**Project Title:**

Automatic Plant Watering System

**Group Members:** (BSCS 7TH A)

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**Tech Stack:**

MERN (MongoDB, Express, React, Node.js) + Tinkercad & Arduino

**Project Overview:**

The automatic plant watering system will utilize an Arduino Uno R3, soil moisture sensor, relay, and DC motor for the water pump. Additional components include an LED, resistor, and a power supply to complete the circuit. The system will operate as follows:

- When the soil is dry, the water pump will turn on.

- When the soil is wet, the water pump will turn off.

The system will integrate with a MERN-based web interface:

- Arduino: Sends real-time soil moisture data to the backend.

- Backend (Node.js): Stores sensor data in MongoDB and provides APIs for the frontend.

- Frontend (React): Displays the sensor data and includes controls for the water pump.

**Objectives/Goals:**

1. Automate the plant watering process based on real-time soil moisture levels.

2. Allow users to monitor soil moisture and control the water pump remotely through a web interface.

3. Store and display historical soil moisture data for user analysis.

**Use Cases:**

1. Automatic Watering: The system automatically waters the plants when the soil is dry, reducing manual effort.

2. Remote Monitoring: Users can monitor moisture levels and control the water pump through a web dashboard.

3. Historical Data: Users can view past moisture levels to better understand watering patterns.

4. Remote Control: Users can manually turn the pump on/off from the web interface.

**Requirement Gathering:**

1. Hardware:

- Arduino Uno R3

- Soil moisture sensor

- Relay module

- DC motor for the water pump

- LED and resistor

- Power supply

2. Software:

- Frontend: React for web interface to display sensor data and control the pump.

- Backend: Node.js and Express to manage data flow and control.

- Database: MongoDB for storing moisture sensor data and pump activity logs.

- Arduino IDE: To program the Arduino and communicate with the backend.

3. Features:

- Real-time sensor data collection.

- Automated and manual pump control.

- Data storage for monitoring and analysis.

- Remote access via a user-friendly web interface.