Weather Monitoring System using IoT

[1]Vishakha Parate, [2]Vaishnavi Bijwal, [3]Vaishnavi Khadse, [4]Sakshi Gawande

Abstract— Because of the rapidly changing climate, the weather forecast is unreliable and inaccurate these days. In case of that, the weather monitoring system is mostly used to monitor continuously changing climatic and weather conditions over controlled areas like houses, industries, agriculture, etc. in real-time monitoring. The weather monitoring system using IoT is one-way such application of IoT that has paved the way for organizations to create new and efficient solutions. The system proposed in this paper is a possible solution for monitoring the weather conditions at certain places and making the information available all over the world. The machine offers tracking and controlling environmental situations like temperature, relative humidity, rain, and CO levels with sensors and sends the statistics to the internet web page after which plot the sensor records as graphical statistics.

Keywords— Internet of Things, Weather Monitoring, Machine Learning, Weather Forecast.

I. INTRODUCTION

The periodic or non-stop surveillance or evaluation of the nation of the atmosphere and climate, along with variables consisting of temperature, moisture, wind pace and barometric pressure. Traditional climate forecasting structures have come to be unreliable. The motive is international warming is cracking the strong climate system. Sunny days have emerge as long, and winters have emerge as short. Even the wet season has emerge as erratic and irregular. If defective climate reporting continues, there might be an widespread growth in unpredictable storms, hurricanes, and floods. In cause of these, Iot and machine learning have revolutionized the traditional weather monitoring system and made it highly accurate, reliable, and efficient. Sensor devices, clever vehicles, drones, and wi-fi connections at unique places discover weather adjustments and different associated information which includes CO2 level, wind

Vishakha Parate, Vaishnavi Bijwal, Vaishnavi Khadse, Sakshi Gawande, Department of Computer Engineering Suryodaya College of Engineering and Technology, Nagpur, Maharashtra, India.

Mail Id: jayuborker.coet@gmail.com, rajatbansod13@gmail.com, tohidsheikh621@gmail.com, ninadsewakshende358@gmail.com, monishgurnule80077@gmail.com
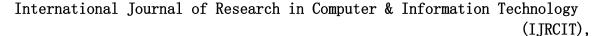
speed, temperature, soil moisture, rainfall, and humidity. The gadget gets statistics from those devices, that's then saved and transferred anywhere required thru microcontrollers and cloud computing. In agriculture, before the yield of crops, the farming process has various phases and in that weather plays the most vital role. 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.

II. LITERATURE REVIW

Author in [1], proposed a system that monitors and predicts the weather condition by which anyone can plan for our day-to-day life. This activity became helpful in every field either in agriculture or industry. So as to achieve monitoring and predicting weather info, the author uses 2 stages of the weather management system. In which they amalgamated the information from the sensors, bus mobility, and deep learning technology is used to allow a weather reporting system in stations and buses in real-time. Forecasting of weather is achieved through the friction model. Depending upon the sensing measurement from vehicles like buses, the work incorporates the strength of local information processing. The author talks about in stage-I, sensing of weather's condition, multilayer perception model and long-term memory are trained and then it will verify using temperature data, humidity, air pressure of test In Stage-II, the training is applied to learn the time series of weather information. To get accurate data or not, to check the system performance, the author comparing the predicted weather data and actually obtained data from the environment Protection Administrator And central Baeuro of Taichung observation system that calculate the prediction of The author finally talks about the proposed system has reliable performance on monitoring of weather. And this model also proposed a one-day weather forecast or prediction via the training model.So finally, the writer demonstrates that this machine gives a real-time weather monitoring and prediction machine using bus information management. The author represents 4 basic components 1- Information management. 2- Interactive bus stop 3- Machine learning predictive model 4- weather information platform. In this, information shown via dynamic chart.

[2]K. S. Nikhilesh, Y. H. Raaghavendra, P. J. Madhu Soothanan and R. Resmi, "Low-cost IoT based weather

International Journal of Research in Computer & Information Technology (IJRCIT),
Vol.8, Issue 3, June 2023
E-ISSN: 2455-3743
Available online at www.ijrcit.co.in

monitoring system for smart community,"

This real-time climate tracking gadget is constructed for a clever domestic that shows climate parameters consisting of the depth of Rainfall, temperature, wind pace and mild depth from the sensors to the cloud with the aid of using injecting message queuing telemetry delivery protocol. The proposed machine is portable, inexpensive and the information may be accessed at any instant.

In the paper [3], The writer proposed an "An Intelligent weathering system using the internet of thing" research in which, with the help of machine learning algorithm and IoT technology, climate condition is measure and predicts the next upcoming condition. and efficient method for controlling the weather condition and sends it to the cloud so that the value is fetched and available on the internet and can be seen anywhere by connecting through the internet. There is a huge function of temperature, humidity, stress in the system. also have a different area used in the system which includes agriculture, logistics, etc. weather monitoring, and forecasting is important for the advancement of these industries. IoT technology used in the formation and development of this research, that is an advanced & green method for connecting the sensor to the cloud that stored the real-time data and connects the whole world of things through a network. The thing might be anything as the sensor, electronic gadget, and automotive electronic equipment as well. The whole system deals with the monitoring and controlling the environmental situation like temperature, smoke, gas, wind, pressure relative humidity level, and many other gases with sensor transfer the data or information to the cloud platform and store the data on it. A machine learning prediction algorithm is used in this system. Machine gaining knowledge of is a department of AI (Artificial Intelligent) which deals with analysing and predicting the given dataset. The accrued facts is analysed. The real-time data sent through the sensor can be reachable through the internet in the entire world. The methodology which is used by the author as node MCU microcontroller is used to acquire the records from discrete sensor which is basically on the code dumped in Nodemcu, send the data to the specific cloud as Thing speak is used for displaying both the data with web view and also application view. Each sensor is connected with node MCU. It transmits the sensed information from the cloud and information evaluation is performed and shows the result in the resultant view on the website. Data is fetched from the cloud in the CSV file format.

Table 1: Summary of previous research work of weather monitoring system using IoT

Author	Data Used	Techniques	Findings
Zi-Qi Huang, Ying-Chih Chen and Chih-Yu Wen	Weather monitoring; weather prediction; bus systems; machine	Raspberry Pi, Weather sensors.	Applying multiple data sources and information processing
K. S. Nikhilesh, Y. H. Raaghavendra, P. J. Madhu Soothanan and R. Resmi,	IoT, weather monitoring system, smart communities, sensors, cloud server, machine learning.	ThingSpeak, weather sensor	85%
M. Prasanna, M. Iyapparaja, M. Vinothkumar, B.Ramamurthy,S, S. Manivannan	Internet of things(IoT), Artificial Intelligence(AI), Machine Learning, Weather Forecast.	ThingSpeak, MATLAB, Linear Regression, Multiple Regression	89%

(continuation of first row of table: "learning." ... "technologies")

III. PROPOSED METHODOLOGY

The proposed methodology of a weather monitoring system can be divided into the following steps:

1. Determine the location: This involves selecting the location(s) where the weather monitoring system will be installed. The location should be ideal for measuring various weather parameters and accessible for maintenance.

2. Determine the weather parameters: The weather parameters to be measured should be identified beforehand. Some commonly measured parameters include temperature, humidity, pressure, wind speed and direction, precipitation, and solar radiation.

3. Select sensors: Once the weather parameters have been identified, appropriate sensors need to be chosen to measure these parameters accurately. The sensors should be reliable, accurate and durable.

4. Data communication: The data from the sensors needs to be communicated to the data acquisition system. There are different options for data communication like wired or wireless technologies.

5. Data acquisition and processing: The data acquisition system will collect data from the different sensors and process it in real-time. The data processing system will provide users with information like weather conditions, trends, and even historical data.

6. Data storage and visualization: The data acquired and processed will be stored in a database for future reference. The visualization of data may be in the form of charts, maps, or graphs.

7. Alerts and notifications: The system can generate weather alerts and notifications to help people plan and prepare for different weather conditions.

8. Maintenance and calibration: The weather monitoring system needs to be properly maintained and calibrated to ensure accuracy and reliability.

IV. CONCLUSION

In conclusion, a weather monitoring system is an essential tool that enables governments and individuals to prepare and respond to weather-related disasters. The system comprises several components, including sensors, communication networks, and data processing platforms. The review paper sought to explore the different components of a weather monitoring system and their importance in enhancing weather predictions and disaster response. From the review, it is evident that a robust and reliable weather monitoring system requires high-quality data sources, secure communication channels, and data processing techniques. Therefore, governments and stakeholders must invest in advanced technologies to ensure an efficient and effective weather monitoring system that can provide accurate and timely weather forecasts. Ultimately, the use of weather monitoring systems will help mitigate the adverse effects of climate change and improve the safety of communities.

REFERENCES

[1] Zi-Qi Huang, Ying-Chih Chen and Chih-Yu Wen, "Real-Time Weather Monitoring and Prediction Using City Buses and Machine Learning", Vols. 3 to 21 Published 10 September (2020)

[2] K. S. Nikhilesh, Y. H. Raaghavendra, P. J. Madhu Soothanan and R. Resmi, \"Low-cost IoT based weather monitoring system for smart community,\" 2020 Fourth International Conference on Inventive Systems and Control (ICISC), 2020, pp. 482-486, doi:

[3] M. Prasanna, M. Iyapparaja, M. Vinothkumar, B Ramamurthy, S.S. Manivannan," An Intelligent Weather Monitoring System using Internet of Things", International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878, Volume-8 Issue-4, November (2019)

[4] Aroos, M.S.M. et al. (2011). Construction of an automated weathersta t ion for gr ound level wea t her mea sur e men t s .Annual Transactions of IESL. (May 2014), pp. 450-455.

[5] Ch awl a, A. etal. (2 01 5) . Bluetooth based weather station. International Journal of Engineering Trends and Technology. 28(2): 98-101. Do i : 10.14445/22315381/ijett-v28p219.

[6] Hussein, Z.K. et al. (2020). Low cost smart weather station using Arduino and Zig Bee. Telkomnika (Telecommunication Computing Electronics and Control). 18(1): pp. 282-288.doi: 10.12928/TELKOMNIKA.v18i1.12784.

[7] Kong, M.A.B.L. (2017). Universidad de zamboanga weather station: Monitoring on wind speed and wind direction. International Journal of Applied Engineering Research. 12(24): 14914-14926.L

[8] earning, M. and Cookbook, R. (2019). Weather Forecasting and Crop Management. pp. 1-6.

[9] Munandar, A. et al. (2017). Design of Real-Time Weather Monitoring System based on Mobile Application using Automatic Weather Station. Proceedings of the 2nd International Conference on A utomation, Cognitive Science, Optics, Micro Electro- Mechanical System and Information Technology, ICACO MIT 2017, 2018-January (Oc tober),pp. 44-47. doi: 10.1109/ICACOMIT.2017.8253384.

[10] Rahut, Y., Afreen, R. and Kamini, D. (2018). Smart weather monitoring and real time alert system using IoT. International Research Journal of Engineering and Technology. 5(10): 848-855.