**Project Title:**

Automatic Plant Watering System

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

- Muhammad Ammar Atique (F20-0174)

- Hamid Khan (F20-0152)

**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.

**Objectives/Goals:**

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

2. Allow users to monitor soil moisture.

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

4. Develop a Machine Learning model to analyze historical soil moisture data and predict optimal timings for activating or deactivating the water pump.

**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 remotely.

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

**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.

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

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

3. Features:

- Real-time sensor data collection.

- Automated pump control.

- Data storage for monitoring and analysis.

- Remote access via a user-friendly web interface.