients. Using this technology client can only able to monitor the data but cannot make changes. Arduino IO server is used to communicate with the hardware device. The system has used the python libraries for developing the client-server model. The graph is generating all the parameter which varies with respect to time [1]. The harmful gases that are NH3 (Ammonia), CO2 (Carbon dioxide) and alcohol are monitors by using the Gases Sensor Board technology which carried out the concentration of the gas in the environment. The device composed of MQ135 to measure the gases. The gateway used is the ESP8266 that receive the data obtained from the environmental parameter sent to the server. The concentration of the harmful gases in the area can be carried using the device [1].

V. PROPOSED SYSTEM

The proposed model is for monitoring Temperature, Humidity, Pressure, Rain level and CO levels in the atmosphere to make the environment intelligent or interactive with the objects through wireless communication.

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. Humidity and Temperature,
2. Carbon monoxide levels in the air using MQ7,
3. ESP8266 WIFI MODULE,
4. Ultrasonic sensor for rain water level,
5. Raindrop sensor for detecting rainfall or snow fall.
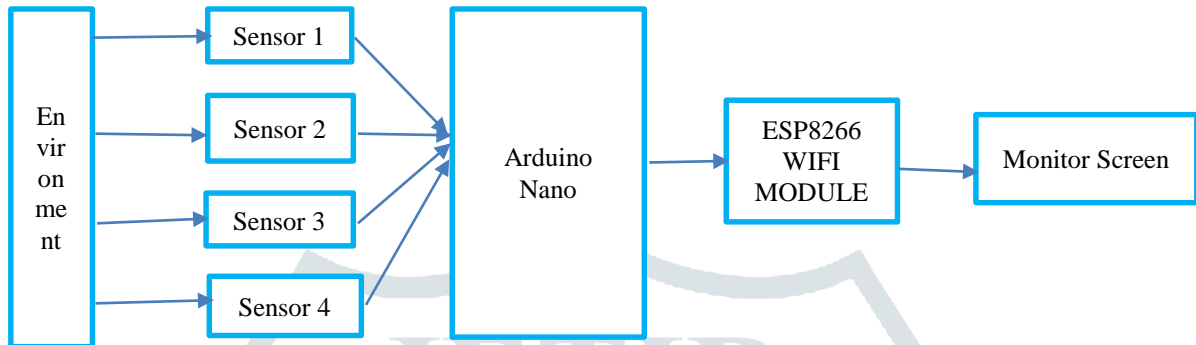
Figure 1: workflow diagram

In workflow diagram all the sensors are extracting data from the environment and the sensors are connected with the Arduino. On processing the data Arduino sends it to the website using ESP8266 WIFI Module and the data can be accessed from the website thingspeak.com.
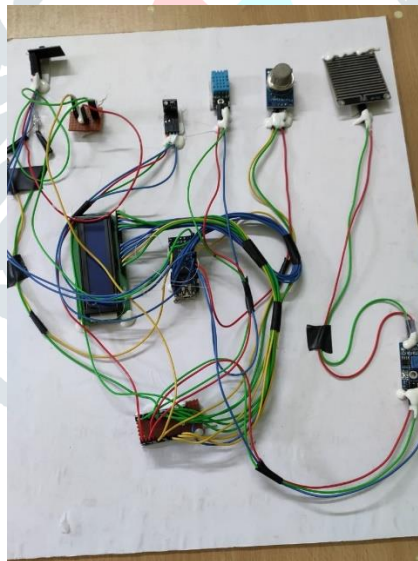

Figure 2: hardware model

In the figure2 hardware model of the project is shown in which sensors are connected to the Arduino nano. The System component diagram of is shown in Figure 2. The sensors connected to the Arduino are temperature and humidity, gas sensor, rain sensor, pressure sensor. The device has a wifi communication with the client. Temperature and Humidity (DHT11) sensor detect as a percentage of the ratio of moisture in the air to the maximum amount that can be held in the air at the current temperature. As air becomes hotter, it holds more moisture, so the relative humidity changes with the temperature. A gas sensor (MQ135) detect the presence of CO_2 in the environment. The Rain sensor (FC-37) is used to detect water and it can detect beyond of what a humidity sensor does.
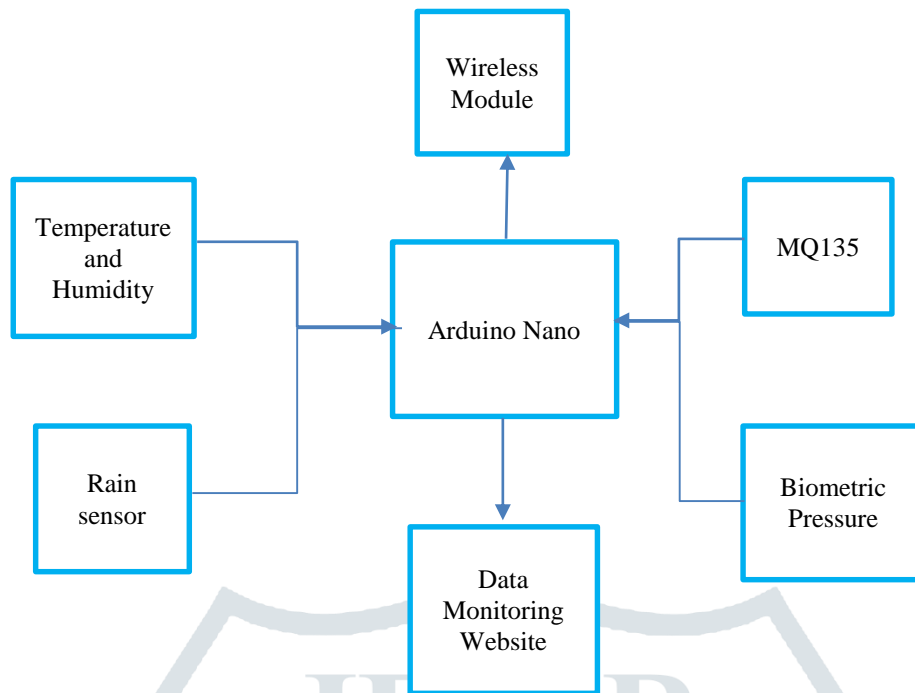
Figure3: System component diagram

VI. RESULT

The figure 4, figure 4.1, figure 4.2 and figure 4.3 shows the result of humidity, temperature, pressure and air quality in the graphical format that will easy for the user to understand the weather condition present in the area. In the graph the results are shown for a particular intevals.
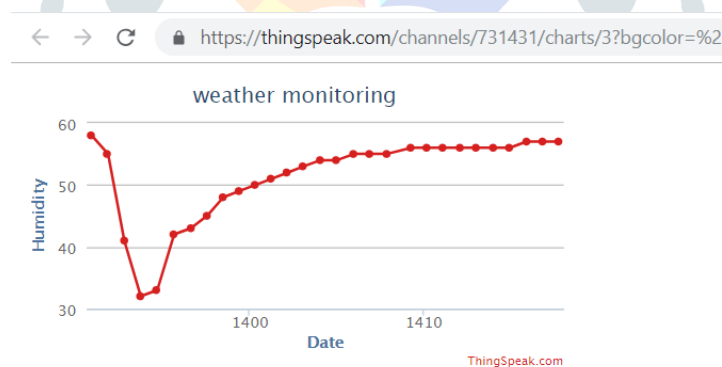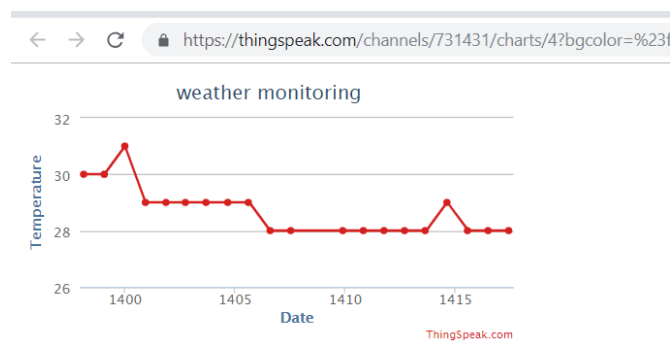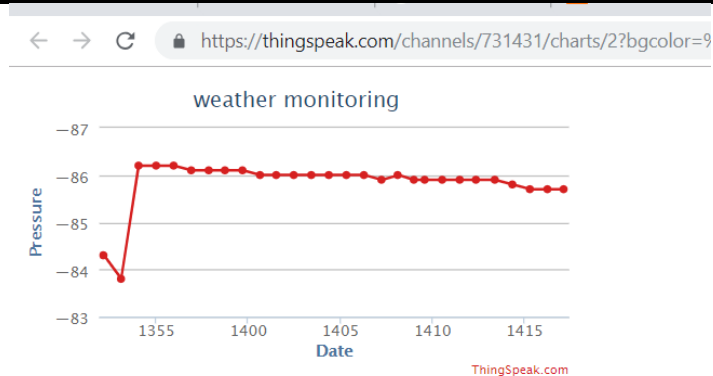
Figure4: humidity graph

Figure4.1: temperature graph
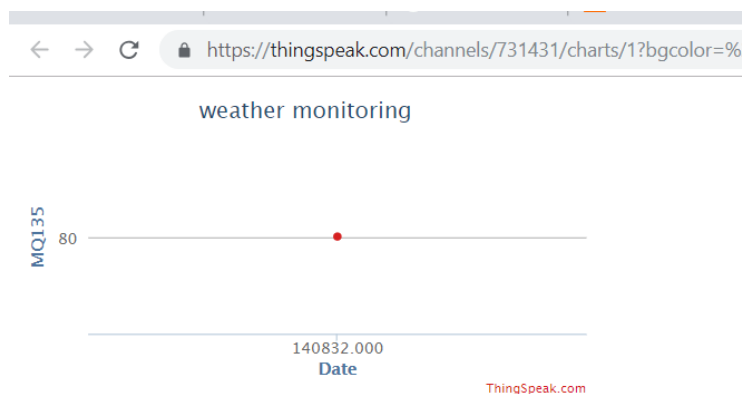
Figure 4.2: Pressure graph

Figure 4.3: Air Quality

VII. CONCLUSION

The project's basic idea is to gather the climatic parameters. The system which combined with different sensors like temperature, humidity, pressure, CO_2, rain. The results helping in gathering information about weather so that we can predict the weather more accurately. The advantage of the project is that it is low-cost, less power consumption. The scope of the project is a specific area it will be helpful to monitor the climate it can be installed anywhere. As the cost is low we can easily make changes in the system by adding new components. The system helps a user to select the best surrounding environment for living purpose and maintain good health by daily monitoring the climate in its area.

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