

AgriSense 2.0 – IoT-Based Smart Agriculture Monitoring System

Overview

AgriSense 2.0 is an innovative IoT-based smart farming system designed to help farmers monitor key environmental and soil parameters in real time. It reduces manual effort and improves crop productivity by providing accurate data through an online platform. The system ensures efficient water usage and promotes sustainable agriculture.

Objectives

- To monitor soil moisture, temperature, and humidity in real time.
- To provide farmers with live farm data through a mobile IoT dashboard.
- To automate irrigation based on soil moisture levels.
- To encourage precision farming using low-cost and energy-efficient technology.

Key Features

- **■ IoT Connectivity:** Sends live sensor data to the **Blynk IoT app** for remote monitoring.
- **■ Automated Irrigation:** Controls a water pump automatically when soil moisture falls below a set threshold.
- **■ Environmental Monitoring:** Displays real-time temperature, humidity, and soil condition.
- **■ User Dashboard:** Farmers can view live readings and control irrigation through the Blynk mobile app.
- **■ Low-Cost & Scalable:** Built using affordable, easy-to-assemble components for rural deployment.

Hardware Components

- ESP32 Development Board – Main microcontroller with built-in Wi-Fi.
- DHT22 Sensor – Measures temperature and humidity with higher accuracy.
- Capacitive Soil Moisture Sensor – Detects soil water content with better durability.
- 16x2 LCD Display – Shows real-time values of all parameters.
- Relay Module + Water Pump – Automates irrigation system.
- Power Supply (5V/9V) – For powering the ESP32 and peripherals.

Software & IoT Platform

- Arduino IDE – Used to program the ESP32.
- Blynk IoT App – Displays live data (temperature, humidity, soil moisture) using widgets like gauges and indicators.
- Wi-Fi Network – Connects the ESP32 to the internet for real-time data transmission.

Working Principle

1. The sensors collect temperature, humidity, and soil moisture data.
2. The ESP32 processes this data and sends it to the Blynk IoT cloud via Wi-Fi.

3. The Blynk mobile app displays live readings in an easy-to-understand dashboard.
4. When soil moisture falls below a preset level, the ESP32 automatically activates the water pump through a relay.
5. The LCD display shows the latest values locally for quick on-site reference.

Applications

- Precision irrigation in farms and gardens.
- Smart greenhouses and nurseries.
- Agricultural research and educational demonstrations.
- Sustainable water management projects.

Advantages

- Reduces water wastage through automated irrigation.
- Minimizes manual monitoring effort.
- Provides real-time farm data anywhere through IoT.
- Low-cost and suitable for small or large farms.
- Easy to maintain and expand with additional sensors.