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IOT-BASED PLANT WATERING SYSTEM

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ABSTRACT

The IoT-based plant watering system is a smart irrigation solution designed to automate and optimize the watering process for plants using Internet of Things (IoT) technology. Equipped with soil moisture, temperature, and humidity sensors, this system continuously monitors environmental conditions to determine the plants' exact water needs. When the soil moisture level falls below a preset threshold, the system automatically activates a water pump to deliver the required amount of water, ensuring plants receive precise and timely hydration. Users can monitor data in real-time and remotely control the system via a smart phone app or web interface, making it particularly useful for those with busy schedules or managing multiple plants or large areas.

Keywords: ESP 8266, Capacitive Moisture Sensor, Battery, Water Pump, Relay.

I. INTRODUCTION

This project aims to develop an IoT-based plant watering system that automates the watering process using soil moisture sensors. The system will monitor soil moisture levels and activate a water pump when the soil is dry, ensuring optimal water supply for plants. This technology aims to prevent overwatering and underwatering, providing an efficient and sustainable solution for plant care. With real-time data and remote monitoring capabilities, this system enhances plant health and conserves water, making it ideal for both household gardens and agricultural applications.

II. METHODOLOGY

This project integrates various components and technologies to automate plant watering using IoT and soil moisture sensors. Soil Moisture Sensors: These sensors are strategically placed in the soil to measure moisture levels at different points. They continuously monitor the soil's moisture content and send the data to the microcontroller i.e. ESP 8266. Microcontroller (ESP8266): This acts as the brain of the system, processing the data from the sensors. It is programmed to compare the sensor data with predefined moisture thresholds. Water Pump controlled by the microcontroller; this pumps water from a reservoir to the plants through an irrigation system. Microcontroller send data to the cloud and receive commands from a remote user interface. The soil moisture sensors continuously measure the soil's moisture levels.

The sensor data is transmitted to the microcontroller for processing. The microcontroller compares the real-time data with the predefined moisture threshold. If the soil moisture level falls below the threshold, the microcontroller activates the water pump to irrigate the plants. Once the desired moisture level is reached, the microcontroller deactivates the water pump, preventing overwatering. The system operates autonomously but also allows for manual intervention if necessary.

The IoT module sends real-time data to a cloud server, which can be accessed through a user-friendly mobile application. Users can monitor soil moisture levels, water usage, and system status remotely. The mobile app allows users to adjust settings, such as moisture thresholds and watering schedules, providing flexibility and control. Historical data on soil moisture levels and watering patterns are stored in the cloud. This data can be analyzed to optimize watering schedules and improve water efficiency. Machine learning algorithms can predict future watering needs based on historical data and weather forecasts, further enhancing the system's efficiency.

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III. BLOCK DIAGRAM

A block diagram for the IOT-Based Plant Watering System typically includes the following components:

1. Power Supply: Provides power to all components in the system, including the Node Mcu , Moisture Sensor , relay, and water pump .
2. Moisture Sensor: Capacitive Moisture sensor will sense the moisture of the soil gives analog output to the node mcu .
3. ESP8266 (NodeMCU): This microcontroller acts as the "brain" of the system, processing the sensor data and controlling the pump.
4. Relay: A switch that allows the microcontroller to control the pump's power supply.
5. Blynk Server: This cloud-based platform enables remote monitoring and control of the system through a smartphone app.

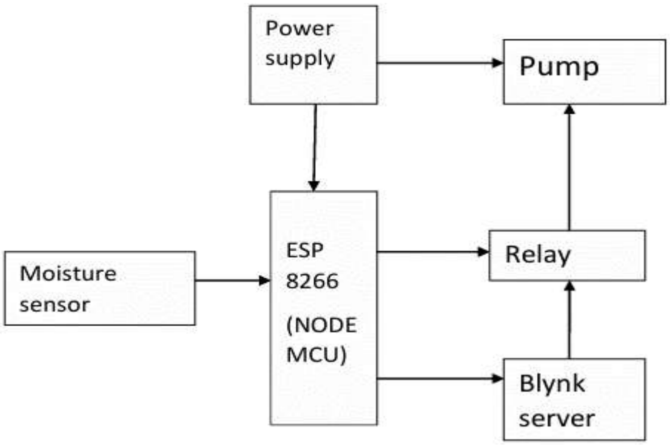

Figure 1: Block diagram

CIRCUIT DIAGRAM

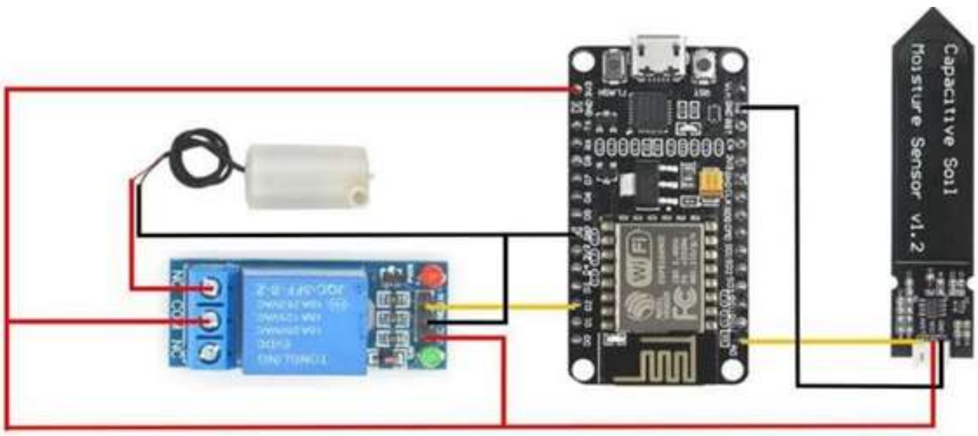

Figure 2: Circuit design

An IoT-based plant watering system is an automated solution that utilizes sensors, actuators, and cloud connectivity to monitor and control the watering of plants. This system aims to optimize water usage, improve plant health, and reduce manual intervention. Core Components:

1. Soil Moisture Sensor: Continuously measures the moisture content of the soil. Transmits real-time data to the microcontroller.
2. Microcontroller (e.g., ESP8266): Receives and processes sensor data. Makes decisions based on pre-defined thresholds.
3. Controls the water pump or valve to deliver water as needed. Communicates with the cloud platform for remote monitoring and control.
4. Water Pump or Valve: Delivers water to the plants based on the microcontroller's instructions. Can be

controlled remotely or automatically.

5. Cloud Platform (e.g., Blynk) Collects and stores sensor data. Provides a user-friendly interface for remote monitoring and control. Sends notifications and alerts based on predefined conditions.
6. Power Supply: Provides power to the system components, which can be battery-powered or connected to a mains

IV. RESULT

The system waters plants based on soil moisture readings, ensuring that the plants only receive water when needed and that the water is not wasted due to over-watering The system will help conserve water, making it ideal for agricultural applications, urban gardening, or home gardens where water resources may be limited or expensive. During dry seasons, the system will detect low moisture levels and ensure consistent watering without wasting water when it’s not needed. By automating watering and reducing water waste, the system can lower utility costs and save the user time by removing the need for manual watering.

Figure 3:

V. FUTURE SCOPE

Predictive Analytics: Utilizing AI to predict future plant needs based on historical data and weather forecasts Adaptive Watering Strategies: Dynamically adjusting watering schedules based on plant growth stages and environmental changes. Automated Disease Detection: Employing computer vision and machine learning techniques to identify early signs of plant diseases. Integrating voice assistants for hands-free control of watering systems. Virtual Reality and Augmented Reality: Immersive experiences for monitoring and managing plant health. Personalized Plant Care Plans: Tailored watering recommendations based on user preferences and plant species. Shared Knowledge and Data: Creating online communities for sharing plant care tips, experiences, and data.

VI. CONCLUSION

IoT-based plant watering systems have emerged as a powerful tool for optimizing plant care and resource management. By leveraging the power of technology, these systems offer a sustainable and efficient solution for both residential and agricultural applications.

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VII. REFERENCE

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