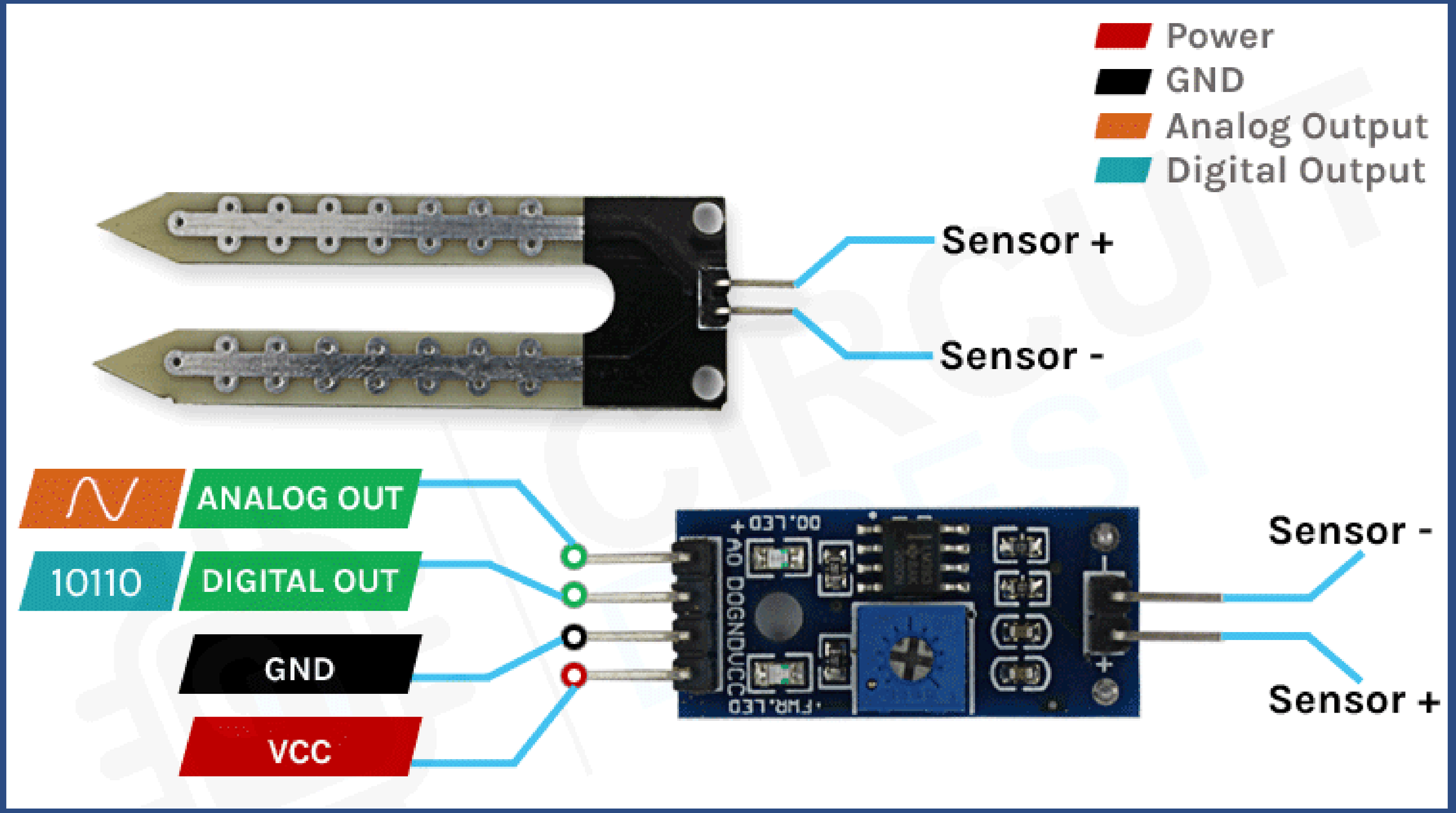
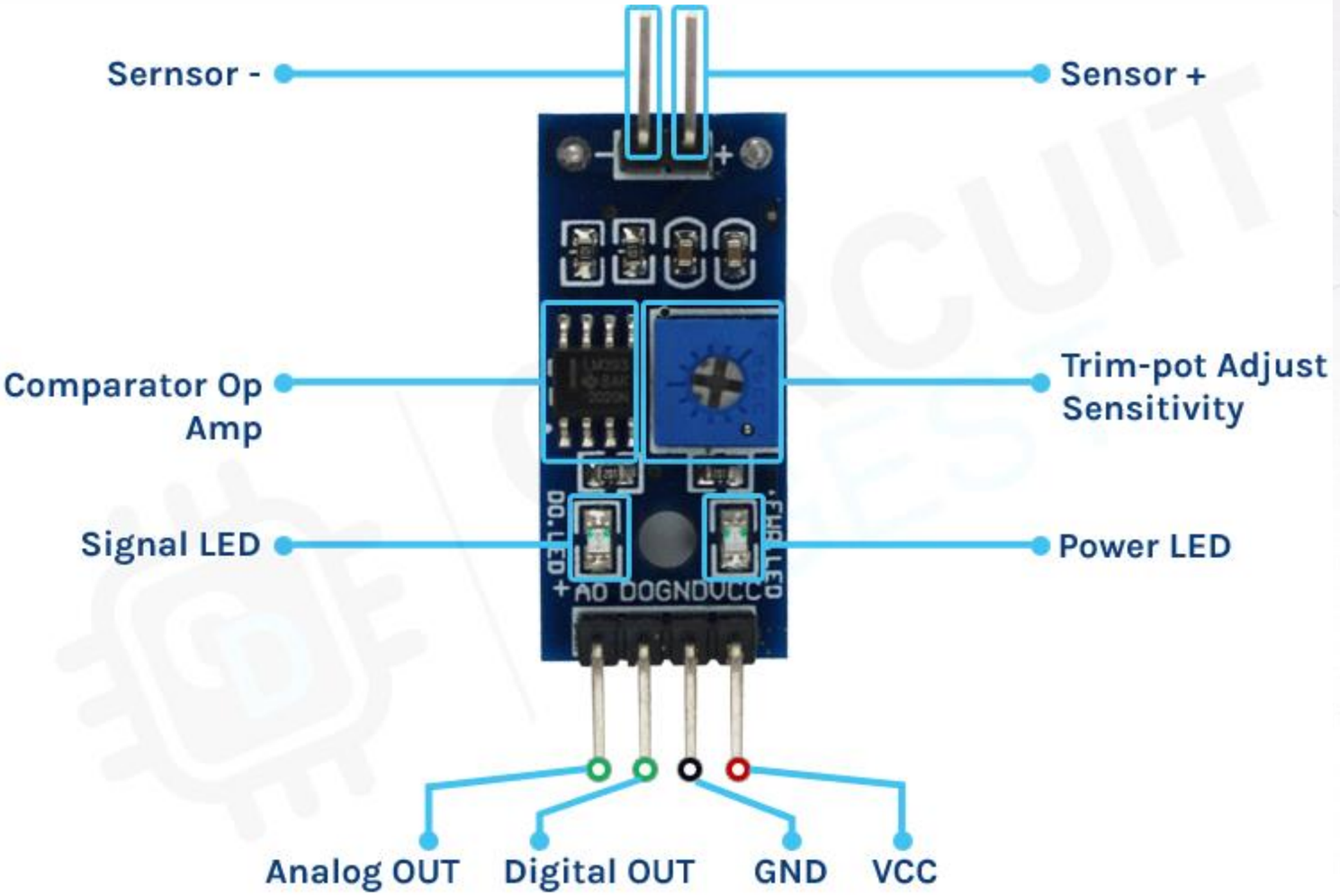
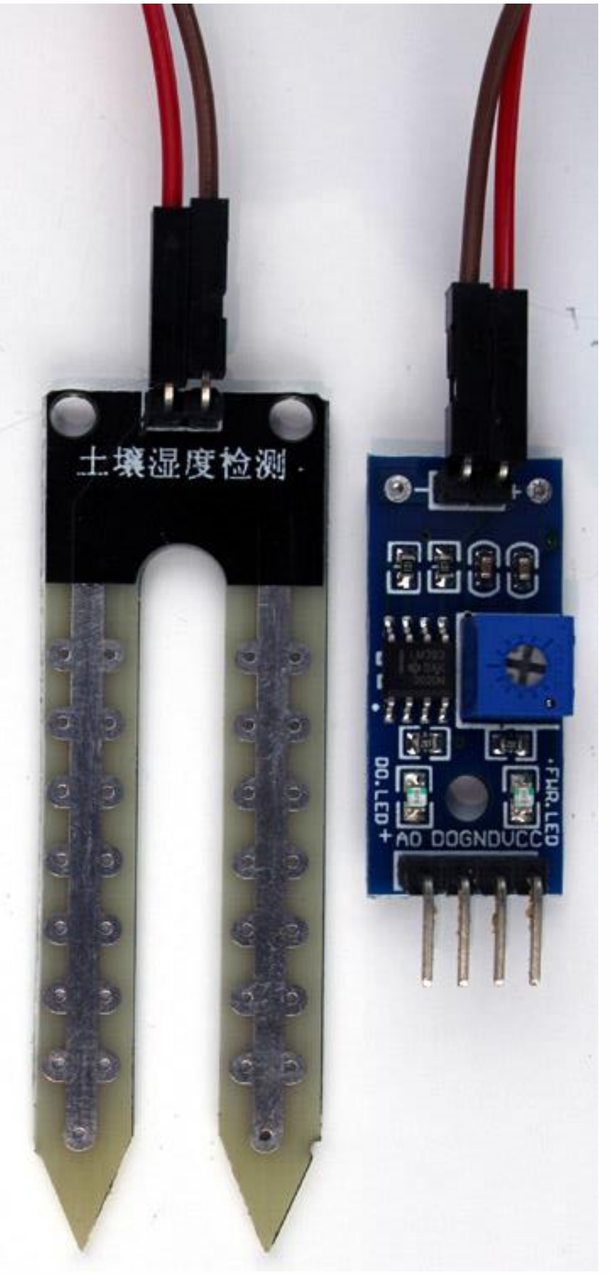
SOIL MOISTURE SENSOR

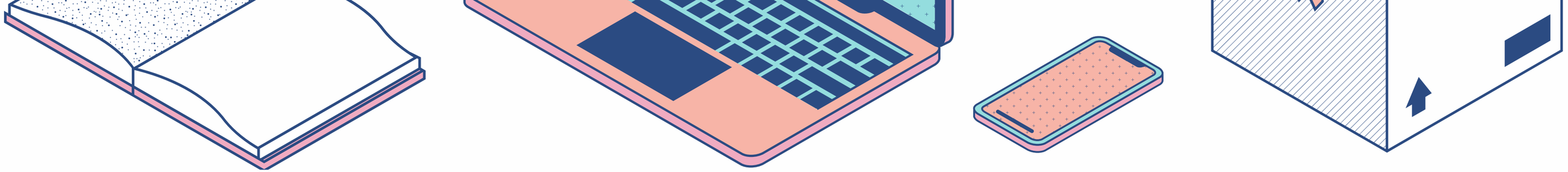
It measures the volumetric concentration of water inside the soil.


Power
GND
Analog Output
Digital Output
Sensor +
Sensor -
ANALOG OUT
10110
DIGITAL OUT
GND
VCC
Sensor -
Sensor +

The entire soil humidity sensor consists of two parts: the first one is the soil moisture sensor probe and the second one is an electronic module. The module processes the incoming data from the probe and that gets processed by a microcontroller like Arduino and we get the final output.


Sernsor -
Sensor +
Comparator Op Amp
Trim-pot Adjust Sensitivity
Signal LED
Power LED
Analog OUT
Digital OUT
GND
VCC


土壤湿度检测



The Soil Moisture Sensor Probe:

- the sensor contains a fork-shaped probe with two big exposed conductive pads. The probe acts like a variable potentiometer, the value of which can be read by a microcontroller like Arduino.

The Soil Moisture Sensor Module:

- The soil moisture sensor module converts incoming analog signals to digital signals and is designed to be used without microcontroller support. The module has two signal input pins for connecting the probe, as well as VCC and GND pins, and digital and analog output pins. It also includes a High Precision Comparator, LM393, to digitize the analog signal from the sensor probe. Additionally, the module has a built-in potentiometer for sensitivity adjustment of the digital output, allowing for the setting of a threshold. When the moisture level exceeds the threshold value, the module outputs LOW; otherwise, it outputs HIGH.

VCC

is the power supply pin of the soil moisture sensor that can be connected to 3.3V or 5V of the supply. But do note that the analog output will vary depending upon the provided supply voltage.

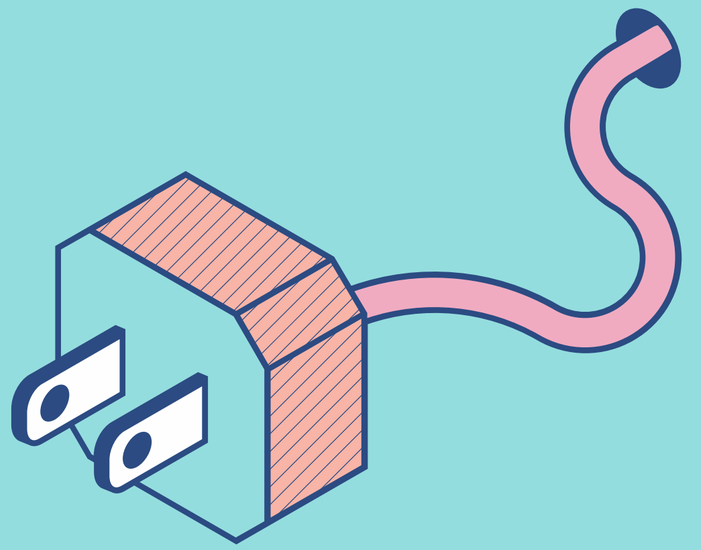
DOUT

is the **Digital output pin** of the board, output low indicates soil moisture is appropriate, and high indicates soil moisture is low.

AOUT

is the **Analog output pin** of the board that will give us an analog signal in between vcc and ground.

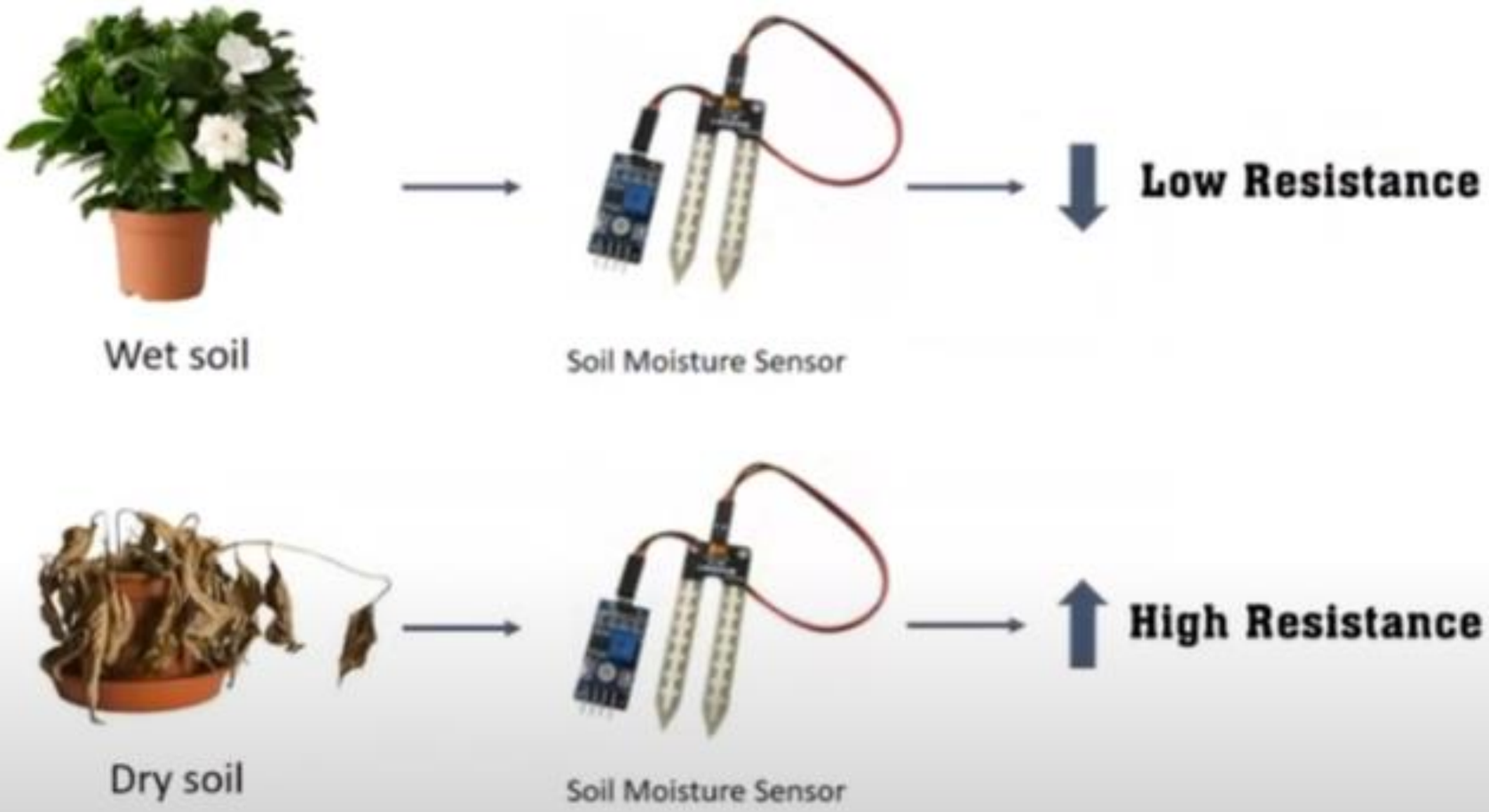
How does a Soil Moisture Sensor Works

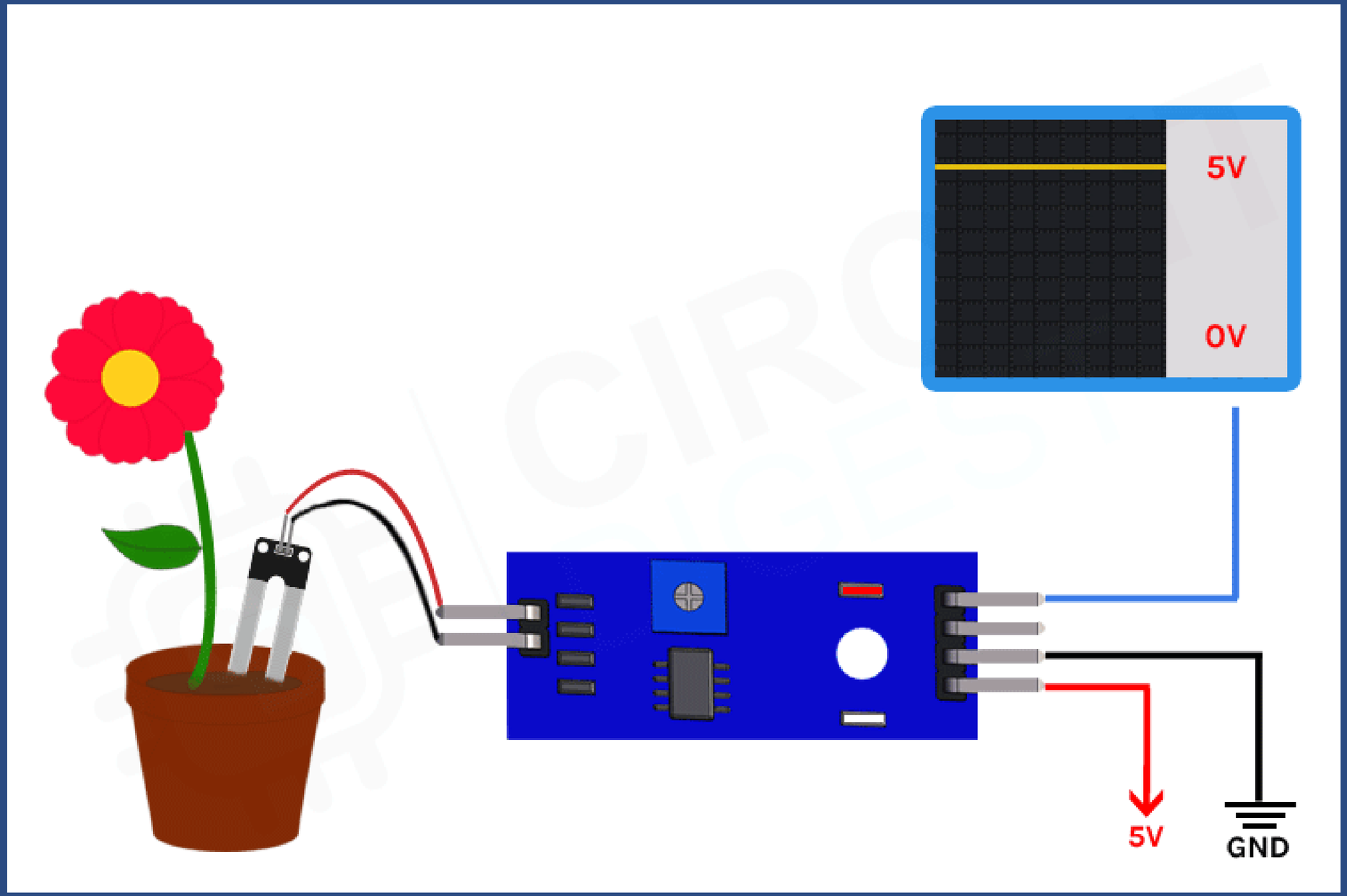


We just need to stick the fork-shaped conductive probe to the soil, as the probe has **two exposed conductive plates that will act as a variable resistor** whose resistance will vary depending on the water content in the soil.

This resistance of the probe is inversely proportional to the soil moisture of the device. The more water in the soil the better the conductivity which will result in lower resistance. The less the water in the soil the poor the conductivity which means higher resistance.

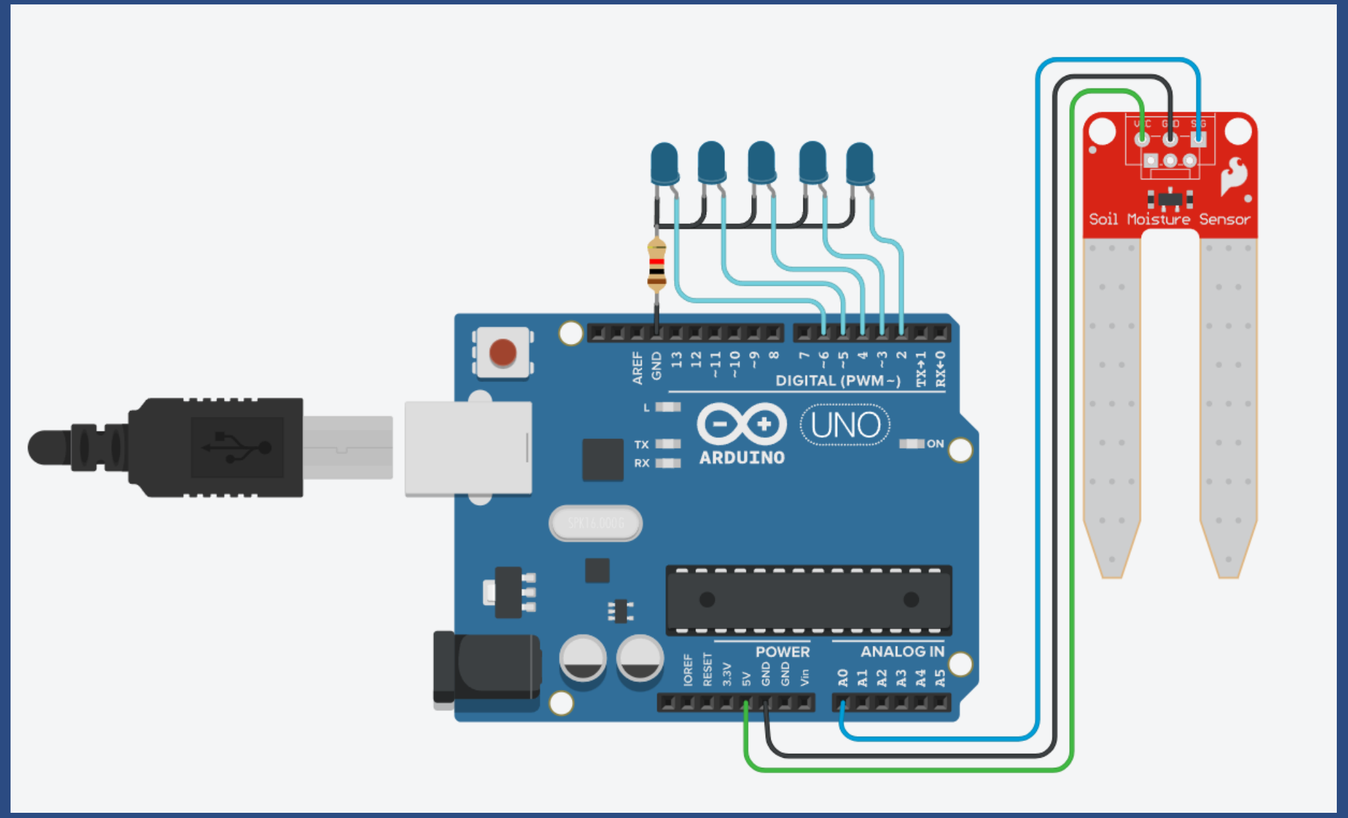
This arduino moisture sensor produces an output voltage according to the resistance by measuring which we can determine the moisture level.


Wet soil
Soil Moisture Sensor
Low Resistance
Dry soil
Soil Moisture Sensor
High Resistance


5V
0V
5V
GND

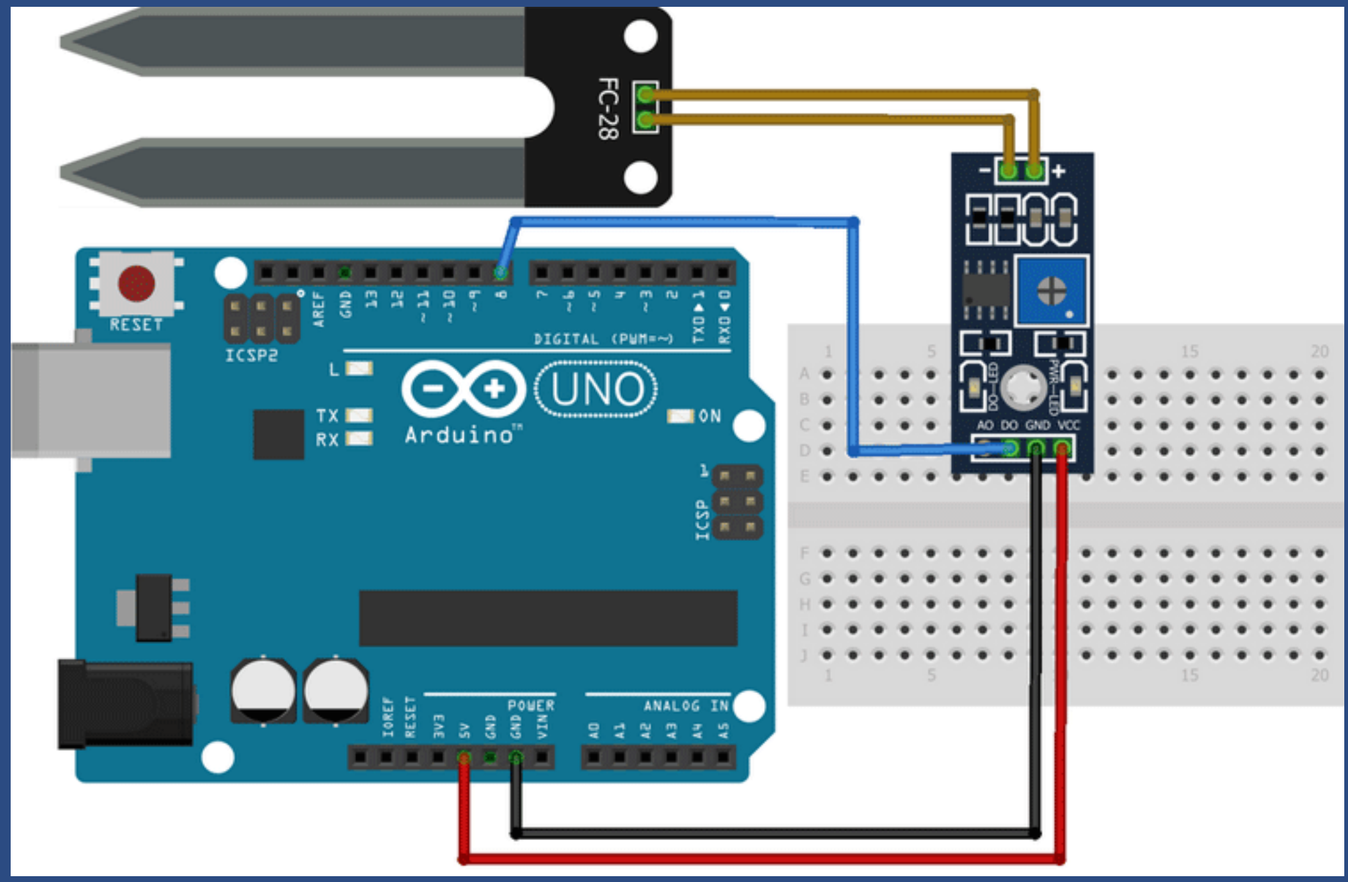
Soil Moisture Sensor :

You can check the Thinkercad simulation for Arduino Soil moisture sensor.



```
// Arduino Soil moisture sensor will show the humidity
// level using the 5 LEDs connected to Arduino.
#define ledPin1 2
#define ledPin2 3
#define ledPin3 4
#define ledPin4 5
#define ledPin5 6
#define sensorPin A0

void setup()
{
  pinMode(sensorPin, INPUT);
  Serial.begin(9600);
  pinMode(ledPin1, OUTPUT);
  pinMode(ledPin2, OUTPUT);
  pinMode(ledPin3, OUTPUT);
  pinMode(ledPin4, OUTPUT);
  pinMode(ledPin5, OUTPUT);
}

void loop()
{
  int sensorValue = analogRead(sensorPin);
  digitalWrite(ledPin1, LOW);
  digitalWrite(ledPin2, LOW);
  digitalWrite(ledPin3, LOW);
  digitalWrite(ledPin4, LOW);
  digitalWrite(ledPin5, LOW);
  if (sensorValue < 200) {
    digitalWrite(ledPin5, HIGH);
  } else {
    if (sensorValue < 400) {
      digitalWrite(ledPin5, HIGH);
      digitalWrite(ledPin4, HIGH);
    } else {
      if (sensorValue < 600) {
        digitalWrite(ledPin5, HIGH);
        digitalWrite(ledPin4, HIGH);
        digitalWrite(ledPin3, HIGH);
      } else {
        if (sensorValue < 800) {
          digitalWrite(ledPin5, HIGH);
          digitalWrite(ledPin4, HIGH);
          digitalWrite(ledPin3, HIGH);
          digitalWrite(ledPin2, HIGH);
        } else {
          digitalWrite(ledPin5, HIGH);
          digitalWrite(ledPin4, HIGH);
          digitalWrite(ledPin3, HIGH);
          digitalWrite(ledPin2, HIGH);
          digitalWrite(ledPin1, HIGH);
        }
      }
    }
  }
  delay(100);
}
```

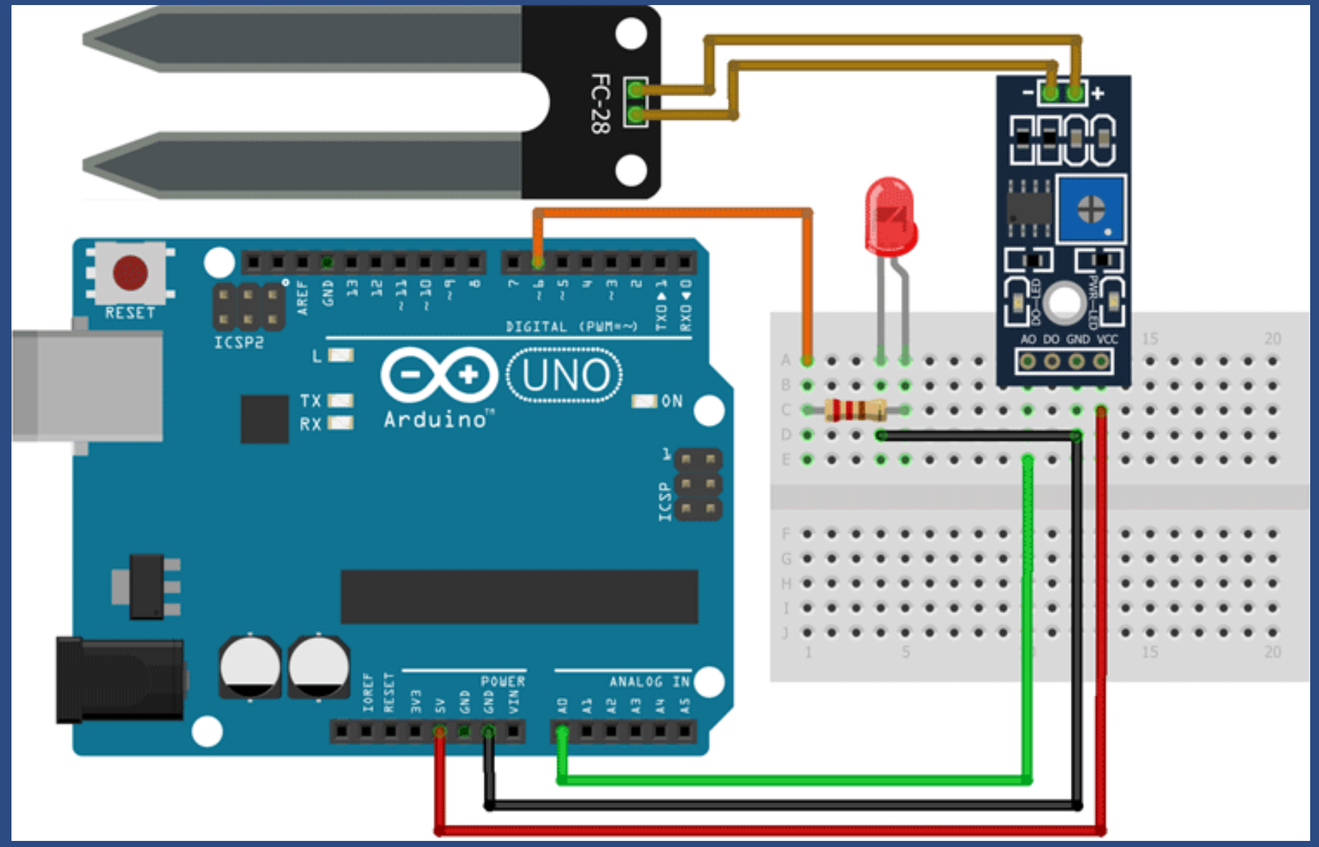
Soil Moisture Sensor - Digital Output:



```
#define sensor_pin 8
void setup() {
    Serial.begin(9600);

}

void loop() {
    int sensorValue = digitalRead(sensor_pin);  // Read the digital value from sensor
    if (sensorValue == 1){
        Serial.print("WET!");
    }
    else {
      Serial.print("DRY!");
      }

      delay(200);
}
```

Soil Moisture Sensor - Analog Output:

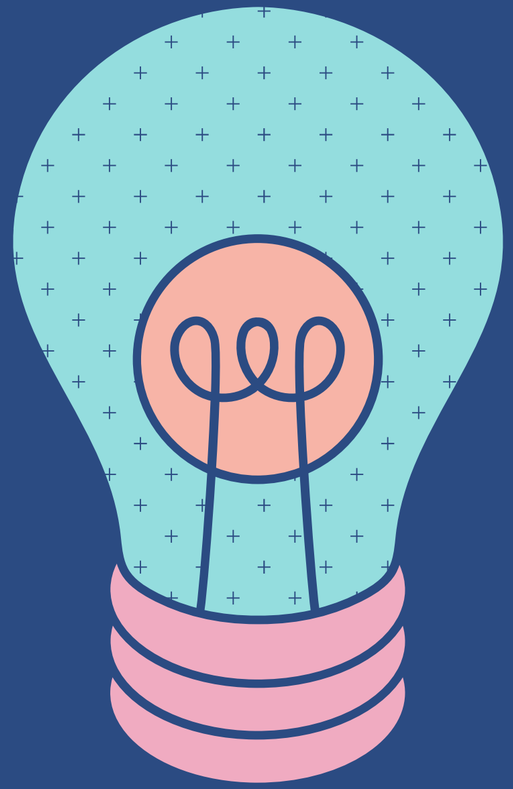
As shown in the above arduino soil moisture sensor circuit diagram we have connected an LED to digital PIN 6 of the Arduino and the analog out pin of the sensor is connected to the A0 pin of the Arduino UNO board, finally, the ground is common between the LED and the sensor. We will program the Arduino so that the brightness of the LED will change depending on the soil moisture data sensed by the probe.



```
// Sensor pins pin D6 LED output, pin A0 analog Input
#define ledPin 6
#define sensorPin A0
void setup() {
  Serial.begin(9600);
  pinMode(ledPin, OUTPUT);
  digitalWrite(ledPin, LOW);
}
void loop() {
  Serial.print("Analog output: ");
  Serial.println(readSensor());
  delay(500);
}
int readSensor() {
  int sensorValue = analogRead(sensorPin);  // Read the analog value from sensor
  int outputValue = map(sensorValue, 0, 1023, 255, 0); // map the 10-bit data to 8-bit data
  analogWrite(ledPin, outputValue); // generate PWM signal
  return outputValue;               // Return analog moisture value
}
```

“We need technology in every classroom and in every student and teacher’s hand, because it is the pen and paper of our time, and it is the lens through which we experience much of our world."

DAVID WARLICK



Thanks <3

Do you have any questions?