

# Smart Plant Monitoring System

## A PROJECT REPORT

*Submitted by*

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# IoT-Based Smart Plant Monitoring System

## Project Title:

IoT-Based Smart Plant Monitoring System

## 1. Introduction:

With the advancement of the Internet of Things (IoT), agriculture and gardening processes can be automated and optimized. This project, *"Nature of Plant"*, is a smart plant monitoring based on the ESP8266 microcontroller. The system monitors environmental parameters like soil moisture, temperature, and humidity, and controls a water pump automatically or manually via a smartphone app (Blynk platform).

## 2. Objectives:

- To continuously monitor soil moisture, temperature, and humidity.
- To display real-time data on an LCD and send it to a mobile app.
- To automate water pumping based on soil moisture levels.
- To provide manual control of the pump through the Blynk app.
- To optimize water usage and ensure plant health.

## 3. Components Used:

Component	Description
ESP8266 NodeMCU	Wi-Fi enabled microcontroller used for IoT applications.
DHT11 Sensor	Measures temperature and humidity.
Soil Moisture Sensor	Measures the volumetric water content of soil.
Relay Module	Controls the water pump (ON/OFF).
Water Pump	Pumps water to the plant.
16x2 I2C LCD	Displays real-time sensor data.
Blynk App	Mobile application for remote monitoring and control.

## 4. System Architecture:

- Sensors (DHT11 and soil moisture) collect environmental data.
- Data is processed by the ESP8266, which sends it to the Blynk App over Wi-Fi.

- Based on the moisture level, the pump is turned ON/OFF automatically.
- Users can also control the pump manually using a virtual button (V3) in the Blynk App.
- All real-time data is displayed on an LCD screen.

## **5. Working Principle:**

- The soil moisture sensor provides analog readings which are mapped to a percentage scale.
- When the moisture level falls below the defined threshold (40%), the pump is activated for a maximum of 30 seconds to avoid overwatering.
- The pump can also be controlled manually via the Blynk App.
- Temperature and humidity are read using the DHT11 sensor and sent to the app.
- A 16x2 LCD displays current values and pump status locally.

## **6. Software Used:**

- **Arduino IDE** – Programming and uploading code to the ESP8266.
- **Blynk App** – Mobile interface for monitoring and controlling the system.
- **Libraries** – DHT.h, Wire.h, LiquidCrystal\_I2C.h, BlynkSimpleEsp8266.h

## **7. Features:**

- Real-time monitoring of plant environment.
- Dual mode control (automatic and manual).
- User-friendly mobile interface (Blynk).
- LCD display for local feedback.
- Smart irrigation to conserve water.
- Automatic shutdown of pump after 30 seconds to prevent overwatering.

## **8. Future Enhancements:**

- Add rain detection to prevent irrigation during rain.
- Include multiple soil sensors for large-scale fields.
- Implement data logging and analytics.
- Power the system using solar energy for sustainability.

## **9. Conclusion:**

This IoT-based plant monitoring system effectively integrates environmental sensing with smart irrigation, making plant care efficient and intelligent. It is highly suitable for home gardens, greenhouses, and urban farming setups.