Soil Moisture Sensor

Government degree college located in a rural area. Here the main income is from agriculture lands. People around here depended on cultivation. So the B.Sc students of this college are interested to make a device which is useful for farmers. Soil moisture is one we selected because watering is more important in agriculture. By testing the moisture in the field farmers can easily make his field as wet.

Soil Moisture Sensor Interfacing with Arduino

A typical soil moisture sensor consists of two parts.

The Probe

The sensor includes a fork-shaped probe with two exposed conductors that is inserted into the soil or wherever the moisture content is to be measured.it acts as a variable resistor, with resistance varying according to soil moisture.

The Module

In addition, the sensor includes an electronic module that connects the probe to the Arduino.
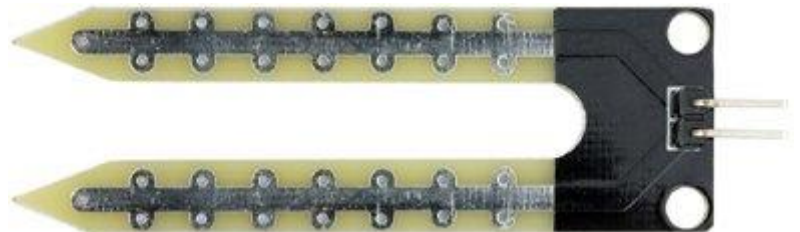
The module generates an output voltage based on the resistance of the probe, which is available at an Analog Output (AO) pin.

The same signal is fed to an LM393 High Precision Comparator, which digitizes it and makes it available at a Digital Output (DO) pin.

The module includes a potentiometer for adjusting the sensitivity of the digital output (DO). it set a threshold, so that when the soil moisture level exceeds the threshold, the module outputs LOW otherwise HIGH.

This setup is very useful for triggering an action when a certain threshold is reached. For example, if the moisture level in the soil exceeds a certain threshold, you can activate a relay to start watering the plant.

The module also includes two LEDs. The Power LED illuminates when the module is turned on, and the Status LED illuminates when the soil moisture level exceeds the threshold value.

Soil Moisture Sensor Pin out

The soil moisture sensor is extremely simple to use and only requires four pins to connect.

AO (Analog Output) generates analog output voltage proportional to the soil moisture level, so a higher level results in a higher voltage and a lower level results in a lower voltage.

DO (Digital Output) indicates whether the soil moisture level is within the limit. D0 becomes LOW when the moisture level exceeds the threshold value (as set by the potentiometer), and HIGH otherwise.

VCC supplies power to the sensor. It is recommended that the sensor be powered from 3.3V to 5V. Please keep in mind that the analog output will vary depending on the voltage supplied to the sensor.

GND is the ground pin.

Soil Moisture Sensor

Soil moisture is basically the content of water present in the soil. This can be measured using a soil moisture sensor which consists of two conducting probes that act as a probe. It can measure the moisture content in the soil based on the change in resistance between the two conducting plates.

The resistance between the two conducting plates varies in an inverse manner with the amount of moisture present in the soil.

For more information about soil moisture sensor and how to use it, refer the topic **Soil Moisture Sensor** in the sensors and modules section.

Connection Diagram of Soil Moisture with Arduino
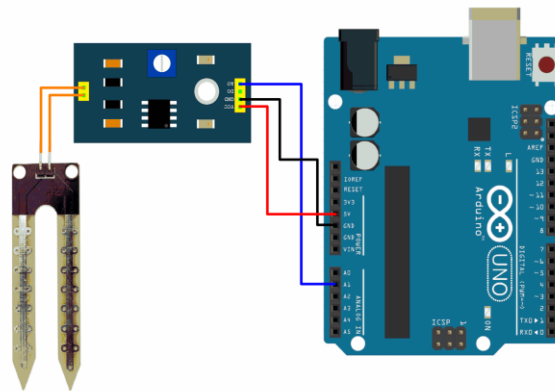
Interfacing Soil Moisture Sensor With Arduino UNO

Measure soil moisture using Arduino Uno

Here, the analog output of soil moisture sensor is processed using ADC. The moisture content in terms of percentage is displayed on the serial monitor.

The output of the soil moisture sensor changes in the range of ADC value from 0 to 1023.

This can be represented as moisture value in terms of percentage using formula given below.

$$AnalogOutput = \frac{ADCValue}{1023}$$

Moisture in percentage = 100 – (Analog output * 100)

For zero moisture, we get maximum value of 10-bit ADC, i.e. 1023. This, in turn, gives 0% moisture.

Soil Moisture Code for Arduino Uno

```cpp
const int sensor_pin = A1;        /* Soil moisture sensor O/P pin */

void setup() {
  Serial.begin(9600);     /* Define baud rate for serial communication */
}

void loop() {
  float moisture_percentage;
  int sensor_analog;
  sensor_analog = analogRead(sensor_pin);
  moisture_percentage = ( 100 - ( (sensor_analog/1023.00) * 100 ) );
  Serial.print("Moisture Percentage = ");
  Serial.print(moisture_percentage);
  Serial.print("%\n\n");
  delay(1000);
}
```

- The more water in the soil, the better the conductivity and the lower the resistance.

- The less water in the soil, the lower the conductivity and thus the higher the resistance.

The sensor produces an output voltage according to the resistance, which by measuring we can determine the soil moisture level.

Conclusion:

We are also planning to extend this project in two aspects.

By checking soil moisture the motor will be automatically on.

 In addition to that a text message will be send to farmer mobile about moisture then he can start the motor through mobile.