Auto Climate Monitoring System

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Abstract: the proposed system will remove this problem since it monitors real-time weather conditions. In this proposed work we will monitor the live weather's parameter of the Amravati Region. The proposed system will work on the client-server architecture model using IoT. The system is organized in Two-tier Architecture. Our proposed system contains a various sensor which will monitor the temperature of the region, humidity, Rain value and pressure of the system. The sensor captured data and send it to the node MCU controller. Arduino ide is used to upload the sensed data. The serial monitor has worked as a gateway between the sensor and the cloud. The data is pushed by the sensor on a serial monitor. The serial monitors an IP address. The HTTP protocol is used to view the data on the webserver. This paper displays the data on the webserver and monitor the real-time data of weather using environmental parameter or sensor. Using a webserver, everyone can monitor the weather's condition from anywhere without depending on any application or website. The data is available publicly. With the help of this proposed system, we measure the weather condition of the Amravati Region. After getting results from the various sensor, it is observed that our proposed model achieves better results in comparison with the standard weather parameter.

1 Introduction

Monitoring weather's condition plays an extensive role in every person's life. The impact of the environment's condition causes numerous challenges in various fields like agriculture, industry, constructions as well as more other fields. But the measured impact occurs mostly in agriculture and industry. As we all know, agriculture perform a crucial role in India's Economy. Almost One- fourth of India's economy is acquired from Agriculture. Over the recent year, smart agriculture was a debated topic in the world. In IoT [13,16], the smart word indicates that the use of minimum parameters produces a better result. It reduces the use of land, water, time as well and the uses of the new technology and science for the enhancement of crops. The security is one of the major issues [17,18] in IoT network, lot of security techniques are available but still many several possibilities to enhance the existing security.

In agriculture, Before the yield, the Farming process consists of several phases and in that weather plays the most extensive role. In Amravati Region, the situation of rain mostly happens. It is situated near the border of India "Nepal" and Nepal is a hilly area due to which the rainy situation occurs mostly. Due to this situation, the farming problem occurs due to heavy rainfall. In this situation, an indication of weather's condition is an important aspect before sowing or reaping the crops. Hence in this situation, the monitoring of weather's condition [14,15] would help farmers with the help of a weather monitoring system. S It will help the farmer before reaping and sowing. In Amravati Region, the total geographical area of this region is around 3488.8 square km and cultivable land is 26428 hectares, In which the percentage of irrigated area is 76.5 %. The main crop of this region is Paddy. The total area is around 152655 hectares. The amount of water if became high then it will be a problem for farmers. Because in the sowing of paddy it needs water sufficiently but if the quantity of water will grow then it should be a problem for farmer. So, to remove this problem, if the weather's condition is known then it will be beneficial for them. The main objective of our system is to provide an indication of whether that would be beneficial for the farmers before sowing crops or reaping crops. In this paper, Section-II shows the literature review. Development of weather monitoring system is done in section III. Section IV describes the hardware parts of our system. Section V portrays the analysis of our experimental result in real-time. The next part will be the summary or conclusion parts of this research.

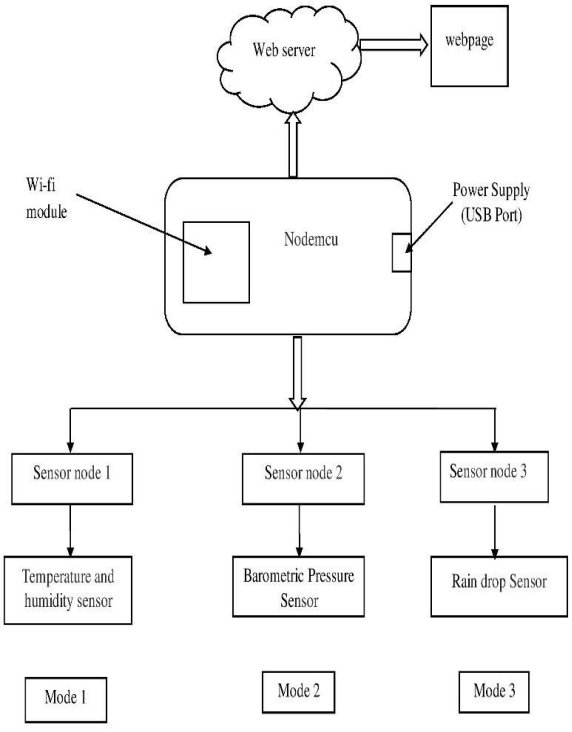
2 Literature Survey-

The author in [1], proposed a robust and affordable Automatic weather station. In this paper, the author elaborates how the weather prediction system is becoming a crucial challenge in every Weather extreme event that causes an adverse effect of the system on lives and property as well. Hence the accuracy of weather data is being one of the critical challenges to enhance the

weather prediction skills and build up the resilience to effect of detrimental weather report condition. The author describes that Uganda and various other developing countries have looked challenges in developing timely & accurate weather data due to scarce weathers observation. The scarce weather monitoring is a part of the high cost of developing automatic weather situations. The restricted funding is available to national meteorological services of the respective countries. In this proposed system the author firstly takes care of the problems and then applies them. The author proposed an Automatic weather monitoring Station based on a wireless sensor network. The planning of the author is to develop three generations of Automatic weather stations or AWS prototypes. In this research, the author evaluates the 1st-generation AWS prototype to improve the 2nd generation depending upon the need and generation. The author provides a suggestion to improve the non-functional requirement such a power consumption, data accuracy, reliability, and data transmission in order to have an Automatic Weather Station. The non-functional requirement collapsed with cost reduction in order to produce a robust and affordable Automatic Weather Station (AWS) Therefore the proposed work, like developing countries like Uganda will be able to acquire the AWS in suitable quantities. So that it can improve the weather forecasting

3 System Analysis And Architecture

Fig 1 represents the architecture diagram. With the help of this architecture, Every sensor is connected with node MCU pins. The power supply is given to the node MCU by USB which is connected with pc.



4 Circuit Diagram

The circuit diagram of our proposed system is given below. The diagram represents the connection of the sensor and how the connection will be done.

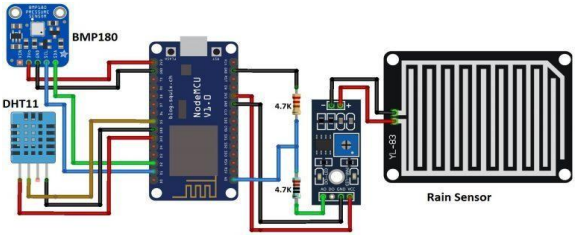


Fig.2. Circuit diagram of the weather monitoring system

The Dht11 sensor, BMP 180 sensor, rain sensor, all are connected with the node MCU pins and the power supply is done by USB cable to connect the hardware to the system. The prototype model is represented in the above images. All the connections should be done in the same manner then will get a proper result. The below tables show the pin connection for each sensor.

5 Flow chart of the proposed model

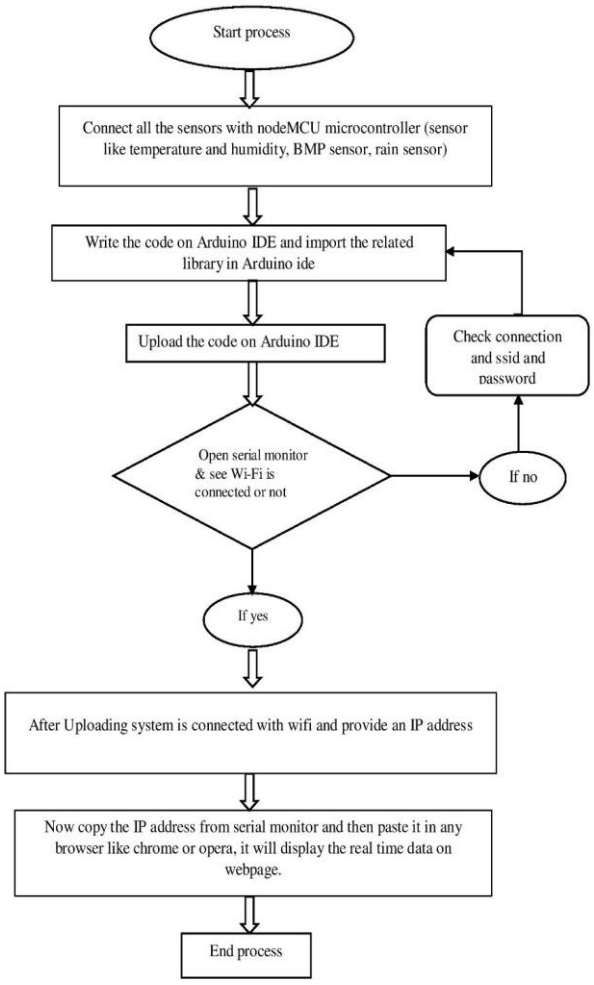


Fig.3. Flow chart of the proposed model

The flowchart describes the functioning of our proposed system. This proposed system is developed as a weather monitoring system for the Amravati region. This system is comprising of only three sensors and display the result on the webpage using HTTP.

6 Implementation

After making all the connections as shown in fig.2. The power supply is provided to node MCU through a USB cable. Which is connected with our personal computer. We have written two code modules. The first one is to connect to the different sensors in Arduino code and the second code module is for the web page which is written in java script.

After providing connection to hardware. Then upload the code which we have written. But before uploading code, it needs to verify. So, Open Arduino ide then write code there and click on verify and wait for almost 1-2 min to complete verification and then choose an option to upload the code then it compiles successful and done uploading successfully. After that open the serial monitor. There, it shows that system is connected with Wi-Fi. When hardware connection is established, HTTP request starts processing, and then it will show an IP address on the serial monitor. Then copy the IP address and paste it on a web browser like chrome, internet explorer, opera, etc. You can select any browser and it will show the corresponding temperature value, humidity, pressure, and rain value. The result is showing below

Hence, the above fig.4 shows the result on the webpage contains different parameters information from the weather. As the weather of Amravati region is very cold and rain possibility is also very high. The temperature, pressure, and rain sensor have a different variation available.

7 Experimental Results and Analysis

The function of "weather monitoring system using IOT", the agenda of this system to design a system which keeps track of weather condition and simultaneously measuring environmental variables through the internet of things. Fig shows a prototype development for a weather monitoring system with some parameters. The developed weather monitoring system monitor different parameters like humidity, pressure rain value, etc. After making the connection as per in fig.2 the value from the temperature and humidity sensor, pressure sensor, and rain sensor value is observed on the webserver. Here we are storing observed data on the web server through HTTP requests on the webpage.

Experimental result Date- 21 January 2022

S. N.	Time	Weather	Temperature value	Humidity value	Pressure value	Rain value
1.	9:00am	Fog	14 °C	87%	1016mbar	38 %
2.	12:00 pm	Cloudy	13 °C	78%	1018mbar	32%
3.	2:00pm	Partially sunny	14 °C	72%	1019mbar	34%
4.	5:00pm	Fog	15 °C	73%	1018mbar	39%

Experimental result Date-25 Jan 2022

S. N.	Time	Weather	Temperature value	Humidity value	Pressure value	Rain value
1.	10am	Fog	12 °C	88%	1018mbar	30 %
2.	11am	Fog	14°C	78%	1019mbar	32%
3.	12:30pm	Cloudy	16 °C	70%	1133mbar	30%
4.	2pm	Partially sunny	15 °C	70%	101mbar	28%

We have gathered sensor data on 21 January 2022 at different time slots. The sensed value is shown inwe have **se**nsed the weather's information for MMMUT college. In this experiment, we measured the temperature, humidity, rain, and pressure value dated 25 January 2022. The above table 7 represents the sensed value with our proposed model for MMMUT location.

we have measured the environment parameter with the help of different sensors for Gida Location Amravati.

This experiment is developed using a prototype model of the environment. This has been developed within the Amravati region in three different locations. The locations are AMRAVATI, MMMUT college Amravati and Gida Amravati. Primarily we have tested in the AMRAVATI region in the month of January and dated 21 Jan 2022. Secondly in MMMUT college Amravati and then Gida Amravati location. We have placed temperature and humidity sensors, pressure sensor, and rain sensor and start detecting the environment's parameters. When the reading obtained from sensors, we have tabulated all the readings captured through sensors according to their location, date, and time for analysis. The sensor's analysis is shown below.

A. Temperature

As shown in table 6 we have first sensed temperature value at the AMRAVATI location. On 21 January 2022, at time 9:00 am, we measure the minimum temperature as 7 and the maximum temperature is 21degree and found the average temperature is 14 degrees and the real-time temperature is 13 degrees. To analyse more, we have taken a temperature reading through the sensor at the different time slots. At 12pm, the average temperature or relative temperature is 13 degrees and the weather is cloudy. On the same day, at 2:00 pm, the average temperature value is 14degree and next time instance the average temperature value is 15 degrees. Hence at all the time, we have compared with real-time temperature value we found that temperature value is approximately accurate at AMRAVATI place.

Like, AMRAVATI place, On 25 January 2022, we have also measured temperature value at different time instance of MMMUT College Amravati Location is shown in table 7 In the morning, at 10:00 am, we measured average temperature value is 12 degree and real-time temperature value is 12degree. At 11:am, the average temperature value captured value is 12degree and the real-time temperature is 13degree. Another time interval is 12:30 pm, captured average temperature value is 16degree but the real-time temperature is 15degree and at 2:00 pm, the observed average temperature value

is 15degree, and the available real-time temperature is 15degree. Hence in this way, we can say that at the MMMUT College Amravati location the sensed temperature value is extremely nearer to the real-time temperature.

Same as the previous location, we have measured temperature value at Gida Location at multiple time instance on 26 January 2022 which is shown in table 8. Now we measure the temperature value at 8:30 am, the average temperature value is 11degree and the real-time temperature is 12degree. At 11:00 am, the relative captured temperature value is 12degree and the real-time temperature is 13degree. At 2:30 pm, the observed average temperature is 16degree and the actual temperature is 16degree and the last time instance, the sensed average temperature data is 15degree and the real-time observed temp is 15 degrees.

Hence with the above result, we can say that the observed result through our proposed model is sensed temperature data is closed by real-time data.

B. Humidity

As we have measured the temperature value of a particular location, in the same manner, we have measured the humidity value. Firstly, measure the humidity value of AMRAVATI then MMMUT College Amravati, and then Gida Amravati location. In AMRAVATI, the sensed humidity is 87 % and the humidity value in real-time is 89% at 9:00 am. Next, at 12:00pm, the average humidity percentage is 78% and the real-time humidity value is 77%. At 2:00 pm, the average humidity value in percentage is 72% and in real- time, the humidity value is 72%. And last time reading which we have measured i.e., at 5:00 pm, humidity value is 73% and real-time observed data is 74%. So, after taking the reading for AMRAVATI, we have analyses that humidity value is almost accurate when compared to the real-time observed data through the internet.

Likewise, for MMMUT College and Gida Amravati, the humidity value is sensed through our proposed model, dated on 25 Jan and 26 Jan 2022. We have seen that observed and real-time percentage value of humidity gives nearly accurate value. We have sensed reading for both locations with date and time is shown in table 7 **a**nd table 8.

B. Pressure

Pressure value of AMRAVATI, MMMUT College Amravati and Gida Amravati is observed and is referred to in table 6, table and table. The first reading has been taken for the AMRAVATI location and tabulated in table 6**.** The first reading is taken at 9:00 am and the average value of pressure is 1016mbar (millibar pressure unit) and the real-time pressure value is 1016mbar. Next, at 12:00pm, the average pressure value is 1018 mbar and the average pressure value in real-time is 1018mbr. Next at 2:00 pm, the pressure value on average is 1019mbar and the real pressure value is 1017mbar. And at 5:00 pm, the average value of pressure is 1018 and the real-time pressure value is 1018mbr. Hence in this way, we have observed and compare with real-time pressure and we

have seen that the pressure value is very much similar to real-time obtained data for the AMRAVATI location.

In the same manner, we have sensed pressure value for MMMUT College and Gida Amravati location and we found that observed pressure is nearer to the real-time pressure value. The sensed pressure data is tabulated in table 7 and table 8.

C. Rain

Rain value is observed in percentage form. Like all the above parameters is measured, the rain sensor value is also measured. In the same way, the Rain value is measured and compared with real-time data and found that like other parameters it is also very much accurate. So first we measure for AMRAVATI location and the date is 21 January 2022. The average rain value is 38% at 9:00 pm and the real value is 35%. Again, we measured at 12:00pm, the average rain value is 32% and the instantaneous value is 33%. We measure again at another time i.e., 2:00 pm then the rain value is 34% and at the same time, the real-time value is 33%. At 5:00 pm, the rain value is 39% and the rain value in real-time is 38%. These readings are obtained at the different time slots. On the basis of the above rain value data, we can say that it is almost similar to the real value. And we can say the possibility of rain is less.

Hence like the above location we have also analyse that the value of rain for MMMUT College and Gida location is also the same and almost gives accurate values of rain value. For

these two locations, the readings are available in table 7 and table 8.

Hence with this experiment analysis, we can take an idea for our future planning. This will especially help in industry, agriculture, and various field. So, if we provide this facility to the farmer to do an experiment with this system then they will collect data with these sensors and make analysis and perform their action according to the gathered information of weather.

Conclusion

Devices that monitor weather's parameters with minimum cost in our proposed system. The proposed system works on the client-side architecture model. The proposed approach observed various environmental information using multiple sensors. The system which is designed has used less sensor than the existing model. The main aim of our proposed model is to make the system cost-effective, affordable. So that everyone can use it freely. In our proposed system, capturing multiple data from multiple sensors and send all the data to the webpage by HTTP request protocol on the webserver. Here, the proposed system performs working in the region of Amravati. In this region, we have sensed the value for three locations i.e. AMRAVATI, MMMUT College, and Gida Amravati. Then we have arranged all the values in table form with respect to their data and time and done analysis. The proposed model is not only collecting data but also making decisions on the basis of observed data. It is very much helpful for farmers because it collects environmental data making an interpretation for the former. But it is also very important for making another decision such as or industry work purpose, transportation. The accuracy of the proposed model nearly accurate with real data

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