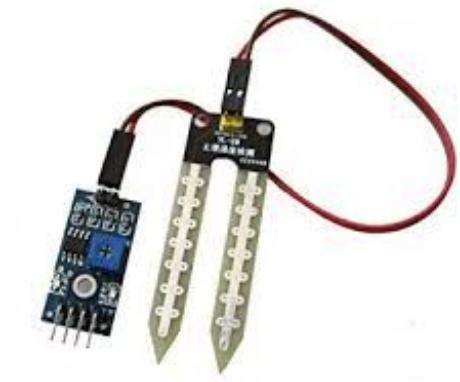
Soil Sensor

(Technical Note)



What is a Soil Sensor?

Soil sensor detects the volumetric water content in soil. It does so by measuring the electrical resistance, dielectric constants, and neutron interaction. Since water is a good conductor, the water molecules when present in soil makes the sensor conductive when exposed to moisture thus decreasing the resistance. This means, the lower the resistance or sensor value output, the greater the water content, and vice versa.

Scientific Fact and Applications

Though there are various principles used in water content measurement like frequency-domain reflectometry, time-domain transmission, time-domain reflectometry, neutron moisture and galvanic cell, soil resistivity is the most commonly used one.

Application

Agriculture

Farmers uses soil moisture sensor for proper conditioning of crops. Since, different crops requires different water cycles and sunlight exposure, farmers can know and then add adequate amount of nutrients and water.

Biofuel Studies

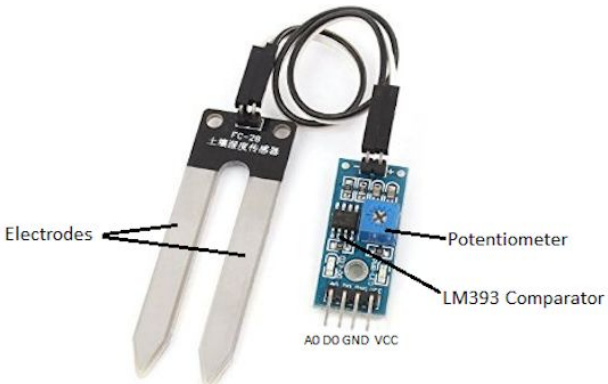
Soil moisture sensors are used to characterize the hydrological requirements of the biomass crops and predict the characterization of the bio fuels.

Drought Forecasting

We can predict various meteorological conditions of an area by knowing the moisture content for a long period of time over a specific area and analyzing the patterns.

Example of an agricultural soil sensor

Soil Sensor Pin Connections



Ref: Maker.pro

Z2M Part Number:
EMS-00019-A

Soil Sensor
(Application Note)

Project

Make a system that can detect and light a red LED if the soil moisture drops below a certain limit otherwise shows green .

Procedure

Soil Moisture Sensor

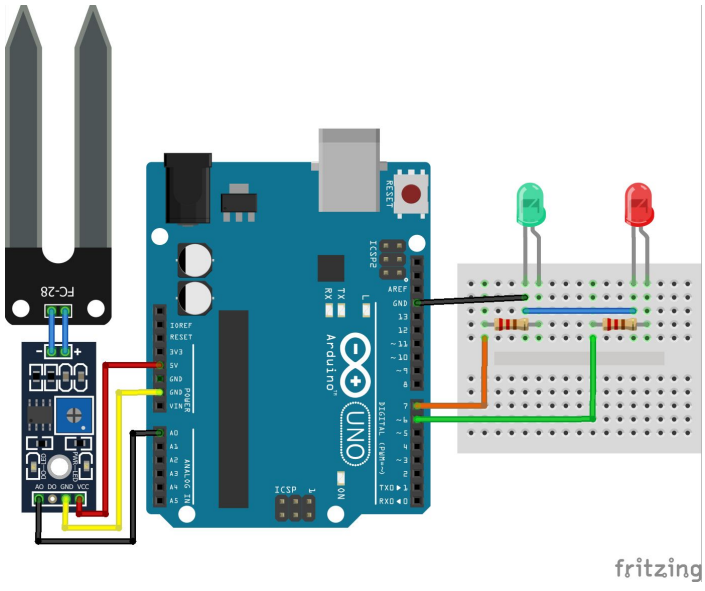
- Connect the **Vcc** pin of the sensor to **5V** of Arduino
- Connect the **GND** pin of sensor to **GND** pin of Arduino
- Connect the **Output** pin of sensor to A0 pin of Arduino

LED

- Connect pin **7** and **6** of Arduino to **anode** of **red** and **green** led via a resistor.
- Connect **cathode** of both led to **GND** of Arduino

Please note that **the sensor gives lower value in a soil of higher moisture content.**

Schematic



Challenge Yourself

1. Design a smart plant monitoring system that turns on a led and a buzzer when it need to water.
2. Advance the above system by connecting it to a water valve that can automatically water whenever required.

Components Required

Component	Part No.	Qty
Arduino UNO	EMX-00001-A	1
Soil Sensor	EMS-00019-A	1
LED	EDD-0002-A/B	2
Resistor - 220Ohm	EDR-00001-220Z	2

Code

```
#define red 6
/*Connect red led to pin6 */
#define green 7
/*Connect green led to pin 7 */
int sensor = A0;
/*Connect sensor to pin A0*/
int threshold=400;
/*Defining limit to light up led*/
void setup() {
      pinMode(red, OUTPUT);
      pinMode(green, OUTPUT);
      pinMode(sensor, INPUT);
      Serial.begin(9600);
}

void loop() {
int value = analogRead(sensor);
/*Reading sensor value*/
Serial.println(value);

if(value>threshold){
      digitalWrite(red, HIGH);
      /*if moisture drops below a limit,
      light up red led*/
      digitalWrite(green, LOW);
      /* turn off green led*/
      delay(1000);
}
else {
      digitalWrite(green, HIGH);
      /*if moisture is above threshold,
      light up green led*/
      digitalWrite(red, LOW);
      /* turn off red led*/
      delay(1000);
}
}
```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