

Weather Email Alert System using ESP32

Abstract

Climate conditions change rapidly, and staying updated is essential for safety, agriculture, travel planning, and daily decision-making. Manual weather checking through applications is inconvenient and often ignored. This project proposes an automated Weather Email Alert System using an ESP32 microcontroller that retrieves real-time weather data from an online API and mails it to the user. The ESP32 connects to Wi-Fi, fetches temperature, humidity, and weather conditions, and sends periodic email alerts without the need for user intervention. This system ensures timely weather updates and enables informed decision-making, improving convenience and safety for users.

INTRODUCTION

Weather forecasting plays a crucial role in personal planning and industrial sectors such as aviation, marine navigation, and agriculture. Traditionally, individuals rely on smartphones and television forecasts, but this method requires manual effort and may be overlooked. To address this issue, an intelligent system capable of automatically gathering and sending weather updates is required.

The proposed project uses an ESP32—a low-cost Wi-Fi-enabled microcontroller—to access online weather APIs such as OpenWeatherMap. The fetched data is processed and mailed to a registered user through SMTP or IFTTT-based automation. The system requires no additional user interaction once configured. Unlike conventional systems, the ESP32 handles everything autonomously, enabling a simple, efficient, and reliable weather notification mechanism. The project provides a scalable and IoT-based approach toward automated weather alerts.

LITERATURE SURVEY

OpenWeatherMap API Documentation – Provides global weather data through HTTP/JSON services, enabling IoT devices to retrieve live meteorological parameters.

Espressif Systems – Official ESP32 reference material explaining integrated Wi-Fi, TCP/IP stack, and HTTP handling suitable for IoT automation.

IFTTT Platform – Offers cloud-based email triggers, simplifying communication systems for IoT devices.

Research studies on IoT-enabled notification systems demonstrate successful integration of microcontrollers with cloud platforms for automation services and alert systems.

WORKING PRINCIPLE

1. Wi-Fi Connection

The ESP32 connects to a Wi-Fi network using user-provided SSID and password.

2. Weather Data Collection

The ESP32 sends an HTTP request to the OpenWeatherMap API and receives JSON weather data, including temperature, humidity, and weather descriptions.

3. Data Parsing

The ESP32 extracts relevant meteorological parameters using JSON parsers.

4. Email Preparation

The weather data is formatted into a readable email message summarizing current atmospheric conditions.

5. Email Dispatch

The system either:

- Communicates with an SMTP server (Gmail/Yahoo), or
- Triggers an IFTTT webhook to deliver the email automatically.

6. User Notification

The user receives timely weather updates directly in their email inbox without needing manual checks.

