GNANAMANI COLLEGE OF

TECHNOLOGY(Pachal,Namakkal)

DEPARTMENT OF BIOMEDICAL

ENGINEERING

(Third Year)

TITLE : SMART WATER MANAGEMENT

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SMART WATER MANAGEMENT

PROBLEM:

Inefficient Water Usage In A Garden

DESCRIPTION:

Imagine you have a garden with automated irrigation,but it waters your plants on a fixed schedule,regardless of weather conditions.This leads to water wastage during rainy days or over watering during periods of high humidity.

SOLUTION:

Create a Smart Watering System using IoT and Arduino.

COMPONENTS NEEDED:

1. Arduino Board(e.g.,Arduino Uno)

2. Soil Moisture Sensor

3. Water Pump

4. Relay Module

5. Rainfall Sensor(optional)

6. Wifi Module(e.g.,ESP8266)

7. Smart Phone or Computer for monitoring

STEPS TO IMPLEMENT:

SOIL MOISTURE MONITORING:

Connect the soil moisture sensor to the Arduino.Program the Arduino to read soil moisture levels periodically.Set a moisture threshold to determine when the plants need water.

WATER PUMP CONTROL:

Connect the water pump to a relay module.Program the Arduino to control the relay based on soil moisture readings.When the moisture level falls below the threshold,activate the pump to water the garden.

WEATHER DATA INTEGRATION(OPTIONAL):

Connect a range sensor to the Arduino to detect rainfall.integrate weather data from the internet using the wifi module.If it’s raining or for caste predicts rain,suspend watering to avoid over watering .

REMOTE MONITORING AND CONTROL:

Set up wifi connectively and the Arduino to send data to the cloud .Create a web or mobile app to monitor soil moisture and control the system remotely.Receive alerts or notifications when the system waters the garden or when a issues arise.

BENEFITS:

WATER EFFICIENCY:

The system waters the garden only when neccesary,reducing water wastage.

REMOTE CONTROL:

Monitor and control the system from anywhere,ensuring optimal plant care.

WEATHER INTEGRATION:

Prevent over watering during rainy periods,saving water and money.

THIS SIMPLE PROJECT DEMONSTRATES HOW IOT AND ARDUINO CAN BE USED TO SOLVE A COMMON WATER MANAGEMENT PROBLEM BY MAKING IRRIGATION SMARTER AND EFFICIENT.

**PHASE-2**

1. **\*\*IoT Connectivity:\*\***

- Utilize IoT modules (such as ESP8266 or ESP32) with Arduino to connect the system to the internet.

- Enable bidirectional communication, allowing the system to send data to the cloud and receive commands or updates.

**2. \*\*Soil Moisture Sensing:\*\***

- Implement soil moisture sensors in key locations to measure the moisture content of the soil.

- Use capacitive soil moisture sensors for accurate readings, and calibrate them to specific soil types.

**3. \*\*Data Transmission:\*\***

- Establish a secure connection to an IoT platform (like ThingSpeak, Blynk, or AWS IoT) to transmit real-time data.

- Ensure data encryption for privacy and security.

**4. \*\*Cloud-Based Analytics:\*\***

- Implement cloud-based analytics to process and analyze the collected data.

- Utilize machine learning algorithms to predict future soil moisture levels based on historical data, weather forecasts, and other relevant parameters.

**5. \*\*Mobile Application:\*\***

- Develop a user-friendly mobile app for farmers or users to monitor and control the system remotely.

- Include features such as real-time soil moisture levels, historical data graphs, and the ability to adjust irrigation settings.

**6. \*\*Automated Irrigation Control:\*\***

- Implement an automated irrigation system that adjusts water flow based on real-time sensor data.

- Include features like scheduling, threshold alerts, and emergency shutdown in case of sensor malfunctions or extreme conditions.

**7. \*\*Energy Efficiency:\*\***

- Design the system to be energy-efficient by using low-power components and optimizing the communication protocols.

**8. \*\*Scalability:\*\***

- Ensure that the system is scalable, allowing users to expand the coverage area or add more sensors as needed.

**9. \*\*Weather Integration:\*\***

- Integrate weather APIs to incorporate forecast data into the decision-making process.

- Adjust irrigation schedules based on upcoming weather conditions to avoid unnecessary watering during or after rainfall.

**10. \*\*Community and Data Sharing:\*\***

- Allow for community-based data sharing where users can contribute anonymized data for broader analysis.

- Promote a collaborative approach to water management, especially in regions facing water scarcity.