**Automatic Watering System Using Soil Moisture Sensor and Servo Motor**

**Project Overview**

This project involves creating an automatic watering system that uses a soil moisture sensor to detect the moisture level of the soil and a servo motor to control the water sprinkling mechanism. The system automatically sprinkles water when the soil is dry and stops when the soil reaches a sufficient moisture level.

**Components Required**

* Arduino board
* Soil moisture sensor (analog)
* Servo motor
* Connecting wires
* Breadboard
* LED (optional, for indicator)
* Resistor (220 ohms, for LED)
* USB cable for programming

**Circuit Diagram**

1. Connect the VCC pin of the soil moisture sensor to the 5V pin on the Arduino.
2. Connect the GND pin of the soil moisture sensor to the GND pin on the Arduino.
3. Connect the analog output pin (A0) of the soil moisture sensor to the analog pin A0 on the Arduino.
4. Connect the VCC and GND pins of the servo motor to the 5V and GND pins on the Arduino, respectively.
5. Connect the signal pin of the servo motor to the digital pin 7 on the Arduino.
6. (Optional) Connect an LED to digital pin 13 with a 220-ohm resistor in series.

**Code Explanation**

The Arduino code reads the moisture level from the soil moisture sensor and controls the servo motor based on the readings. When the soil moisture level is below a defined threshold, the servo motor is activated to sprinkle water. When the soil moisture level reaches a sufficient level, the servo motor is deactivated.

**Code**

#include <Servo.h>

int soilMoisturePin = A0; // Analog pin for soil moisture sensor

int soilMoistureValue = 0;

Servo servo\_7;

const int moistureLowThreshold = 300; // Adjust these values based on your sensor's range

const int moistureHighThreshold = 600; // Adjust these values based on your sensor's range

void setup() {

Serial.begin(9600);

servo\_7.attach(7, 500, 2500);

pinMode(13, OUTPUT);

}

void loop() {

soilMoistureValue = analogRead(soilMoisturePin); // Read analog value from soil moisture sensor

Serial.println(soilMoistureValue); // Print the moisture value for debugging

if (soilMoistureValue < moistureLowThreshold) {

// If soil is dry, turn on the servo to sprinkle water

servo\_7.write(90); // Adjust the angle based on your setup

digitalWrite(13, HIGH); // Turn on an LED or any indicator (optional)

} else if (soilMoistureValue > moistureHighThreshold) {

// If soil is sufficiently moist, turn off the servo

servo\_7.write(0); // Turn off the servo

digitalWrite(13, LOW); // Turn off an LED or any indicator (optional)

}

delay(1000); // Wait for a second before the next reading

}

**Setup Instructions**

1. Connect the components as per the circuit diagram.
2. Upload the code to the Arduino using the Arduino IDE.
3. Open the Serial Monitor to observe the soil moisture values.
4. Test the system by varying the soil moisture level and observing the servo motor's response.

**Calibration**

* Adjust the moistureLowThreshold and moistureHighThreshold values based on your specific soil moisture sensor's output. You can determine these values by reading the sensor output in completely dry and fully saturated soil conditions.

**Testing and Troubleshooting**

* Ensure all connections are secure and correct as per the circuit diagram.
* Verify that the soil moisture sensor is giving accurate readings by checking the Serial Monitor.
* Adjust the servo motor's angles if it doesn't respond correctly to the moisture levels.

**Conclusion**

This project demonstrates a simple yet effective way to automate the watering of plants using an Arduino, a soil moisture sensor, and a servo motor. By adjusting the threshold values, you can customize the system to different types of soil and plant water requirements.