IoT Weather and Environment Monitoring System

Project Overview:

The IoT Weather and Environment Monitoring System is a comprehensive project that leverages a microcontroller to collect and store data related to weather conditions, light intensity, and air quality in a given area. The collected data is then made accessible through both a web application and an Android application, providing users with real-time information about their surroundings. This project showcases the integration of IoT technologies, data collection, and data visualization, making it a relevant and practical application.

The main objective of this project is to show the temperature, humidity, air quality, and climate (like cloudy, sunny, etc.) using a light sensor. There is also an idea to show wind speed and wind direction.

Key Components:

Microcontroller:

The heart of the system is the microcontroller, which plays a pivotal role in collecting data from various sensors. The choice of microcontroller will influence the project's overall efficiency and effectiveness. The basic idea is to use the ESP32 microcontroller, which has network capabilities, but we could change it due to resource limitations caused by using simulation software in this project.

Temperature Sensor & Humidity Sensor:

The temperature sensor measures ambient temperature levels, offering crucial insights into the environmental conditions. The humidity sensor measures atmospheric

humidity levels, providing valuable information about moisture content. The idea is to use a DHT11 sensor which will act as both the humidity and temperature in the atmosphere. The DHT11 sensor is a low-cost digital temperature and humidity sensor. It is commonly used in Arduino and other microcontroller projects. The sensor is easy to use and provides accurate readings.The DHT11 sensor can measure temperature from 0°C to 50°C and humidity from 20% to 90% with an accuracy of ±1°C and ±1%, respectively. The sensor has a sampling rate of 1 Hz, which means that it can provide a new reading every second. This is an ideal sensor to calculate the temperature and humidity in the atmosphere.

Light Intensity Sensor:

The light intensity sensor measures ambient light levels, enabling users to gauge the brightness in a specific area. A comprehensive review should focus on its sensitivity, range, and precision. This light sensor is used to calculate the light intensity which can be used to find that the area is cloudy or sunny. The idea is to use the LM393 sensor to calculate the intensity of that area. The LM393 is a dual independent precision voltage comparator capable of single or split supply operation. The LM393 has a wide operating voltage range of 2V to 36V, and it can be used to compare both single-ended and differential voltages. It has a low input offset voltage of 5mV, and its output is compatible with TTL, MOS, and CMOS logic. The LM393 is available in a variety of packages, including DIP, SOT-23, and SOIC. It is also available in a dual version (LM393) and a quad version (LM339). If the voltage on the non-inverting input is greater than the voltage on the inverting input, the output of the LM393 will be high. The LED will then turn on. If the voltage on the inverting input is greater than the voltage on the non-inverting input, the output of the LM393 will be low. The LED will then turn off. The LM393 is a versatile and easy-to-use voltage comparator.

Air Quality Sensor:

The air quality sensor is crucial for monitoring the presence of harmful pollutants in the atmosphere. The air quality ensures the air quality of that area i.e.

It will show the air quality index of that particular area to the users. The MQ-135 is a semiconductor sensor that is used to detect a variety of gasses, including ammonia, sulfur dioxide, alcohol, and benzene. It is a low-cost and easy-to-use sensor, making it a popular choice for a variety of applications, such as air quality monitoring, industrial safety, and smart home devices. The MQ-135 sensor works by measuring the change in conductivity of a tin dioxide (SnO2) semiconductor when it is exposed to gasses. The conductivity of the SnO2 semiconductor increases as the concentration of gas in the air increases. The MQ-135 sensor has a built-in heater that helps to maintain a consistent operating temperature, which improves the accuracy and sensitivity of the sensor. The MQ-135 sensor has a wide operating voltage range of 5V to 15V, and it can be used to detect a variety of gasses in concentrations ranging from a few ppm to hundreds of ppm. The sensor has a fast response time and a good recovery time, making it suitable for real-time monitoring applications. The MQ-135 sensor is available in a variety of packages, including DIP, SOT-23, and SOIC. It is also available in a dual version (MQ-135D) and a quad version (MQ-135Q)

Data Storage:

The data storage component ensures the secure retention of the collected data. Evaluate its capacity, reliability, and ease of retrieval. The data storage medium is still undecided. This means that we are still evaluating the different options available in the cloud.

Web Application:

The web application provides an intuitive and informative interface for users to data.It also shows all the existing data collected from the IoT project. It is also created as an android application for ease of access for android users.

Conclusion:

The IoT Weather and Environment Monitoring System is a promising project that highlights the potential of IoT technology in environmental monitoring. As technology continues to advance and environmental concerns become increasingly important, systems like this hold great value. However, it is important to continue refining and upgrading the system to provide the most accurate and reliable data to users. Through ongoing development and user engagement, this project can become an invaluable tool for individuals and communities seeking to make informed decisions based on their local weather and environmental conditions.