

# SMART IRRIGATION SYSTEM USING SOIL MOISTURE SENSOR

## Aim

The aim of this project is to design and implement a Smart Irrigation System that automatically monitors soil moisture levels and controls a water pump using Arduino. This ensures optimized water usage, reduces manual effort, and prevents over-irrigation or under-irrigation in agriculture.

## Problem Statement

Traditional irrigation methods often result in excessive water usage and require manual supervision. This leads to water wastage, high labor effort, and inefficiency in crop growth. There is a need for an automated irrigation solution that ensures water is supplied only when required.

## Scope

The project provides a cost-effective, automated, and scalable irrigation system. It can be used in agriculture, home gardens, and greenhouse farming. By integrating with IoT modules, the system can be further expanded to allow remote monitoring and control.

## Components Required

1	Arduino Uno/Nano/ESP32
2	Soil Moisture Sensor
3	Relay Module
4	Water Pump
5	Jumper Wires
6	Power Supply

## Working Principle

The soil moisture sensor measures the moisture content of the soil and sends the data to the Arduino. If the soil is dry (below the threshold), the Arduino activates the relay to turn ON the water pump. When the soil becomes sufficiently wet, the pump is turned OFF automatically. This ensures efficient use of water.

## Arduino Code (Preview)

```
int soilMoisturePin = A0; int pumpPin = 7; int threshold = 400; void
setup() { pinMode(pumpPin, OUTPUT); digitalWrite(pumpPin, LOW);
Serial.begin(9600); } void loop() { int moistureValue =
analogRead(soilMoisturePin); if (moistureValue < threshold) {
digitalWrite(pumpPin, HIGH); } else { digitalWrite(pumpPin, LOW); }
delay(2000); }
```

## **Result**

The Smart Irrigation System was successfully implemented. The soil moisture sensor was able to detect the soil condition accurately and control the pump accordingly. The system demonstrated efficient water usage and proved to be reliable for automated farming applications.

## **Conclusion**

This project highlights the importance of automation in agriculture. By using a soil moisture sensor and Arduino, the Smart Irrigation System conserves water, reduces human intervention, and improves crop productivity. The system can be extended with IoT-based cloud monitoring for smart farming applications.