

IoT weather reporting system

Testing

Component Testing:

Temperature and Humidity Sensor (DHT11):

First, we need to download and install the DHT-sensor-library. ([Link](#))

Next, connect the sensor to the UNO board

VCC TO 5VOLT

GROUND TO GROUND (GND)

DATA TO PIN 2

Connect your UNO board to USB, make sure you have the correct board and port selected in the IDE.

Upload the following sketch :

<https://github.com/adafruit/DHT-sensor-library/blob/master/examples/DHTtester/DHTtester.ino>

Set the type to DHT 11 before uploading

Once successfully uploaded, open the serial monitor.

Make sure your baud rate is set to 9600.

You will see the following:

DHTXX TEST!

HUMIDITY: 35.00 % TEMPERATURE: 18.00 *C

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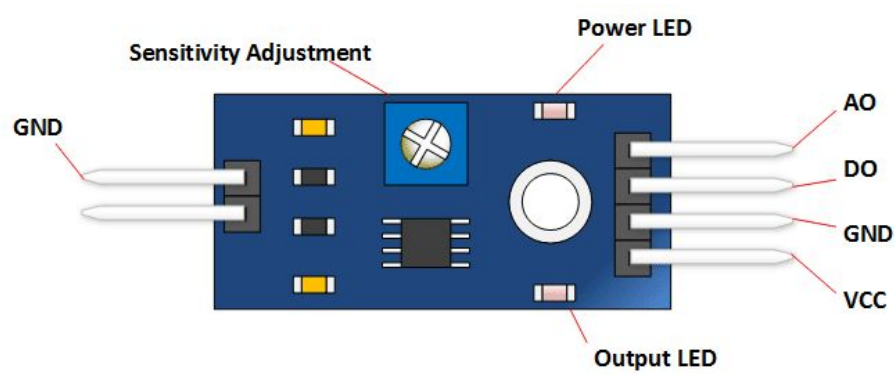
HUMIDITY: 35.00 % TEMPERATURE: 18.00 *C

Rain Level Sensor:

This module allows you to measure moisture via analog output pins and it provides a digital output when a threshold of moisture is exceeded. The module is based on the LM393 op amp. It includes the electronics module and a printed circuit board that “collects” the rain drops. As raindrops are collected on the circuit board, they create paths of parallel resistance that are measured via the op amp. The lower the resistance (or the more water), the lower the voltage output. Conversely, the less water, the greater the output voltage on the analog pin. A completely dry board for example will cause the module to output five volts.

Rain Sensor Module Pin Outs

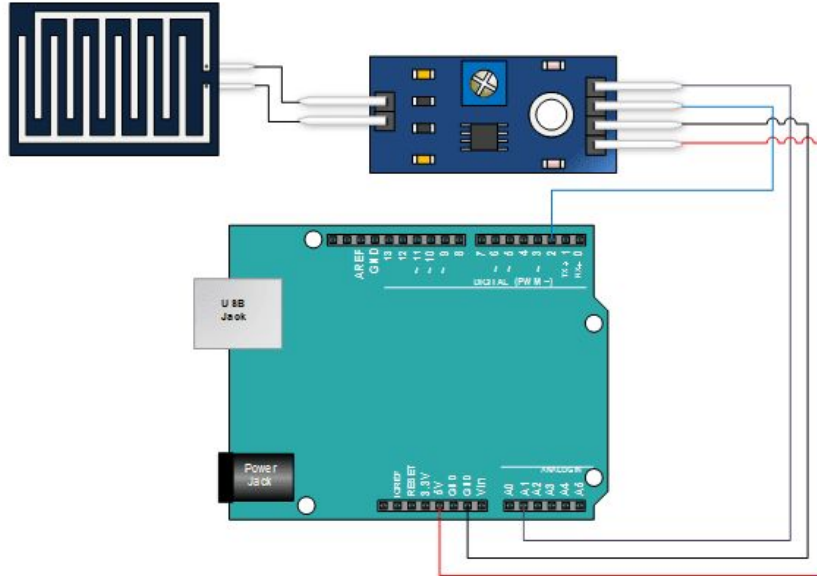
Please refer to the drawing below and the following table for the location and description of various pins, controls and indicators.



Pin, Control, or Indicator	Description
VCC	+5 Volts Power Source
GND	Ground or negative power source
DO	Digital Output. Goes low when moisture exceeds the set threshold.
AO	Analog Output - Zero to five volts. The lower the voltage, the greater the moisture.
Power LED	Indicates that power is applied
Output LED	Illuminates when moisture has exceeded threshold set by sensitivity adjustment.
Sensitivity Adjustment	Clockwise is more sensitive. Counterclockwise is less sensitive.

Connecting the Module to the Arduino

Connecting the module up is pretty straight forward. See the picture below.



Rain Sensor Module Arduino Sketch

The sketch below does a couple of things:

1. It monitors the digital output from the module and makes the decision that it is raining if the digital output goes low.
2. It measures the analog output and provides a moisture level, where 1023 is high and where 0 is very wet.

```
int nRainIn = A1;
int nRainDigitalIn = 2;
int nRainVal;
boolean bIsRaining = false;
String strRaining;
void setup() {
  Serial.begin(9600);
  pinMode(2, INPUT);
}
void loop() {
  nRainVal = analogRead(nRainIn);
  bIsRaining = !(digitalRead(nRainDigitalIn));
  if(bIsRaining){
    strRaining = "YES";
  }
  else{
    strRaining = "NO";
  }
}
```

```
Serial.print("Raining?: ");  
Serial.print(strRaining);  
Serial.print("\t Moisture Level: ");  
Serial.println(nRainVal);  
delay(200);}
```

Running the Sketch

The sketch will begin immediately uploading. Open your serial monitor and view the results. Put a little water (a sponge works good) onto the sensor and see the moisture level decrease.

If you get the board wet enough, the serial monitor should indicate that it's raining. If not, try turning the sensitivity adjustment clockwise.

Soil Moisture Sensor:

Working of Sensor

The soil moisture sensor consists of two probes which are used to measure the volumetric content of water. The two probes allow the current to pass through the soil and then it gets the resistance value to measure the moisture value.

When there is more water, the soil will conduct more electricity which means that there will be less resistance. Therefore, the moisture level will be higher. Dry soil conducts electricity poorly, so when there will be less water, then the soil will conduct less electricity which means that there will be more resistance. Therefore, the moisture level will be lower.

This sensor can be connected in two modes; Analog mode and digital mode. First, we will connect it in Analog mode and then we will use it in Digital mode.

Specifications

The specifications of the soil moisture sensor FC-28 are as follows

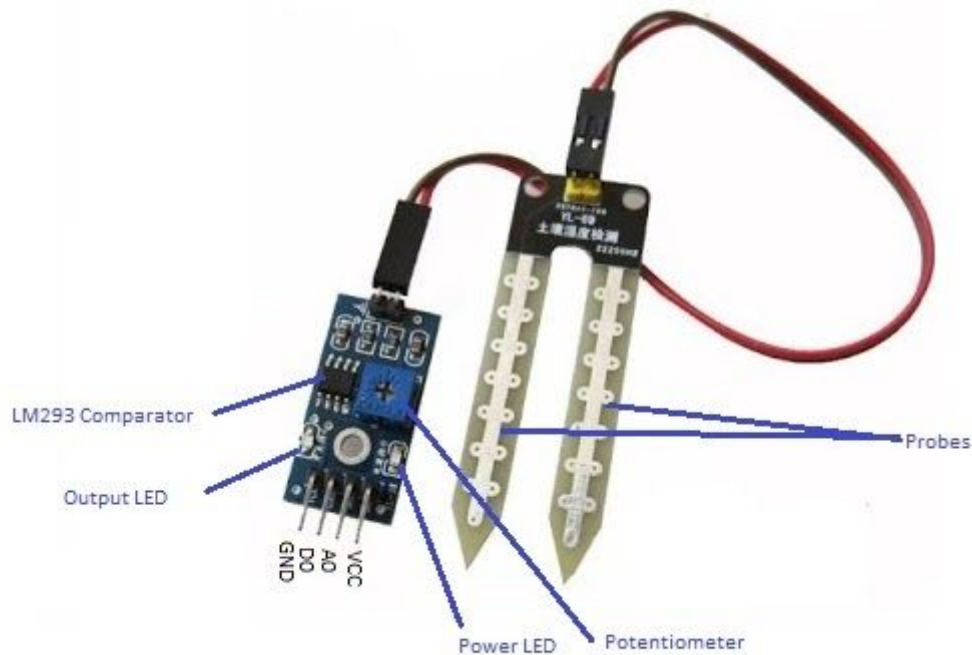
Input Voltage	3.3 – 5V
Output Voltage	0 – 4.2V
Input Current	35mA
Output Signal	Both Analog and Digital

Pin Out – Soil Moisture Sensor

The soil Moisture sensor FC-28 has four pins

- VCC: For power
- A0: Analog output
- D0: Digital output
- GND: Ground

The Module also contains a potentiometer which will set the threshold value and then this threshold value will be compared by the LM393 comparator. The output LED will light up and down according to this threshold value.



Pin Out – Diagram

Analog Mode – Interfacing Soil Moisture Sensor and Arduino

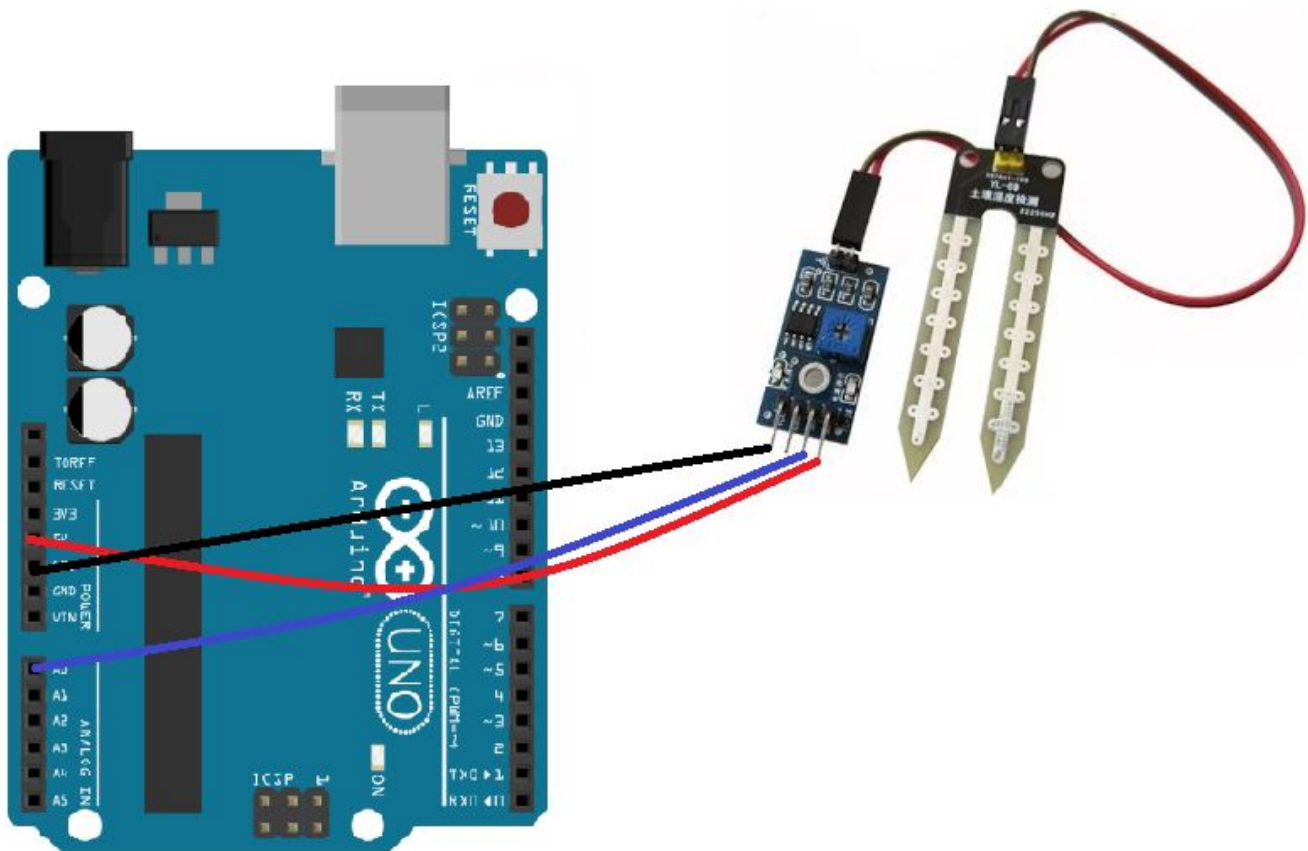
To connect the sensor in the analog mode, we will need to use the analog output of the sensor. When taking the analog output from the soil moisture sensor FC-28, the sensor gives us the value from 0-1023. The moisture is measured in percentage, so we will map these values from 0 -100 and then we will show these values on the serial monitor.

You can further set different ranges of the moisture values and turn on or off the water pump according to it.

Circuit Diagram

The connections for connecting the soil moisture sensor FC-28 to the Arduino are as follows.

- VCC of FC-28 to 5V of Arduino
- GND of FC-28 to GND of Arduino
- A0 of FC-28 to A0 of Arduino



Circuit Diagram – Analog Mode

Analog Code

```
int sensor_pin = A0;
```

```
int output_value ;
```

```
void setup() {
```

```
  Serial.begin(9600);
```

```
  Serial.println("Reading From the Sensor ...");
```

```
delay(2000);
```

```
}
```

```
void loop() {
```

```
    output_value= analogRead(sensor_pin);
```

```
    output_value = map(output_value,550,0,0,100);
```

```
    Serial.print("Mositure : ");
```

```
    Serial.print(output_value);
```

```
    Serial.println("%");
```

```
    delay(1000);
```

```
}
```

Pictures:



Integration Testing:

- 1- Test Wifi Module alone and check for the working of the server.**
- 2- Test Wifi Module + LCD Display for checking their humidity.**
- 3- Test Wifi Module + LCD + DHT11**
- 4- Test Wifi Module + LCD + Rain Level + DHT11**
- 5- Test Wifi Module + LCD + DHT11 + Rain Level + Moisture Sensor**