"Smart IoT Based Plant Watering System with Mobile Application Integration"

Submitted By

A. Sai Sudheer (21R01A04B6) **Y. Surya prakash (21R01A04C9)**

Y. Sri Manikanta (21R01A04C1)

Under the Esteemed Guidance of

Dr. K. Praveen Kumar

Associate Professor

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CMR INSTITUTE OF TECHNOLOGY

(UGC AUTONOMOUS)

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www.cmrithyderabad.edu.in

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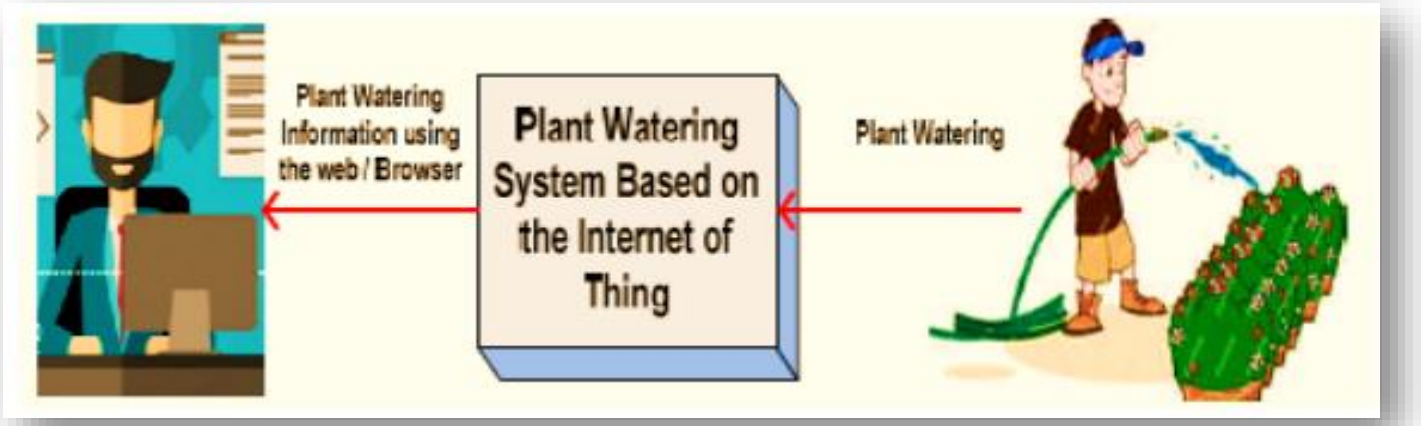
Motivation

This project aims to conserve water, promote plant health, and simplify plant care using IoT technology and automation. By monitoring soil moisture and environmental conditions, it ensures plants are watered only when necessary, preventing overwatering and reducing water wastage. The system integrates with a mobile application, enabling users to monitor and control watering remotely, making it ideal for busy individuals or frequent travelers.

The automation ensures optimal plant health by maintaining the right growing conditions, encouraging the adoption of greenery in urban spaces. This not only enhances air quality but also makes plant care more accessible, even for those with limited time or space.

Objective

The objective of this project is to develop a Smart IoT-Based Plant Watering System integrated with a mobile app to automate plant care, conserve water, and ensure optimal plant health. The system monitors soil moisture and environmental conditions to provide precise watering schedules and allows remote control via the mobile app. This helps reduce water wastage, encourages sustainable practices, and makes plant care more accessible, particularly for busy individuals.

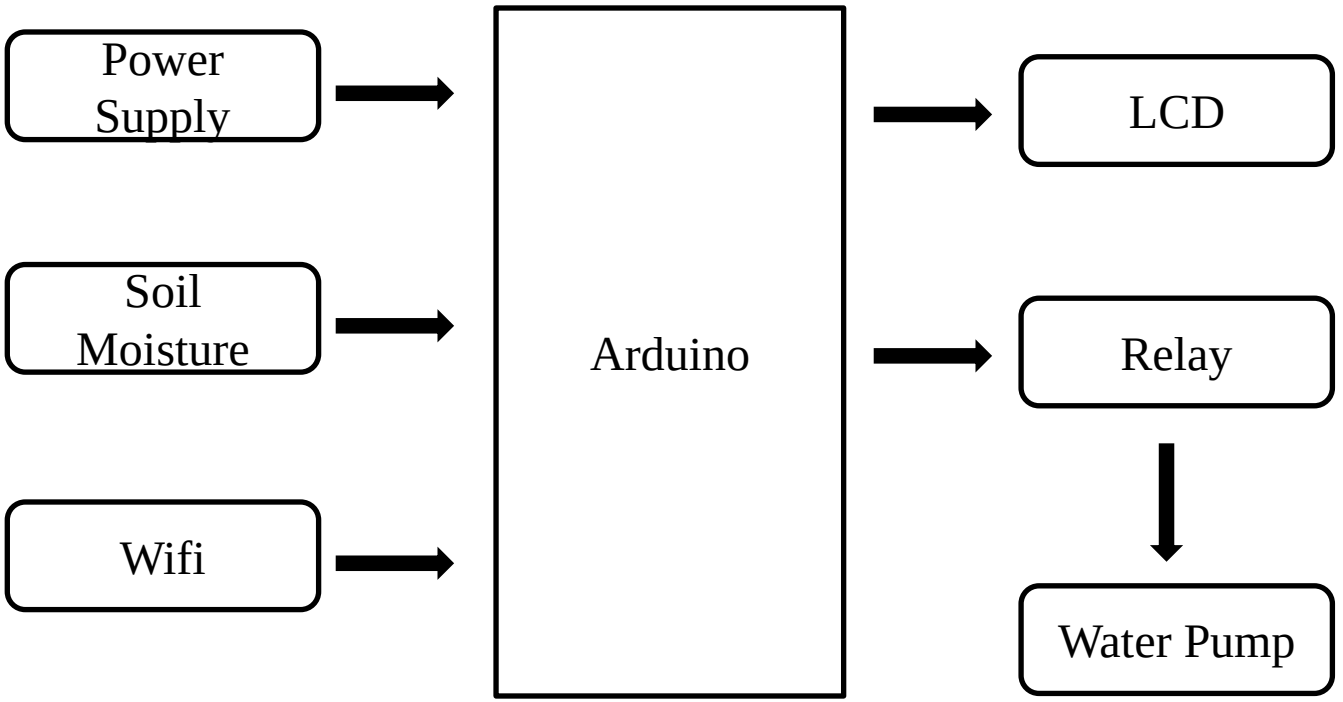


Introduction

The **Smart IoT-Based Plant Watering System with Mobile Application Integration** addresses the need for efficient and automated plant care in modern lifestyles.

- Combines IoT technology, automation, and mobile app control.
- Utilizes **soil moisture, temperature, and humidity sensors** to analyze environmental conditions.
- Automates precise irrigation, reducing water wastage and ensuring optimal plant health.
- The mobile app allows real-time monitoring, customized schedules, manual overrides, and alerts.
- This innovative system promotes sustainable living, saves time, and is adaptable to diverse settings like homes, offices, and agricultural environments.

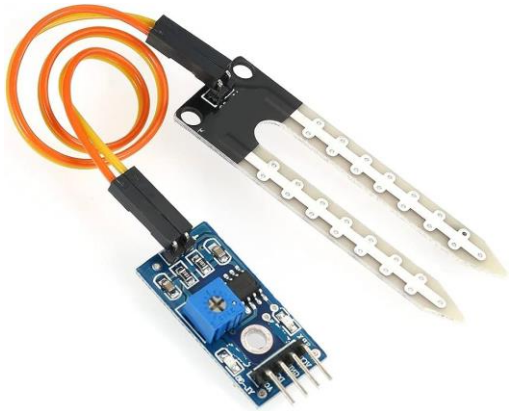
BLOCK DIAGRAM



MOISTURE SENSOR :

- A moisture sensor is a device used to measure the moisture level in various materials, typically soil, but also air and other substances.

- A moisture sensor in an IoT planting and watering system for the elderly measures soil moisture and sends the data to a microcontroller.
- If the soil is too dry, the system activates a watering mechanism.

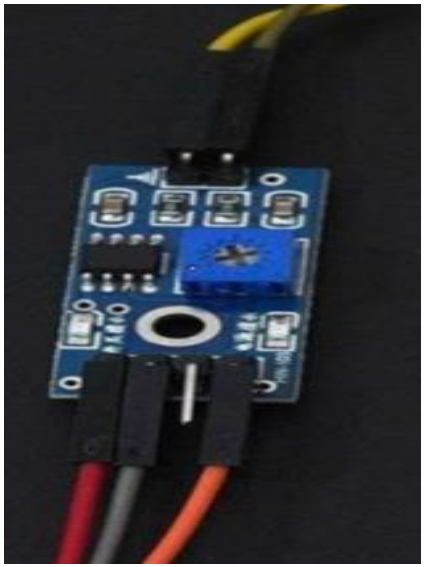


- Users can monitor and control the system through a mobile app, which displays moisture levels, sets thresholds, provides alerts, and allows manual control.

- This automation ensures proper hydration and simplifies plant care for the elderly.

LM393 :

- The LM393 is used as a soil moisture sensor in the Smart IoT-Based Plant Watering System, enabling accurate monitoring of soil water levels.
- It converts the resistance of the soil into a voltage signal, which is then read by the Node MCU microcontroller.
- This data is used to determine when the soil moisture level is low, prompting the system to activate the irrigation system.
- The LM393 provides real-time feedback on soil moisture levels, ensuring plants receive the appropriate amount of water.
- By integrating LM393 with Node MCU, the system can efficiently manage water usage and prevent over or under-watering.



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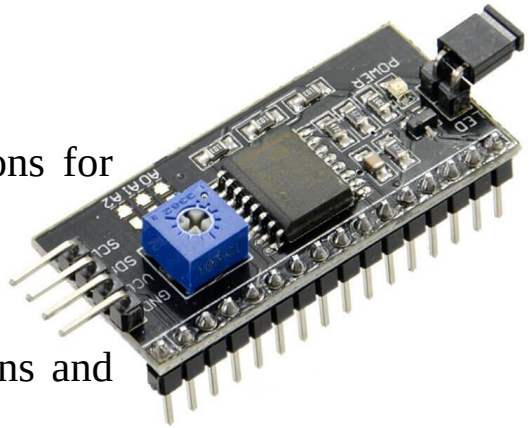
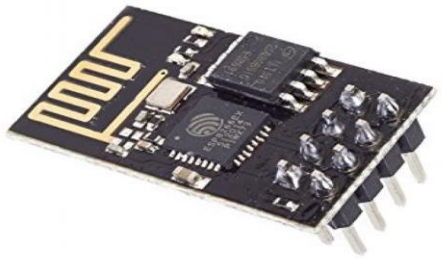


- Expands GPIO pins using I2C communication, enabling connections for multiple sensors and actuators.
- Connects soil moisture sensors and relays to monitor soil conditions and automate water pumps.
- Reduces wiring complexity by using only two I2C pins (SDA, SCL) for communication.
- Supports real-time data collection for mobile app monitoring and control.
- Ensures scalability, allowing the system to manage multiple plants efficiently.

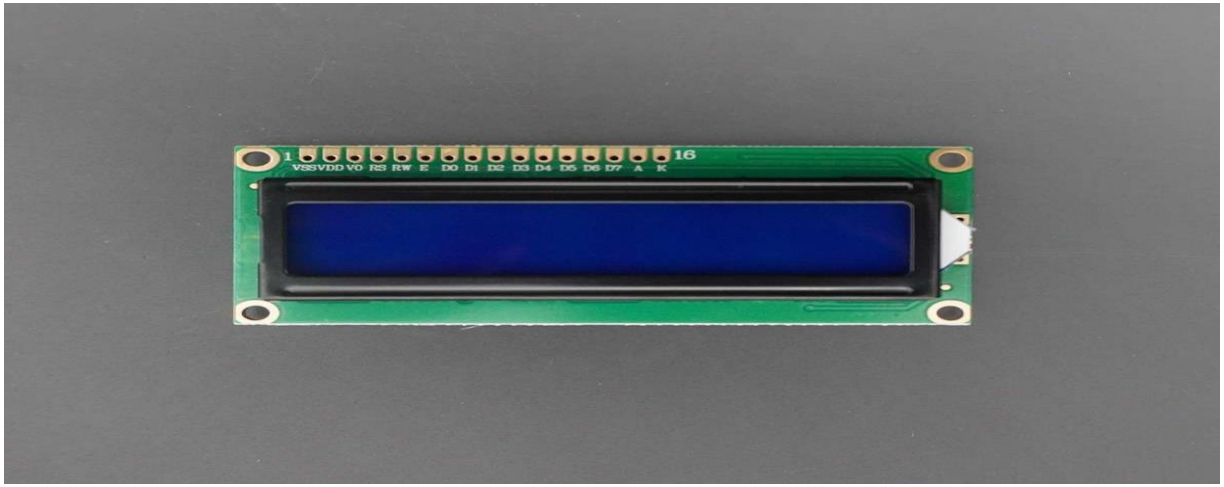
ESP01:

- Provides Wi-Fi connectivity for the IoT-based plant watering system.
- Sends real-time sensor data (e.g., soil moisture, temperature) to the mobile application.
- Allows remote control of the water pump or irrigation system via the mobile app.
- Facilitates communication between the microcontroller and cloud platforms for data storage and analysis.
- Enables alerts and notifications to be sent to the user for monitoring plant conditions.



LCD :

- Displays real-time soil moisture, temperature, and humidity readings.
- Provides a visual interface for monitoring sensor data without needing a mobile app.
- Shows system status, such as watering in progress or alerts.
- Helps in debugging by displaying error messages or connection statuses.
- Enhances user experience by offering immediate on-site feedback.



WATER PUMP:

- A water pump is a mechanical device used to move water from one place to another. In the context of an IoT planting and watering system, a water pump plays a crucial role in automating the irrigation process.
- In an IoT-based planting and watering system for the elderly, a water pump functions as a key component in automating the irrigation process.

- The system uses a moisture sensor to continuously measure soil moisture levels. This data is sent to a central microcontroller or gateway, which processes the information.
- If the soil moisture falls below a predetermined threshold, the microcontroller decides that watering is needed. The elderly user can monitor and control this process through a mobile application, which communicates with the central system.

RELAY:

- In an IoT-based planting and watering system, a relay serves as an electrical switch to control the water pump.
- The relay operates based on a control signal from the mobile application or central microcontroller.
- When the system determines that watering is needed, the control signal energizes the relay coil, creating a magnetic field that closes the switch contacts. This allows power to flow to the water pump, enabling it to operate and water the plants.

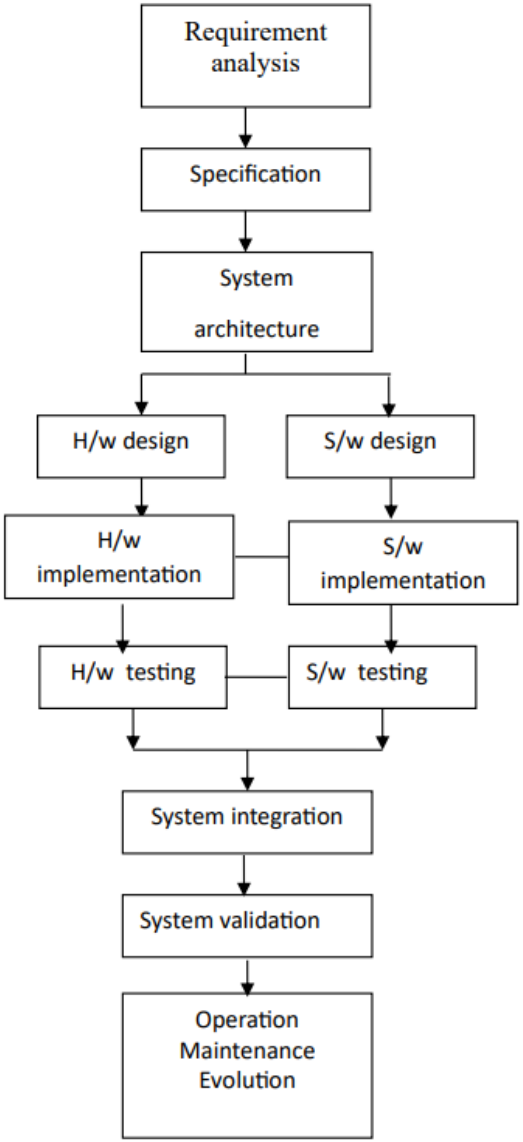
- Once watering is complete or if conditions change, the relay deactivates, opening the switch contacts and cutting off power to the pump.

ARDUINO:

- Arduino is an open-source electronics platform based on easy-to-use hardware and software. It's widely used for building digital devices and interactive objects.
- In an IoT-based planting and watering system for the elderly, an Arduino microcontroller plays a central role in managing the system.
- The Arduino is connected to a moisture sensor embedded in the soil, which continuously measures soil moisture levels. The Arduino processes this data to determine if the soil is dry and needs watering.

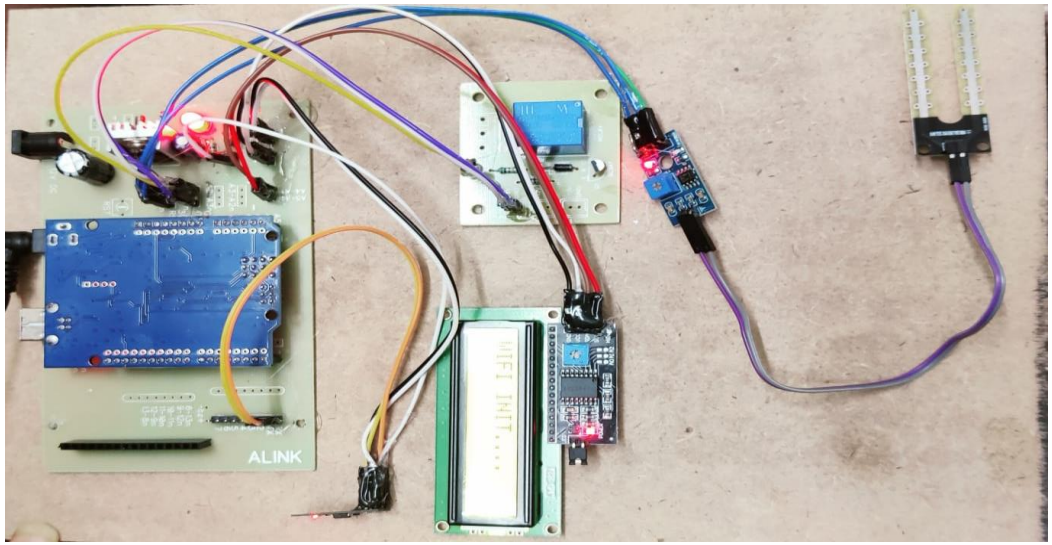
- For remote monitoring and control, the Arduino is equipped with a Wi-Fi or Bluetooth module, allowing it to communicate with a mobile application.

DESIGN FLOW:


Requirement analysis
Specification
System architecture
H/w design
S/w design
H/w implementation
S/w implementation
H/w testing
S/w testing
System integration
System validation
Operation
Maintenance
Evolution

RESULT :

- The system automates watering based on real-time soil moisture data, significantly improving water efficiency and reducing waste.
- It allows users to monitor and control plant care remotely through a mobile app, ensuring timely and effective plant management.
- By collecting data on soil moisture levels, the system helps users make informed decisions, promoting healthier plants and sustainable gardening practices.



ADVANTAGES :

- The system automates watering based on real-time soil moisture data, significantly reducing water waste and ensuring plants receive the appropriate amount of water.
- Users can monitor and control watering schedules remotely through a mobile application, providing convenience and accessibility.
- The system promotes healthier plant growth by maintaining optimal soil moisture levels, reducing the risk of overwatering or underwatering.

APPLICATIONS :

- **Residential Gardening**: Ideal for home gardeners who need an easy and effective way to manage plant care from anywhere.
- **Urban Agriculture**: Suitable for use in greenhouses, indoor farms, and urban gardens where precision watering is critical for sustainable growth.
- **Commercial Agriculture**: Can be used on farms to optimize irrigation schedules, conserve water, and maintain crop health across large areas.
- **Public Spaces:** Useful in parks, green spaces, and public gardens for efficient and effective watering management.

CONCLUSION :

The Smart IoT-Based Plant Watering System with Mobile Application Integration represents a significant advancement in the field of automated gardening. By leveraging real-time soil moisture data and remote-control capabilities through a mobile app, the system enhances water conservation, ensuring that plants receive the optimal amount of water they need for healthy growth. This integration not only makes plant care more convenient and accessible for users but also promotes sustainable gardening practices. By minimizing water waste and providing data-driven insights, it empowers users to make informed decisions about plant health, contributing to greener and more efficient urban spaces.

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Thank You