

## 4 channel Plant Watering System with Arduino UNO R3



## Overview

The following guide will show you how to set up a watering system that can intelligently monitor and automatically water to up to four plants or flowers at the same time.

## Parts Required

1. Development Board
2. Breadboard
3. Four-channel Relay
4. 4pcs Capacitive Soil Moisture Sensors
5. 4pcs 5V mini water pumps
6. Watering Pipe

## How to connect?

### 1. Development Board <-----> Capacitive Soil Humidity Sensor

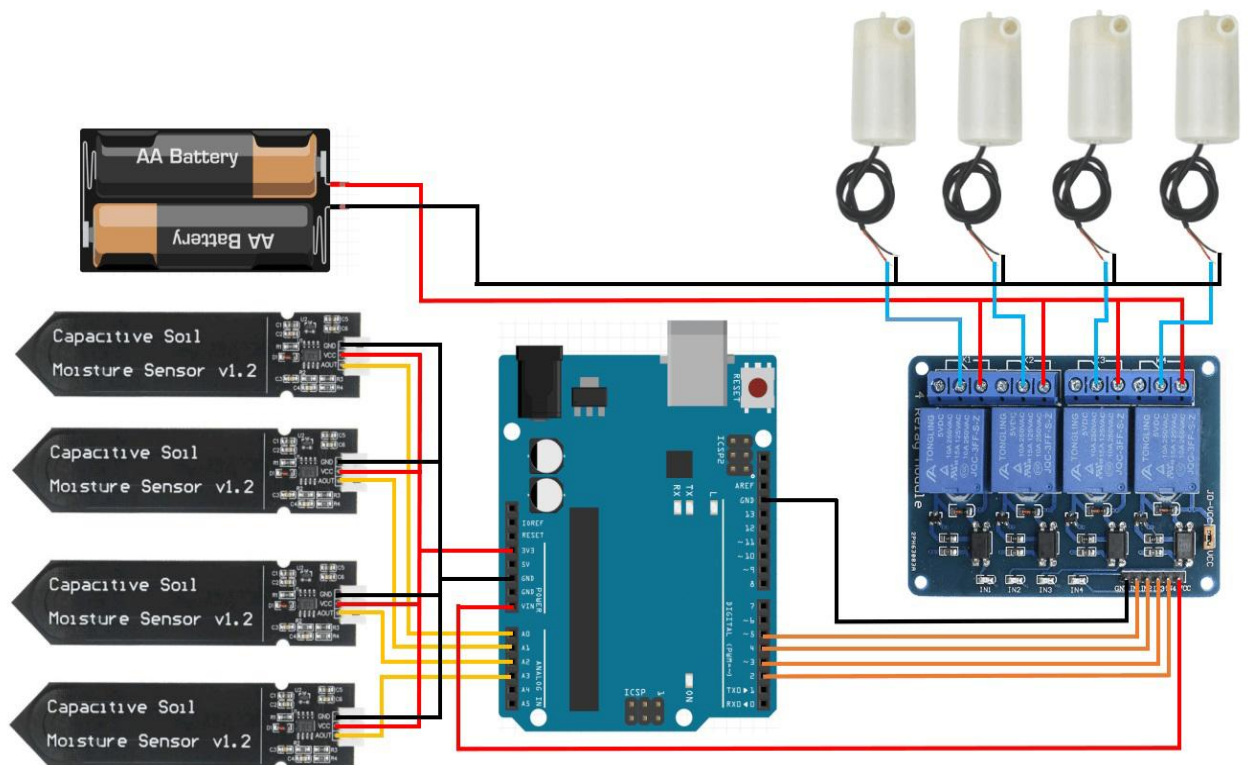
|  |  |
|--|--|
| Capacitive soil humidity sensor <b>one</b>   | A0<----->AOUT<br>3.3V<----->VCC<br>GND<----->GND |
| Capacitive soil humidity sensor <b>two</b>   | A1<----->AOUT<br>3.3V<----->VCC<br>GND<----->GND |
| Capacitive soil humidity sensor <b>three</b> | A2<----->AOUT<br>3.3V<----->VCC<br>GND<----->GND |
| Capacitive soil humidity sensor <b>four</b>  | A3<----->AOUT<br>3.3V<----->VCC<br>GND<----->GND |

## Development Board<----->Four-Channel Relay

VCC<----->VIN  
GND<----->GND  
D2<----->IN1  
D3<----->IN2  
D4<----->IN4  
D5<----->IN5

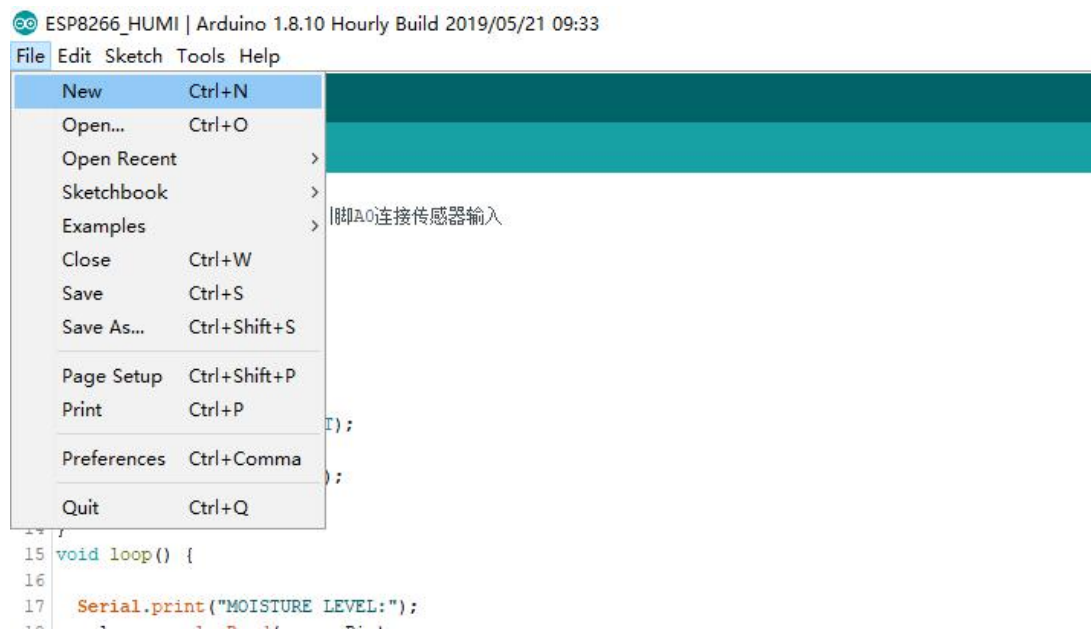
4 of the normally open ports of the four-channels-Relay connect to the positive pole of the 5V power supply, the normally closed port is suspended. 4 of the relay common ports are connected to the positive poles of 4 pumps, and the negative poles of 4 pumps are connected to the negative pole of 5V power supply.

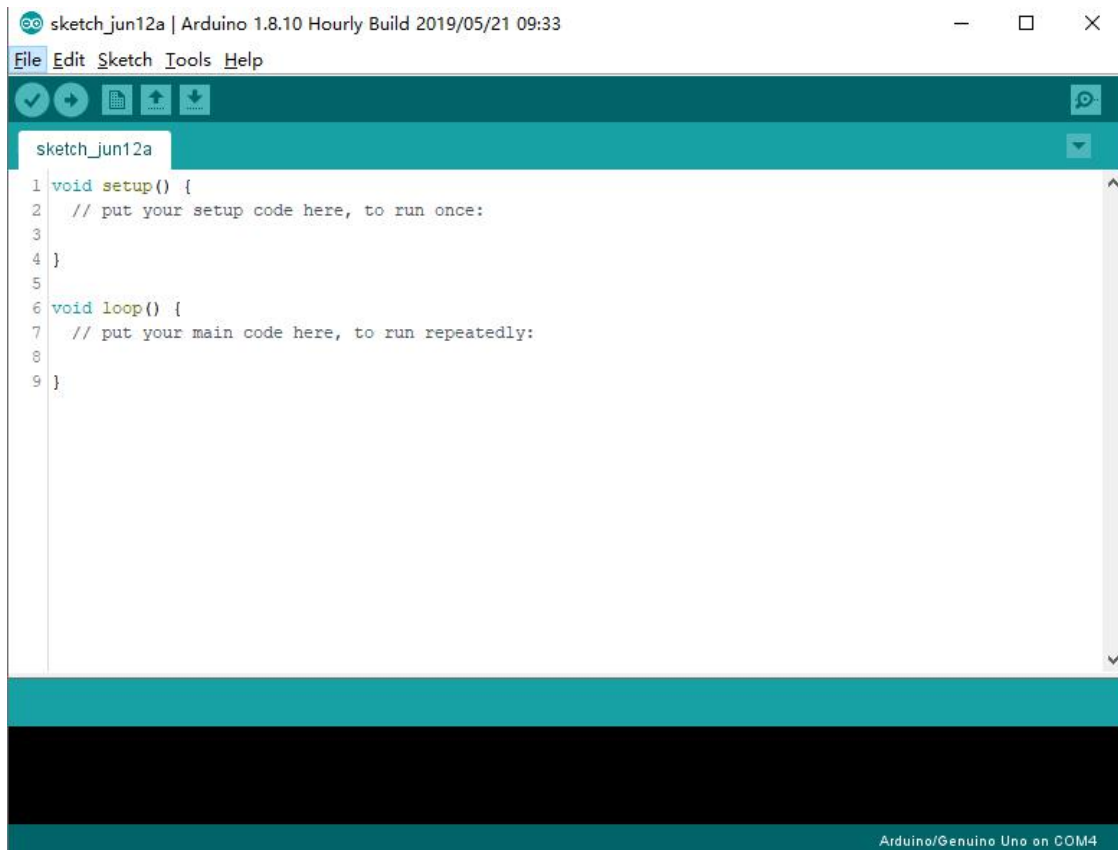
## Connection Diagram



## How to set up with Arduino IDE?

**Step 1: Open the Arduino IDE and create a new file as shown below.**





**Step 2:** Copy the following code all into this file.

```
int IN1 = 2;
int IN2 = 3;
int IN3 = 4;
int IN4 = 5;
```

```
int Pin1 = A0;
int Pin2 = A1;
int Pin3 = A2;
int Pin4 = A3;
```

```
float value1 = 0;
float value2 = 0;
float value3 = 0;
float value4 = 0;
void setup() {
  Serial.begin(9600);
  pinMode(IN1, OUTPUT);
  pinMode(IN2, OUTPUT);
  pinMode(IN3, OUTPUT);
  pinMode(IN4, OUTPUT);
}
```

```

pinMode(Pin1, INPUT);
pinMode(Pin2, INPUT);
pinMode(Pin3, INPUT);
pinMode(Pin4, INPUT);

digitalWrite(IN1, HIGH);
digitalWrite(IN2, HIGH);
digitalWrite(IN3, HIGH);
digitalWrite(IN4, HIGH);
delay(500);
}
void loop() {

  Serial.print("MOISTURE LEVEL:");
  value1 = analogRead(Pin1);
  Serial.println(value1);
  if(value1>550)
  {
    digitalWrite(IN1, LOW);
  }
  else
  {
    digitalWrite(IN1, HIGH);
  }

  Serial.print("MOISTURE LEVEL:");
  value2 = analogRead(Pin2);
  Serial.println(value2);
  if(value2>550)
  {
    digitalWrite(IN2, LOW);
  }
  else
  {
    digitalWrite(IN2, HIGH);
  }

  Serial.print("MOISTURE LEVEL:");
  value3 = analogRead(Pin3);
  Serial.println(value3);
  if(value3>550)
  {
    digitalWrite(IN3, LOW);
  }
}

```

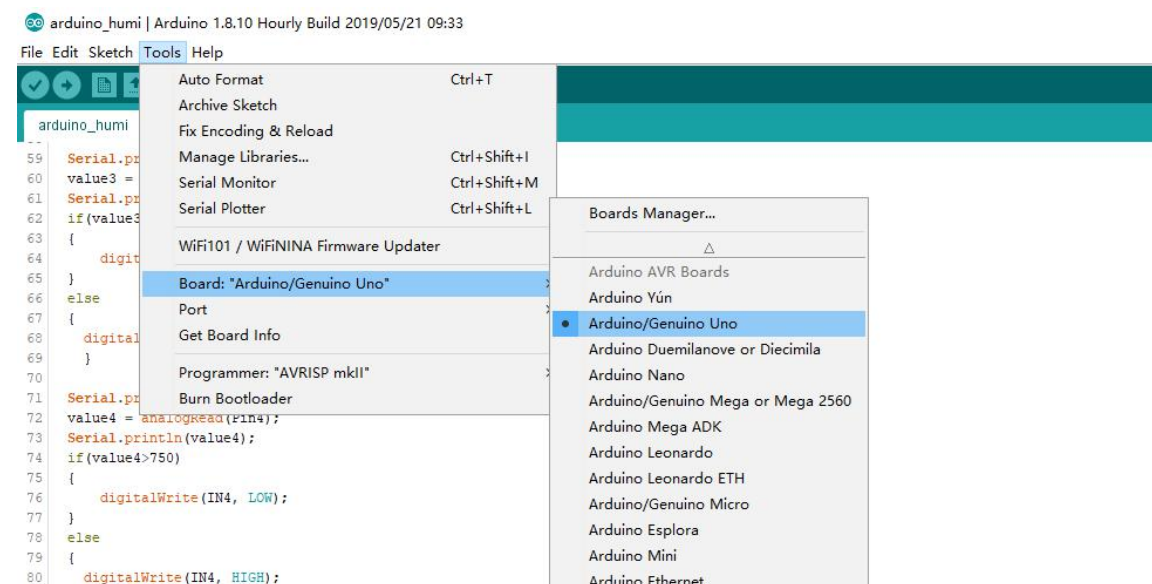
```

else
{
    digitalWrite(IN3, HIGH);
}

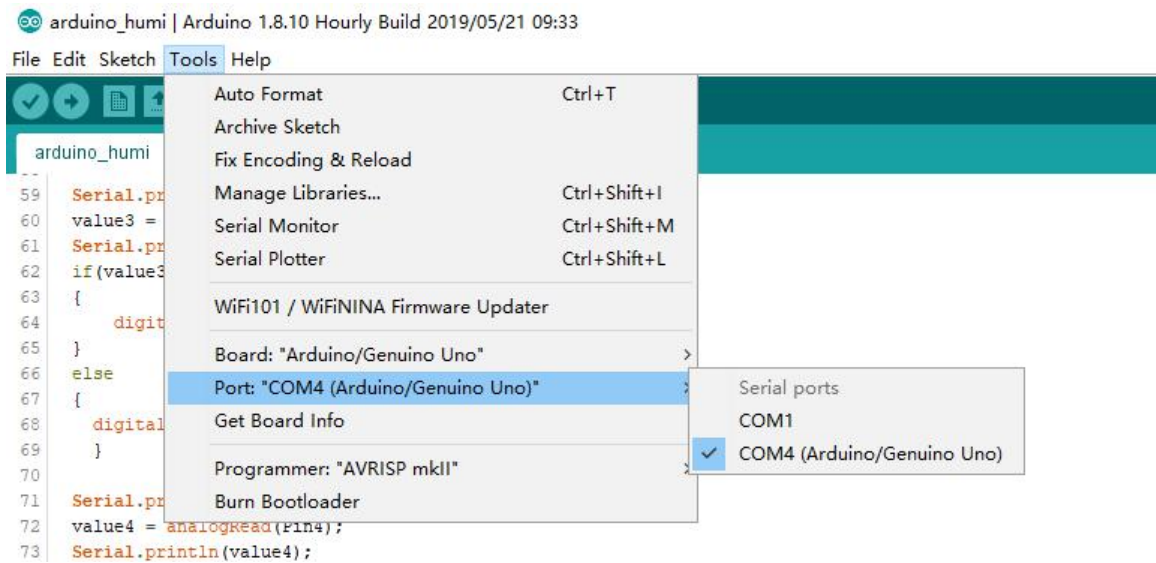
Serial.print("MOISTURE LEVEL:");
value4 = analogRead(Pin4);
Serial.println(value4);
if(value4>550)
{
    digitalWrite(IN4, LOW);
}
else
{
    digitalWrite(IN4, HIGH);
}
Serial.println();
delay(1000);
}

```

**Step 3: Click tools->board:->ardduino/genuine uno, as shown below.**



**Step 4: Click tools->port:->com4, as shown below.**



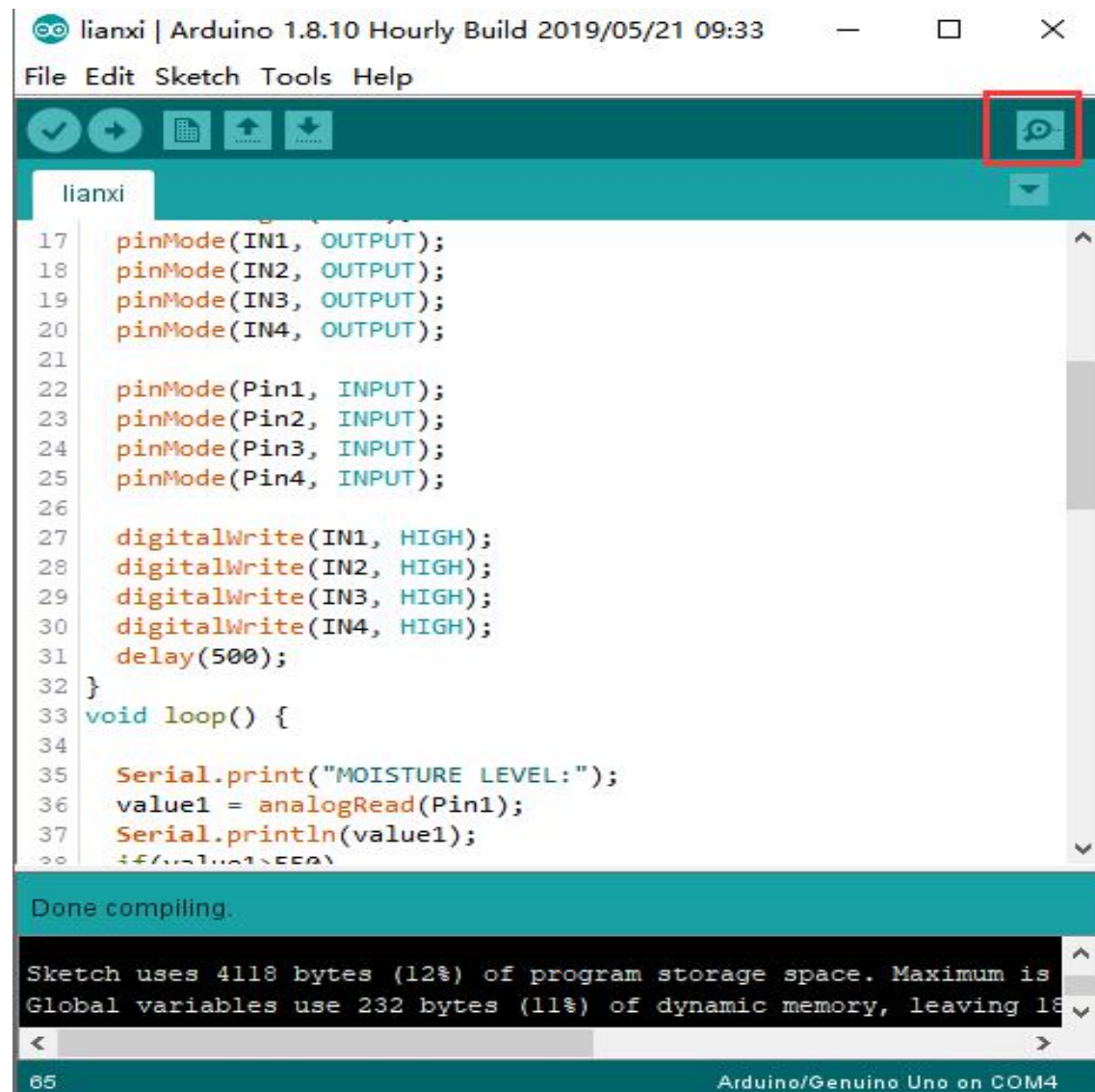
**Step 5:** Click **the icon** as shown below to download the program to the development board.



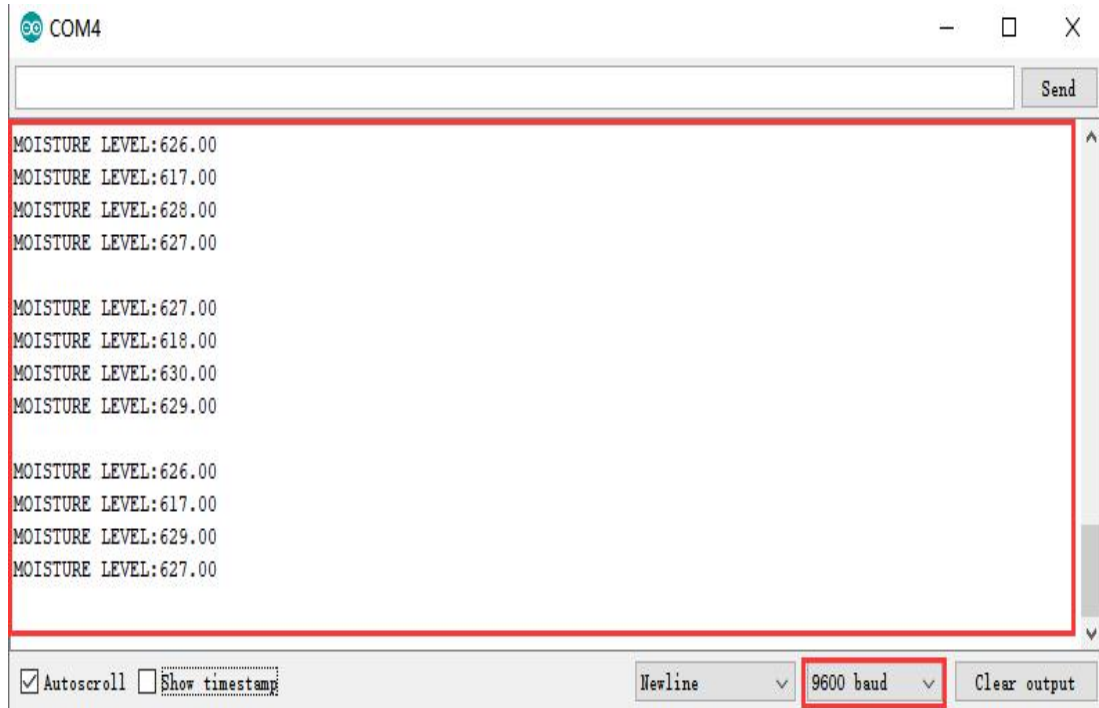
**Step 6:** After downloading the program to the development board,



click **the icon** as shown below to open the serial monitor:



**Step 7:** Set the serial port to **9600 baud** rate as shown below, then click on the data display area to see the detected data.



## Code interpretation

1. In order to use Arduino to control the four-channel relay, we need to define four control pins of the Arduino.

```
Int IN1 = 2;  
Int IN2 = 3;  
Int IN3 = 4;  
Int IN4 = 5;
```

1. Since the value detected by the soil moisture sensor is an analog signal, so four analog ports are defined.

```
Int Pin1 = A0;  
Int Pin2 = A1;  
Int Pin3 = A2;
```

```
Int Pin4 = A3;
```

2. We need to use a variable to store the value detected by the sensor.

Since there are four sensors, we define four variables.

```
Float value1 = 0;
```

```
Float value2 = 0;
```

```
Float value3 = 0;
```

```
Float value4 = 0;
```

In the '**setup**' function, mainly using '**Serial.begin**' function to set the serial port baud rate , using the '**pinMode**' function to set the port input and output function of arduino. 'OUTPUT' indicates output function and 'INPUT' indicates input function.

```
Void setup() {  
  Serial.begin(9600);  
  pinMode(IN1, OUTPUT);  
  pinMode(IN2, OUTPUT);  
  pinMode(IN3, OUTPUT);  
  pinMode(IN4, OUTPUT);  
  
  pinMode(Pin1, INPUT);  
  pinMode(Pin2, INPUT);  
  pinMode(Pin3, INPUT);  
  pinMode(Pin4, INPUT);  
  
  digitalWrite(IN1, HIGH);  
  digitalWrite(IN2, HIGH);  
  digitalWrite(IN3, HIGH);  
  digitalWrite(IN4, HIGH);  
  Delay(500);  
}
```

Finally, in the '**loop**' function, cycle use the '**Serial.print**' function to

output the prompt information in the serial monitor, use the '**analogRead**' function to read the sensor value. Then use the 'if' function to determine the sensor value, if the requirements are met, turn on the relay and using the '**digitalWrite**' function to operate the pump, if not, then turn off the relay.

### Attention:

There are total four lines of '**if(value4>550)**' in the '**loop**' function. This is the statement that controls the start of the pump. The values inside need to be reset according to the water needs of the plants and flowers.

```
void loop() {  
  
    Serial.print("MOISTURE LEVEL:");  
    value1 = analogRead(Pin1);  
    Serial.println(value1);  
    if(value1>550)  
    {  
        digitalWrite(IN1, LOW);  
    }  
    else  
    {  
        digitalWrite(IN1, HIGH);  
    }  
  
    Serial.print("MOISTURE LEVEL:");  
    value2 = analogRead(Pin2);  
    Serial.println(value2);  
    if(value2>550)  
    {  
        digitalWrite(IN2, LOW);  
    }  
    else
```

```

{
    digitalWrite(IN2, HIGH);
}

Serial.print("MOISTURE LEVEL:");
value3 = analogRead(Pin3);
Serial.println(value3);
if(value3>550)
{
    digitalWrite(IN3, LOW);
}
else
{
    digitalWrite(IN3, HIGH);
}

Serial.print("MOISTURE LEVEL:");
value4 = analogRead(Pin4);
Serial.println(value4);
if(value4>550)
{
    digitalWrite(IN4, LOW);
}
else
{
    digitalWrite(IN4, HIGH);
}
    Serial.println();
    delay(1000);
}

```