



# **PATUAKHALI SCIENCE AND TECHNOLOGY UNIVERSITY**

**COURSE CODE: EEE-212**

**Course Title: Electrical Technology  
Sessional**

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**Project title: Automatic Plant Watering System**

# Automatic Plant Watering System

## Introduction

Plants need regular watering to grow healthy, but over or under-watering can harm them. An automatic plant watering system solves this problem by providing plants with the right amount of water at the right time. This project integrates multiple sensors to monitor the soil moisture, ambient temperature, humidity, and rain conditions, automatically activating a water pump when the soil is dry. The system also features an LCD display to show the real-time sensor readings, providing an easy-to-understand interface for users.

## Objectives

The primary objective of this project is to design and develop an automatic plant watering system that can:

- Automatically water plants when the soil moisture falls below a threshold.
- Monitor environmental conditions such as temperature, humidity, and rain to optimize plant care.
- Display real-time data on an LCD screen for user monitoring.

## Components Used

- **Arduino Uno:** The brain of the system, responsible for reading sensor data and controlling the water pump.
- **Soil Moisture Sensor:** Measures the moisture level in the soil, which determines whether the water pump should be activated.
- **DHT11 Temperature & Humidity Sensor:** Collects environmental temperature and humidity data.
- **Rain Sensor:** Detects whether it's raining to avoid unnecessary watering.
- **16x2 LCD Display (I2C):** Displays sensor data, such as soil moisture, temperature, humidity, and rain detection.
- **Water Pump (with Relay Module):** Activated to water the plant when the soil moisture level is below the defined threshold.

- **Power Supply:** Powers the Arduino and the connected components.
- **Jumper Wires, Breadboard, and Power Supply:** For making the necessary circuit connections.

## Cost of Components

Product	Quantity	Price
Arduino Uno R3	1	720.00ቲ
Mini Breadboard 170 Tie Point	1	40.00ቲ
Rain Sensor Module	1	85.00ቲ
Soil Moisture Sensor	1	75.00ቲ
DHT11 Humidity / Temperature Sensor Module	1	135.00ቲ
Male to Male/ Male to Female / Female to Female Jumper Wire	20	40.00ቲ
LCD 1602 with I2C Module	1	320.00ቲ
5 V Water Pump with Pipe	1	100.00ቲ
5V 1 Channel Relay Module	1	70.00ቲ

Product	Quantity	Price
5 mm PVC 1 sq feet	1	65.00₱
Double Side Foam Tape	1	60.00₱

## Hardware Components and Wiring

- **Soil Moisture Sensor:** The sensor will have three connections: VCC, GND, and Analog Output (A0), which are connected to the Arduino's 5V, GND, and Analog Pin A0 respectively.
- **DHT11 Sensor:** The DHT11 will be connected to Arduino's Digital Pin 2 for data reading, and VCC and GND for power.
- **Rain Sensor:** The Rain Sensor is connected to the Analog Pin A1 of the Arduino to detect rain presence.
- **LCD Display (I2C):** The I2C LCD will have two connections: SDA and SCL, which are connected to Arduino pins A4 and A5.
- **Water Pump (Relay Module):** The relay module will control the pump and is connected to Digital Pin 7 of the Arduino.

## Expected Result

### ☐ Automatic Watering:

- The water pump will activate when the soil moisture level falls below the predefined threshold (dry soil) and deactivate when the soil moisture reaches a sufficient level (wet soil), ensuring efficient watering.

### ☐ Environmental Monitoring:

- The system will display real-time data on soil moisture, temperature, humidity, and rain status using the 16x2 LCD. This will allow users to monitor the plant's environment easily.

☐ **Water Conservation:**

- The system will prevent unnecessary watering during rainfall or when soil moisture is adequate, reducing water wastage.

☐ **User-Friendly Operation:**

- The system will operate autonomously with minimal user intervention, requiring only setup and periodic maintenance.

☐ **System Reliability:**

- The system will function effectively across various environmental conditions, ensuring continuous operation for long-term plant care.

## Future Improvements

- Integration with IoT for remote monitoring.
- Adding multiple soil moisture sensors for monitoring larger areas.
- Implementing a battery-powered version for off-grid use.

## Conclusion

The Automatic Plant Watering System helps maintain the health of plants by automating the watering process based on real-time environmental conditions. By integrating soil moisture, temperature, humidity, and rain sensors, this project not only optimizes water usage but also provides crucial environmental data, making it a highly efficient solution for plant care.