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**Vellore Institute of Technology**  
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**COURSE NAME: WEARABLE COMPUTING**

**COURSE CODE: BCSE315L**

**SLOT: E2+TE2**

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## **PROJECT REPORT**

### **TOPIC: AUTOMATIC PLANT WATERING SYSTEM**

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# AUTOMATIC PLANT WATERING SYSTEM

## INTRODUCTION:

Plants require regular watering, but many people forget or are unable to water them on time. The Automatic Plant Watering System is a smart solution designed to maintain plant health by automating the irrigation process.

This system detects soil moisture levels using a sensor and activates a water pump only when necessary. It is an ideal solution for home gardening, reducing water wastage and ensuring that plants receive the right amount of moisture.

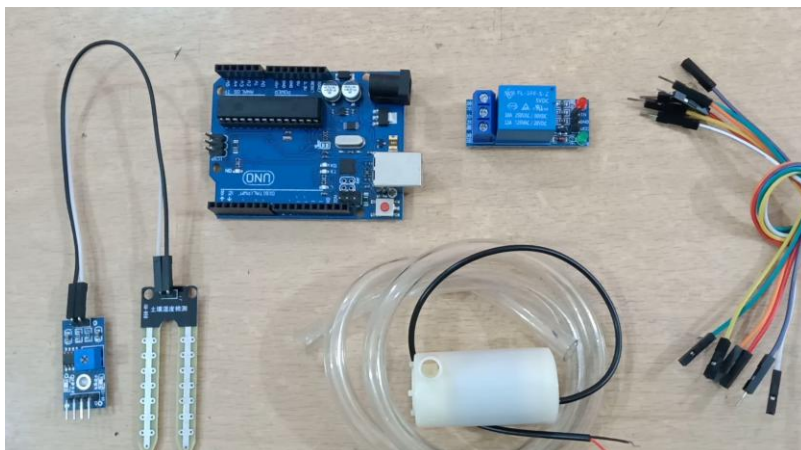
## OBJECTIVE OF THE PROJECT:

The primary objective of this project is to automate the watering of plants using a moisture sensor and Arduino, ensuring that plants receive water only when needed. By eliminating the need for manual watering, the system helps prevent both overwatering and underwatering, which are common issues that can affect plant health. The system is designed to optimize water usage by supplying only the required amount, thereby reducing water consumption and promoting sustainable irrigation practices. Additionally, the project aims to provide a cost-effective and user-friendly solution, making automated irrigation accessible to home gardeners and small-scale agricultural applications.

## COMPONENTS/HARDWARE USED:

- 1.Arduino Uno:** The microcontroller that processes input from the moisture sensor and controls the relay.
- 2.Soil Moisture Sensor:** Detects the moisture level in the soil and sends data to the Arduino.
- 3.5V Relay Module:** Acts as a switch to turn the water pump ON or OFF based on Arduino commands.
- 4.Water Pump & Tube:** Pumps water to the plant when needed.
- 5.Jumper Wires:** Used to connect all the electronic components together.

Each of these components plays a crucial role in making the system function effectively.



## WORKING PRINCIPLES AND METHODOLOGY:

### How the System Works:

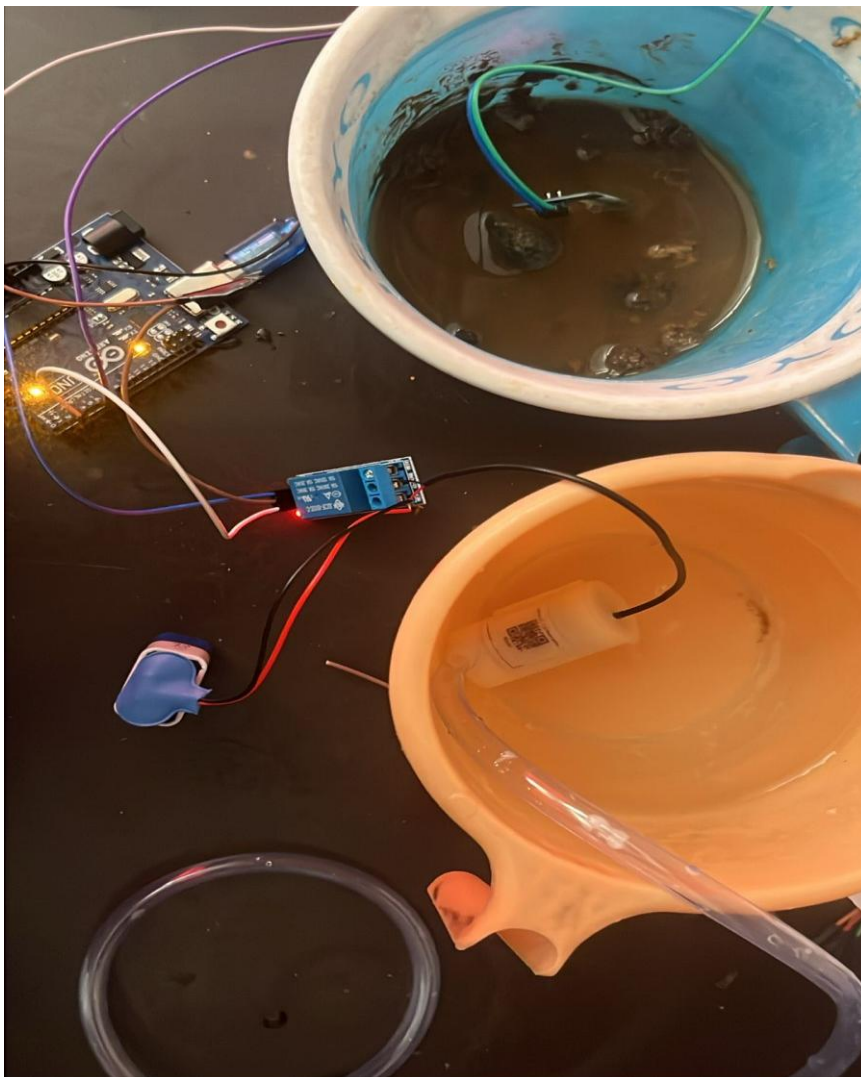
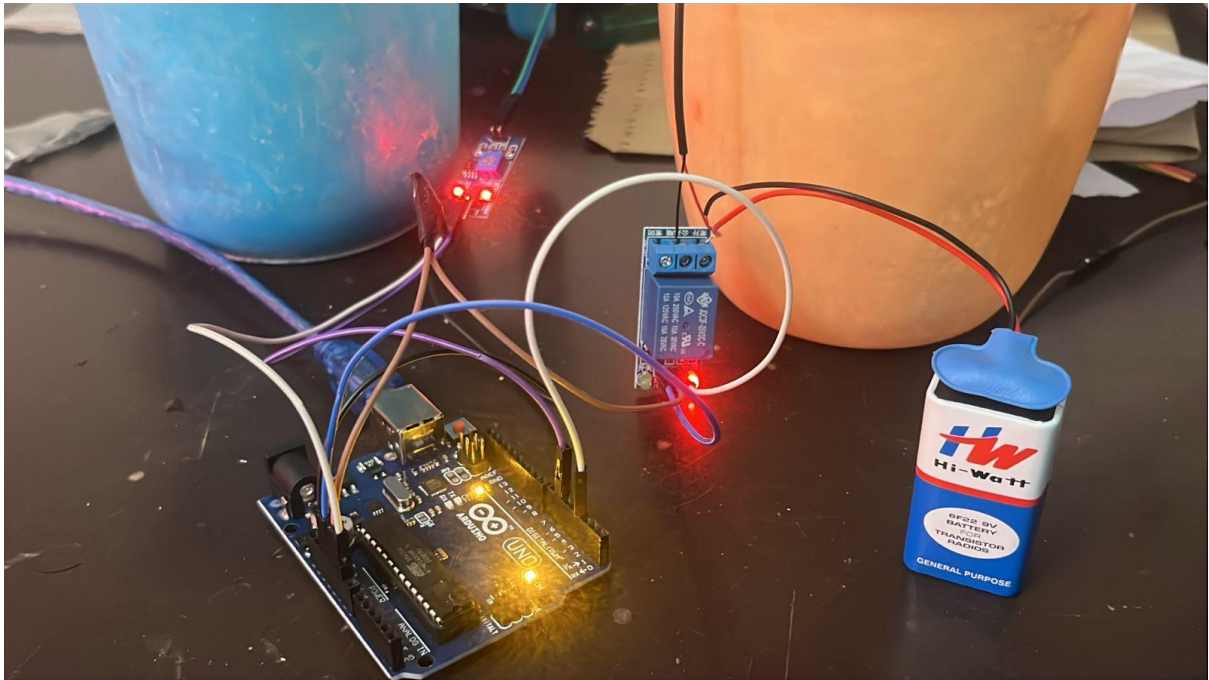
- 1.The soil moisture sensor is placed in the soil to continuously monitor moisture levels.
- 2.If the soil moisture drops below a predefined threshold, the sensor sends a signal to the Arduino Uno.
- 3.The Arduino processes the signal and activates the relay module.
- 4.The relay switches ON the water pump, supplying water to the plant through a tube.
- 5.Once the soil moisture level reaches a sufficient value, the system automatically turns OFF the pump to prevent overwatering.

This process ensures that plants receive just the right amount of water without human intervention.

## ARDUINO CODE:

```
void setup() {  
    pinMode(3, OUTPUT); // Relay output pin  
    pinMode(6, INPUT); // Soil sensor input pin  
}  
  
void loop() {  
    int water = digitalRead(6); // Read soil sensor value  
  
    if (water == LOW) { // Soil is dry -> Turn on the pump  
        digitalWrite(3, HIGH);  
    } else { // Soil is wet -> Turn off the pump  
        digitalWrite(3, LOW);  
    }  
  
    delay(400);  
}
```

## PROJECT SETUP:



## RESULTS AND OBSERVATIONS:

After testing, the system demonstrated its effectiveness in automating the plant watering process. It successfully detected low soil moisture levels and promptly activated the water pump to supply water to the plant. Once the moisture level in the soil reached the required threshold, the system automatically turned off the pump, preventing overwatering and ensuring optimal hydration for plant growth.

The system maintained an efficient watering cycle without requiring any human intervention, making it highly convenient for individuals who may not always be available to tend to their plants. Additionally, by supplying water only when necessary, the system significantly reduced water wastage, making it an environmentally friendly and sustainable solution. The consistent monitoring of soil moisture and automated response helped in maintaining plant health, ensuring that plants received the right amount of water at the right time.

## ADVANTAGES:

1. Fully Automated: No manual watering required.
2. Water Conservation: Reduces unnecessary water usage.
3. Cost-Effective: Uses easily available and affordable components.
4. Scalability: Can be expanded for large gardens or farms.

## LIMITATIONS:

1. The system relies on electrical power—a battery backup may be needed.
2. Sensor calibration may be required based on soil type and plant needs.
3. It is not suitable for all plant types, especially those with specific watering needs.

## CONCLUSION AND FUTURE SCOPE:

The Automatic Plant Watering System is a reliable and efficient solution for maintaining plant health with minimal effort. By automating the irrigation process, it ensures that plants receive water only when necessary, preventing both overwatering and underwatering. This system reduces human intervention, making plant care more convenient, especially for individuals with busy schedules. Additionally, it promotes water conservation by optimizing the amount of water used, making it an eco-friendly solution for home gardening and small-scale agriculture.

The system can be further enhanced by integrating a WiFi module (ESP8266), allowing users to monitor and control the watering process remotely through a smartphone application. Another improvement could be the use of solar panels to power the system, making it energy-efficient and sustainable. Additionally, incorporating multiple soil moisture sensors would enable the system to cater to different plant types with varying water requirements, making it more versatile for larger gardens or farms.

## REFERENCES:

1. Arduino official documentation – [www.arduino.cc](http://www.arduino.cc)

2. Soil Moisture Sensor Working Principle – [www.electronicsforu.com](http://www.electronicsforu.com)
3. IoT-based Smart Irrigation Systems – Research Paper from IEEE Xplore
4. Relay Module and Its Applications – [www.circuitdigest.com](http://www.circuitdigest.com)
5. Microcontroller-Based Automation Projects – [www.researchgate.net](http://www.researchgate.net)
6. Smart Watering Systems for Agriculture – ScienceDirect Journal
7. Working of Water Pumps in Automation – [www.allaboutcircuits.com](http://www.allaboutcircuits.com)

These references cover the working principles of the components used, smart irrigation research, and automation in plant watering systems