# SMART PLANT WATERING SYSTEM

## A Remote-Controlled IoT Approach to Plant Care


***BY***
***FARHEEN TABASSUM H [230701088]***
***DHIVYA SHREE K [230701079]***


# ABSTRACT

Efficient plant care is essential for promoting sustainable living and environmental conservation. However, traditional manual watering methods are often inconsistent and resource-intensive. This study proposes the development of a Smart Plant Watering System using Internet of Things (IoT) technology to remote irrigation based on real-time soil moisture monitoring. The system utilizes sensor data, a microcontroller, and a mobile application for dynamic control and monitoring. Through the integration of hardware components and IoT platforms, the project aims to demonstrate an efficient and sustainable solution for remote plant care.

# INTRODUCTION

Water management plays a crucial role in promoting plant health and supporting sustainable agricultural and gardening practices. With growing environmental concerns and the need for conserving resources, traditional manual irrigation methods are increasingly seen as inefficient due to water wastage and inconsistent plant growth. Urbanization and lifestyle changes have also reduced the amount of time people can spend on plant care, creating a greater demand for efficient, automated irrigation systems. Recent advancements in emerging technologies, particularly the Internet of Things (IoT), have made it possible to develop smart solutions that provide real-time monitoring and automation. These IoT-based systems use sensor networks, cloud platforms, and mobile applications to optimize water usage and allow users to remotely manage environmental conditions. By adjusting irrigation based on soil moisture levels, they significantly improve water efficiency and ensure healthier plants with minimal human involvement.

This study presents the development of an IoT-based Smart Plant Watering System designed to remotely control irrigation using real-time soil moisture data. The system is built using a NodeMCU ESP8266 microcontroller, soil moisture sensors, a relay module, and the Blynk IoT platform for monitoring and control. A structured methodology involving system design, prototype development, and performance evaluation is followed to demonstrate the feasibility and effectiveness of intelligent plant care solutions. The aim is to show how such systems can contribute to sustainable, low-maintenance gardening and agricultural practices through the intelligent application of technology.

# LITERATURE REVIEW

| S. No. | Title | Technology/Platform Used | Key Features | Objective/Outcome |
|---|---|---|---|---|
| 1 | An IoT-Based Smart Irrigation System Using Soil Moisture and Weather Prediction | Sensor nodes, cloud platform | Soil moisture, temperature sensors, weather forecasting | Optimized irrigation scheduling and water conservation |
| 2 | IoT-Based Plant Monitoring System Using NodeMCU | NodeMCU, Blynk IoT Platform | Soil moisture & environmental sensors, mobile app | Real-time monitoring and reduced human intervention |
| 3 | Design and Implementation of Soil Moisture Monitoring and Irrigation System Based on ARM and IoT | ARM architecture, IoT, cloud integration | Soil humidity and environmental data collection | Automated irrigation and improved efficiency |
| 4 | IoT-Based Smart Irrigation with Tracking System Using NodeMCU ESP8266 | NodeMCU ESP8266, mobile devices | Environmental sensors (moisture, temp., humidity) | Crop protection and optimized remote irrigation |
| 5 | Smart Sensors and NodeMCU ESP8266-Based Automated Irrigation System for Effective Water Management in Agriculture | NodeMCU ESP8266, ThingSpeak | Smart sensors, real-time soil monitoring | Automated watering and effective water management |

# OBJECTIVES

- Monitor soil moisture in real-time using IoT sensors.
- Manually control water pump via Blynk App for efficient watering.
- Prevent overwatering & underwatering to ensure healthy plant growth.
- Enable remote monitoring & user control through NodeMCU + Blynk.
- Promote water conservation and reduce manual effort.

# Existing System

**Existing System**

- Traditional systems use manual or fixed-time irrigation methods.
- Manual watering relies on human effort to assess soil moisture, which can be inconsistent and time-consuming.
- Fixed-time systems water plants at scheduled intervals, ignoring actual soil conditions or weather changes.
- These systems are simple, cost-effective, and easy to implement, requiring no technical expertise.

**Advantages of the Existing System**

- Low cost and easy setup, accessible to most users.
- No need for advanced technology, making it beginner-friendly.

**Drawbacks of the Existing System**

- Water wastage due to watering regardless of real-time soil moisture.
- Risk of overwatering or underwatering, affecting plant health.
- No real-time monitoring or adaptability to environmental changes.
- Not scalable or efficient for managing multiple plants or larger setups.

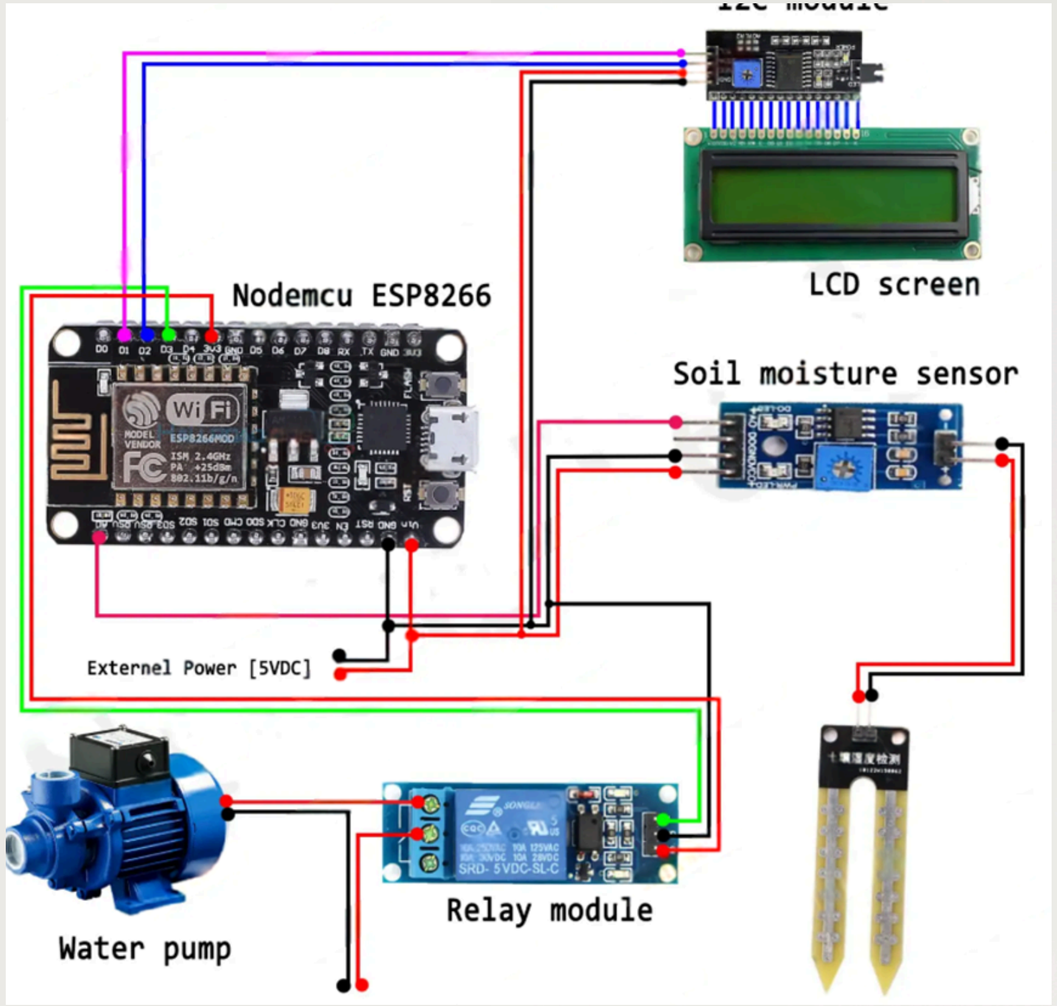
# Proposed System – IoT-Based Self-Watering Solution

The proposed Smart Plant Watering System uses IoT technology and soil moisture sensors to monitor real-time soil moisture levels and adjust watering accordingly. Unlike fixed-time systems, it adapts to the actual needs of the plants, ensuring efficient water use. The system is controlled by a NodeMCU microcontroller, and users can monitor and manage it remotely through a mobile app. This automation eliminates the need for manual intervention, making it more efficient and convenient. The system can be customized to suit different plant needs, ensuring optimal growth while conserving water.

**Advantages of the proposed system**

The proposed system offers better water efficiency by watering only when necessary, reducing waste. It automates the process, eliminating the need for manual intervention,
and provides remote monitoring, making it more convenient for users.

# SYSTEM ARCHITECTURE DIAGRAM



# Future Enhancement

- Upgrade to advanced soil moisture sensors for improved accuracy and durability.
- Integrate additional sensors like temperature and humidity for holistic environmental monitoring.
- Enable multi-plant support to monitor and control multiple plants through the Blynk app.
- Refine control algorithms for more efficient and precise watering decisions.
- Incorporate machine learning to analyze data and suggest intelligent, plant-specific watering schedules.
- Enhance system scalability and user interface for broader application and ease of use.

# References

[1] S. Velmurugan, V. Balaji, T. M. Bharathi, and K. Saravanan. An IoT-Based Smart Irrigation System Using Soil Moisture and Weather Prediction. International Journal of Engineering Research & Technology (IJERT), 2020.

[2] R. Bhattacharya, S. Shrivastava, and A. Ojha. IoT-Based Plant Monitoring System Using NodeMCU. International Journal on Future Revolution in Computer Science & Communication Engineering, 2019.

[3] Design and Implementation of Soil Moisture Monitoring and Irrigation System Based on ARM and IoT. Procedia Computer Science, 2022.

[4] N. E. M. Shawky. IoT-Based Smart Irrigation with Tracking System Using NodeMCU ESP8266. International Journal of Scientific Research in Computer Science and Engineering, 2021.

[5] S. Althaf, S. J. Hussain, and L. S. Dendukuri. Smart Sensors and NodeMCU ESP8266-Based Automated Irrigation System for Effective Water Management in Agriculture. International Journal for Research in Applied Science and Engineering Technology (IJRASET), 2023.

# THANK YOU