

Weather reporting system using IoT

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Abstract

In this paper, the weather reporting system using IoT is presented, i.e., this paper presents a brief information on the weather reporting system using the IoT concepts. The unpredictability of weather forecasts is due to drastic changes in climate. To monitor these constantly changing conditions in various areas such as homes, industries, and agriculture, a Weather Reporting System is commonly used. This system utilizes an Internet of Things (IoT) platform called ThingSpeak, which displays weather parameters and information worldwide. Two-way microcontroller communication via Wi-Fi hotspots enables display on an OLED. Although satellite weather reports provide information on certain locations, they do not always provide precise conditions. To obtain accurate current weather reports, a weather reporting system using ESP32 microcontrollers is employed. The sensors controlled by the microcontroller send data to a database accessible globally and displayed on an OLED, which uses a Wemos D1 mini as a client. The data collected is also saved in Google Sheets format for ease of analysis using the IFTT tool. This system continuously monitors changes in weather conditions and provides users with fast access to information from any location. The work done & presented in this paper is the result of the mini-project work that has been done by the first sem engineering students of the college and as such there is little novelty in it and the references are being taken from various sources from the internet, the paper is being written by the students to test their writing skills in the starting of their engineering career and also to test the presentation skills during their mini-project presentation. The work done & presented in this paper is the report of the assignment / alternate assessment tool as a part and parcel of the academic assignment of the first year subject on nanotechnology & IoT.

Keywords : Weather, Forecast, System, IoT

1. Introduction

The field of weather monitoring and forecasting plays a critical role in various sectors, including agriculture, transportation, disaster management, and urban planning. With the advancements in Internet of Things (IoT) technology, the development of weather reporting systems has reached new heights of accuracy, accessibility, and real-time data collection. This paper presents an introduction to the concept of a weather reporting system using IoT, highlighting its components, functionality, and benefits, supported by informative diagrams.

2. Weather reporting system

The weather reporting system using IoT combines the power of sensors, data communication, and cloud computing to collect, analyze, and disseminate weather information. It involves the deployment

of various IoT devices, such as weather stations, sensors, and data loggers, to capture essential meteorological data. These devices are equipped with sensors to measure parameters like temperature, humidity, wind speed, rainfall, atmospheric pressure, and solar radiation which is shown in the Fig. 1 [1]-[3].

3. Block-diagram

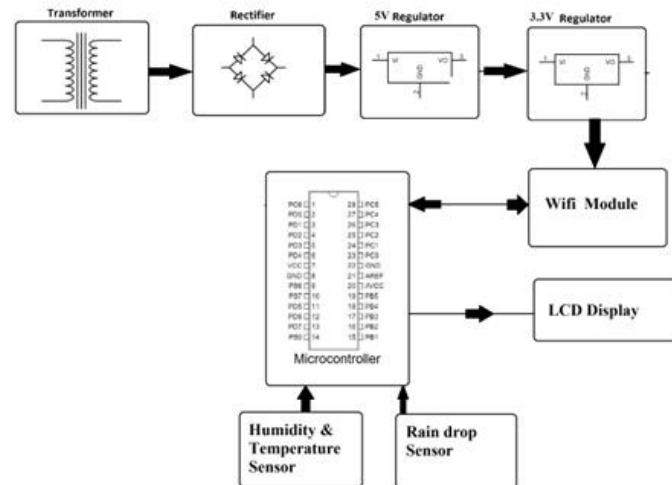


Fig. 1 : Weather Reporting System Components]

The diagram showcases the key elements of the system, including [4]:

Weather Sensors: These devices are responsible for collecting data on different weather parameters. They can be placed at various locations, such as open fields, rooftops, or strategic points within a city [5].

Data Loggers: The data loggers receive the information from weather sensors and store it for further processing. They ensure the continuous recording of weather data, even in cases of intermittent connectivity [6].

Data Communication: IoT devices use various communication technologies, such as Wi-Fi, cellular networks, or satellite communication, to transmit the collected data to the central system or cloud servers [7].

Cloud Computing: The cloud infrastructure plays a crucial role in storing and processing the vast amount of weather data collected from different IoT devices. It provides the computational power and storage capacity required for data analysis, modeling, and forecasting [8].

Data Analysis and Forecasting: The collected weather data is processed, analyzed, and transformed into meaningful information using advanced algorithms and machine learning techniques. This information is then used for weather forecasting, trend analysis, and generating reports [9].

User Interfaces: The weather reporting system incorporates user-friendly interfaces, such as web portals or mobile applications, to provide access to weather information for end-users, including farmers, meteorologists, city planners, or individuals interested in real-time weather updates.

4. Further illustrations

To further illustrate the functionality of the weather reporting system, we can refer to the following diagram shown in the Fig. 1. The diagram demonstrates the workflow of the weather reporting system, which involves the following steps:

Data Collection: Weather sensors deployed at different locations capture weather-related parameters, such as temperature, humidity, and wind speed.

Data Transmission: The collected data is transmitted to the data loggers or directly to the cloud servers using various communication technologies.

Data Storage and Processing: The data loggers or cloud servers store the received data in databases for further processing. The cloud infrastructure provides the necessary resources for data analysis and modeling.

Data Analysis and Forecasting: Advanced algorithms and machine learning techniques are applied to analyze the stored data and generate weather forecasts, trends, and patterns.

Report Generation: The analyzed data is used to generate weather reports, which can be accessed by end-users through user interfaces like web portals or mobile applications.

User Access and Notifications: End-users can access the weather reports, receive real-time weather updates, and set up personalized notifications based on their preferences.

5. Conclusions

In conclusion, the weather reporting system using IoT combines sensors, data communication, cloud computing, and data analysis techniques to provide accurate and real-time weather information. This system facilitates effective decision-making in sectors reliant on weather data. The illustrated diagrams showcase the components and workflow of the weather reporting system,

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