

4 channel Plant Watering System with Arduino UNO R3



Preface

Über Unsere Firma

WayinTop, Your Top Way to Inspiration, ist ein professioneller Hersteller von über 2.000 Open Source-Motherboards, -Modulen und -Komponenten. WayinTop hat sich zum Ziel gesetzt, die wunderbare Welt der eingebetteten Elektronik zu erforschen und zu entmystifizieren, einschließlich, aber nicht beschränkt auf Arduino und Raspberry Pi. Wir sind bestrebt, die am besten gestalteten Produkte für Hersteller aller Altersgruppen und Könnensstufen herzustellen. Unabhängig von Ihrer Vision oder Ihrem Kenntnisstand sind unsere Produkte und Ressourcen darauf ausgelegt, die Elektronik besser zugänglich zu machen. WayinTop wurde 2013 gegründet und ist mittlerweile auf über 100 Mitarbeiter und eine über 50.000 Quadratmeter große Fabrik in China angewachsen. Mit unseren unermüdlichen Bemühungen haben wir auch das Angebot um Werkzeuge, Ausrüstungen, Verbindungssätze und verschiedene DIY-Produkte erweitert, die wir sorgfältig ausgewählt und getestet haben.

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

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

VCC<----->VIN

GND<----->GND

D2<----->IN1

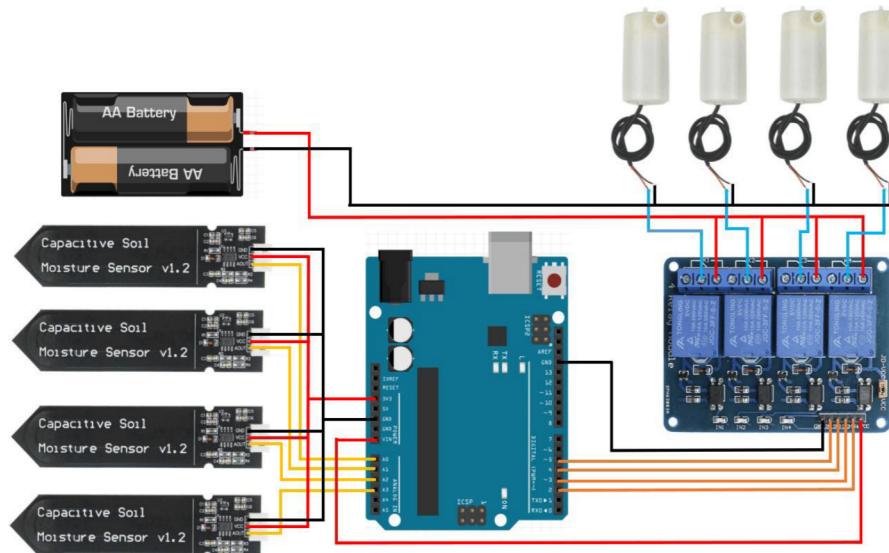
D3<----->IN2

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.

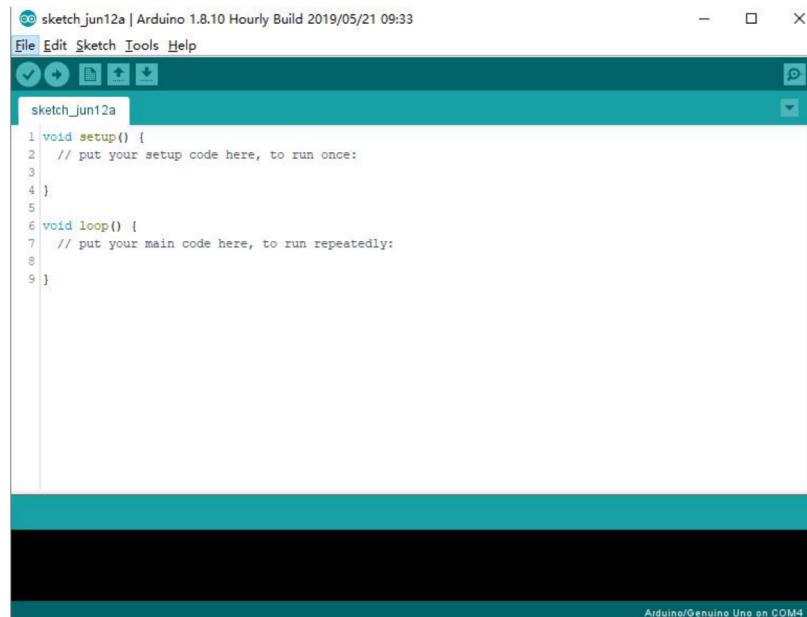
Connection Diagram



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);
    }
```

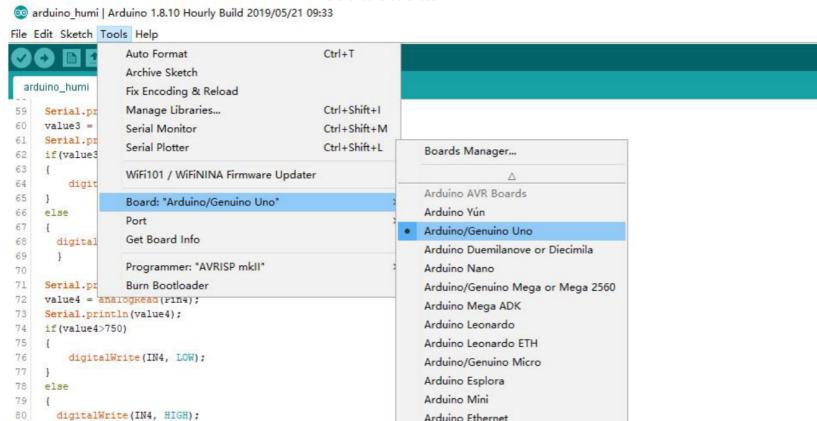
```

else
{
    digitalWrite(IN3, HIGH);
}

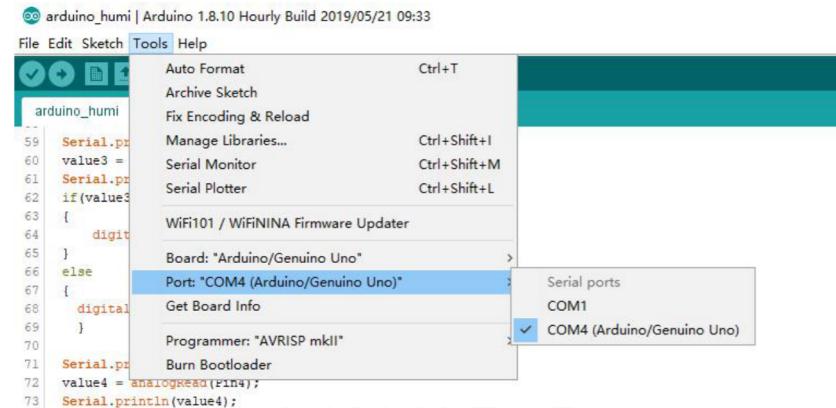
Serial.print("MOISTURE LEVEL:");
value4 = analogRead(Pin4);
Serial.println(value4);
if(value4>550)
{
    digitalWrite(IN4, LOW);
}
else
{
    digitalWrite(IN4, HIGH);
}
Serial.println();
delay(1000);
}

```

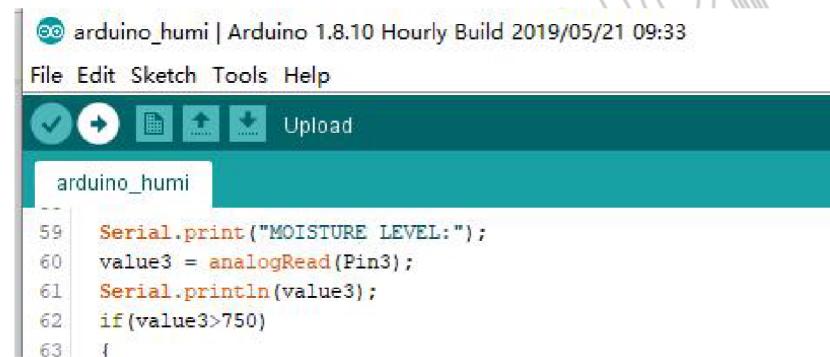
Step 3: Click tools->board:->arduino/genuine uno, as shown below.



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

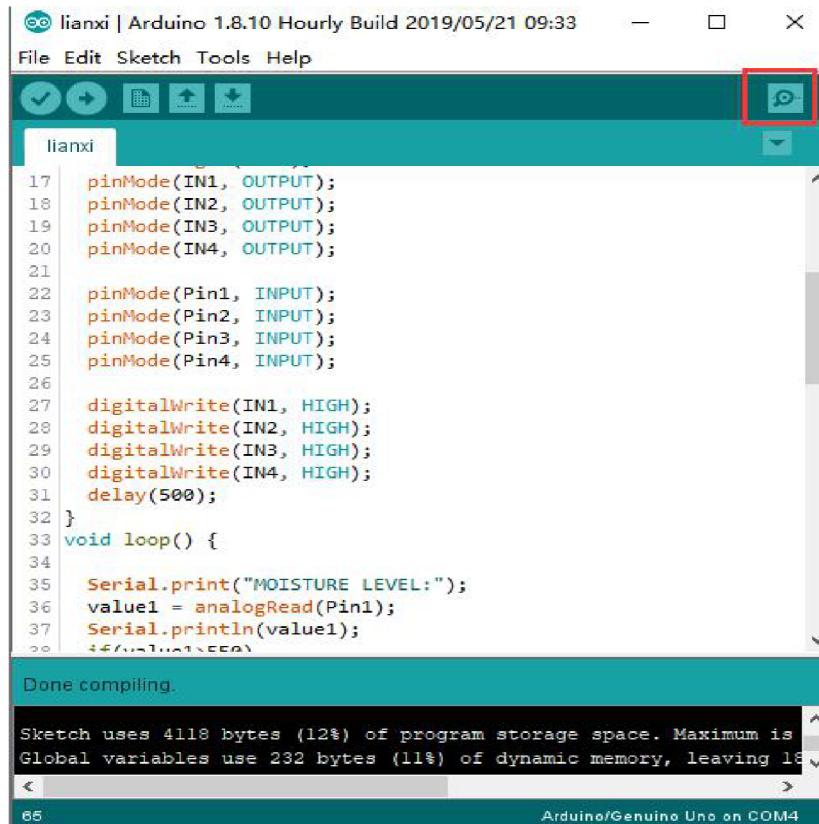


Step 5: Click the icon as shown below to download the program to the development board.



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

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

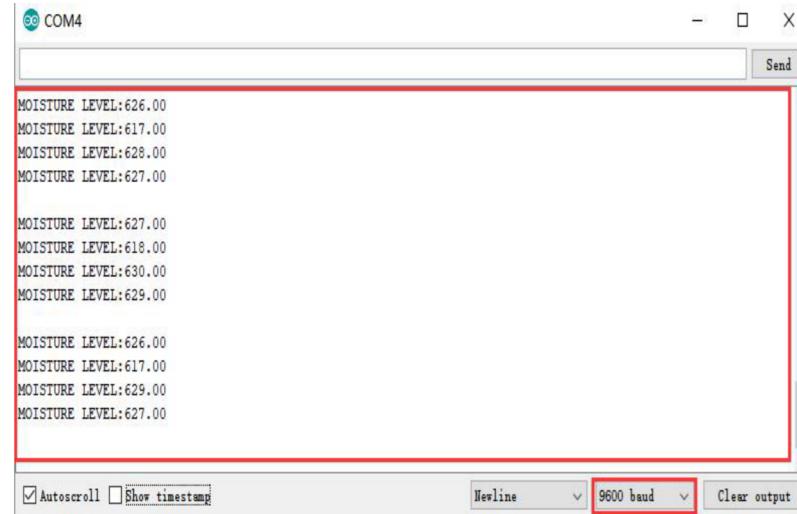


The screenshot shows the Arduino IDE interface. The title bar reads "lianxi | Arduino 1.8.10 Hourly Build 2019/05/21 09:33". The menu bar includes File, Edit, Sketch, Tools, and Help. Below the menu is a toolbar with icons for file operations. A red box highlights the "Serial Monitor" icon, which is a small blue square with a white circular arrow. The code editor window contains the following sketch:

```
lianxi
17 pinMode(IN1, OUTPUT);
18 pinMode(IN2, OUTPUT);
19 pinMode(IN3, OUTPUT);
20 pinMode(IN4, OUTPUT);
21
22 pinMode(Pin1, INPUT);
23 pinMode(Pin2, INPUT);
24 pinMode(Pin3, INPUT);
25 pinMode(Pin4, INPUT);
26
27 digitalWrite(IN1, HIGH);
28 digitalWrite(IN2, HIGH);
29 digitalWrite(IN3, HIGH);
30 digitalWrite(IN4, HIGH);
31 delay(500);
32 }
33 void loop() {
34
35 Serial.print("MOISTURE LEVEL:");
36 value1 = analogRead(Pin1);
37 Serial.println(value1);
38 }
```

The status bar at the bottom indicates "Done compiling." and "Sketch uses 4118 bytes (12%) of program storage space. Maximum is 32256 bytes. Global variables use 232 bytes (11%) of dynamic memory, leaving 1812 bytes free." It also shows "66" and "Arduino/Genuino Uno on COM4".

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);  
}
```