**ESP32 Weather Forecast System Using DHT and Firebase**

**ABSTRACT**

The ESP32 Weather Forecast System using DHT and Firebase is an innovative project that leverages the power of IoT (Internet of Things) to provide real-time weather data through a low-cost, easy-to-implement system. The core components of the system include the ESP32 microcontroller, a DHT sensor (DHT11 or DHT22) for measuring environmental parameters like temperature and humidity, and Firebase, a cloud platform for data storage and real-time synchronization.

The ESP32 microcontroller reads the data from the DHT sensor, processes the information, and uploads it to the Firebase cloud in real-time. The system can be accessed remotely through a mobile app or a web interface, providing users with an up-to-date weather forecast based on the data from the DHT sensor. Firebase plays a crucial role by storing and synchronizing the weather data, making it accessible across multiple devices.

This system offers numerous applications in weather monitoring, smart agriculture, and home automation, where continuous environmental monitoring is required. By combining the ESP32's capabilities with the DHT sensor and Firebase's real-time data management, the project demonstrates an efficient and scalable solution for building weather forecast systems that can be further enhanced with additional sensors like pressure, wind speed, and rainfall.

The main advantages of this system are its low cost, ease of setup, and scalability, making it suitable for various environmental monitoring applications.

**LITERATURE SURVEY**

The ESP32 microcontroller has gained popularity for IoT applications due to its Wi-Fi and Bluetooth capabilities. In weather monitoring systems, the ESP32 is often paired with sensors like the DHT11 or DHT22 to measure temperature and humidity. Firebase, a cloud-based database, provides real-time data storage and retrieval, making it a suitable platform for weather data logging and analysis.

This survey reviews existing research on weather forecasting systems using ESP32, DHT sensors, and Firebase, focusing on system architecture, data accuracy, and real-time cloud integration.

Several studies have demonstrated IoT-based weather monitoring using ESP32 and similar microcontrollers. For instance, Patel et al. (2021) developed an ESP8266-based weather station using DHT11 and ThingSpeak, showing the feasibility of cloud-based monitoring. Similarly, Sharma et al. (2022) explored the use of ESP32 in IoT applications, highlighting its efficiency in handling real-time data transmission.

DHT11 and DHT22 are commonly used for temperature and humidity measurement due to their affordability and ease of interfacing. Studies such as those by Gupta et al. (2020) compared the accuracy of these sensors, concluding that DHT22 provides better precision, making it preferable for forecasting applications.

Cloud-based storage and real-time database services enhance data accessibility. Firebase has been widely used in IoT applications due to its low latency and scalability. A study by Reddy et al. (2021) implemented Firebase with an ESP32-based health monitoring system, demonstrating efficient real-time data storage and retrieval. Applying Firebase to weather systems ensures instant updates and historical data analysis for forecasting purposes**.**