

IoT-Based Smart Weather Station

Project Overview :

The objective of this project is to develop a highly accurate, location-specific IoT-based weather monitoring system that delivers real-time environmental data from targeted areas such as agricultural fields, research sites, and storage facilities. Unlike conventional city-wide or regional forecasts, this system provides granular, real-time insights to help users make informed decisions in agriculture, environmental research, and resource management. By leveraging IoT sensors and cloud integration, users can remotely monitor temperature, humidity, air quality, rainfall, and light intensity to ensure crop protection, storage safety, and efficient resource utilization.

Features & Functionalities:

- ✓ Real-time Weather Monitoring – Tracks temperature, humidity, air quality, light intensity, and rainfall.
- ✓ Cloud Integration – Data is sent to Blynk IoT for real-time visualization.
- ✓ Web Dashboard – A custom ESP32-based webpage displays weather data.
- ✓ Alerts & Notifications – Triggers an alert in Blynk when it detects rainfall.
- ✓ Historical Data Analysis – Logs sensor data for further analysis.
- ✓ Precision Monitoring – Provides precise, real-time environmental data for specific locations.

Components & Technologies Used

Hardware Components

- Microcontroller: ESP32
- Sensors:
 - DHT11 – Measures temperature & humidity
 - MQ3 – Detects air quality (gas levels)
 - LDR Sensor – Measures light intensity for day/night detection
 - Rain Sensor – Detects rainfall levels

Software & Cloud Platforms

- Cloud Platform: Blynk IoT (for real-time monitoring)
- Web Server: ESP32 hosts a custom HTML-based webpage
- Programming Language: C++ (Arduino IDE)
- Networking Protocol: Wi-Fi (HTTP communication)

Working Principle

1. Sensors collect weather data (temperature, humidity, air quality, light intensity, and rainfall).
2. ESP32 processes the sensor data and sends it to Blynk IoT via Wi-Fi.
3. A web dashboard hosted on the ESP32 displays live weather information.
4. Rain Detection Alert: If rainfall is detected, an alert is sent to the Blynk dashboard.
5. Users can access real-time weather reports via the Blynk app or web browser.

Applications :

- ✓ **Personal home weather stations** – Monitor local weather conditions.
- ✓ **Smart agriculture** – Helps farmers track environmental changes.
- ✓ **Smart cities** – Contributes to urban weather monitoring.
- ✓ **Disaster management** – Provides early warnings for extreme weather.

Outputs:



Fig 1 - Web Server (LAN) Output

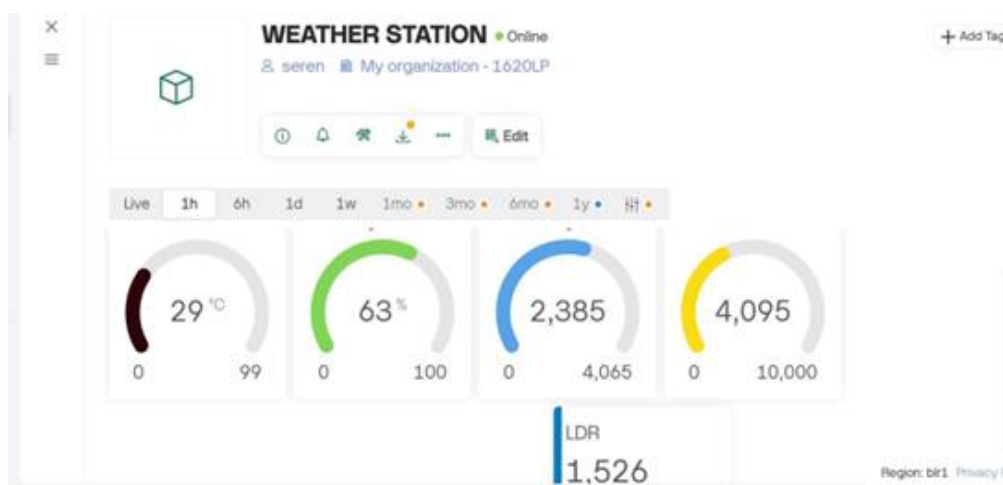


Fig 2- Blynk IOT

GitHub Link : <https://github.com/sireenabhanu19/Weather-Station>