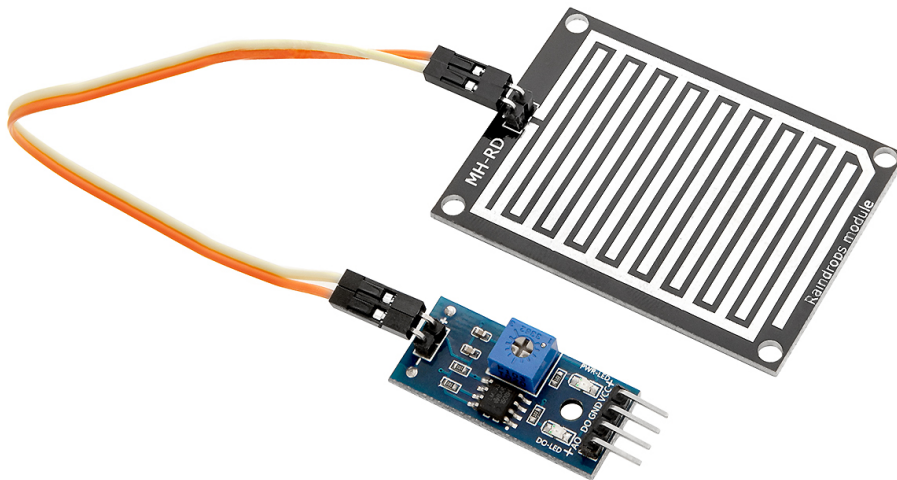


# Az-Delivery

## Welcome!

Thank you for purchasing our *AZ-Delivery Rain Sensor Module*. On the following pages, you will be introduced to how to use and set-up this handy device.

**Have fun!**





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## **Introduction**

The rain sensor module is a device for rain detection and rain intensity measuring. It can be also used to detect snow, hail. This device can be used not only to detect rain, but to send closure requests to electronic shutters, windows, awnings or skylights whenever the rain is detected.

The module consists of a rain sensor and a control board.

The rain sensor is basically a variable resistor. The resistance of the board changes depending on the amount of water to which the surface is exposed. When the amount of water increases, the resistance of the detection board decreases and vice versa.

The control board measures resistance from the detection board and converts received signal into analog and digital output signal. The control board has an on-board potentiometer and two LEDs.

## Specifications

Operating voltage:	from 3.3V up to 5V
Current consumption:	8mA
Sensor output:	analog and digital
Sensitivity control:	via on-board trimpot
Detection board dimensions:	55x40x2mm (2x0.2x0.07in)
Control board dimensions:	32x14x17mm (1.3x0.6x0.7in)

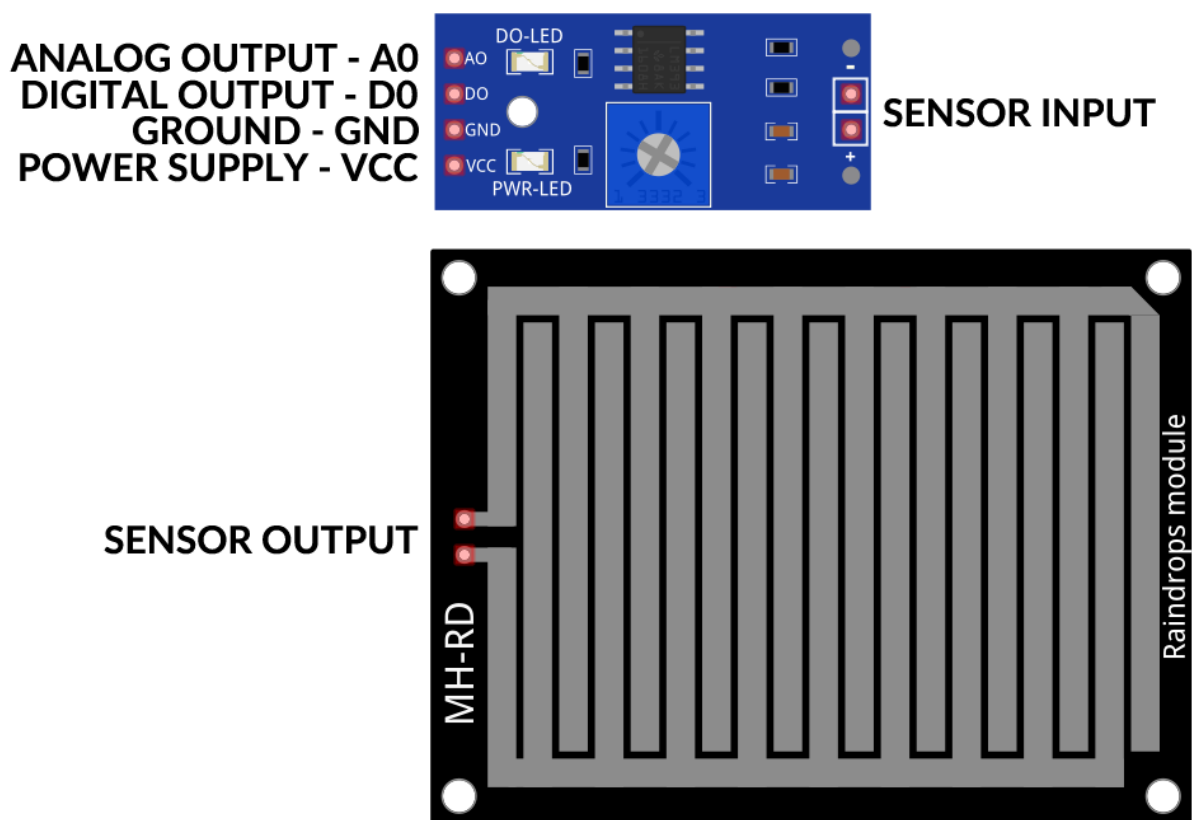
The control board has a LM393 comparator chip and the output signal driving current is over *15mA*.

The module has on-board LEDs which are used for power and detection indication.

The module sensitivity can be adjusted with an on-board potentiometer. Moving the potentiometer shaft into the clockwise direction increases sensitivity. Moving the shaft of the potentiometer in the counterclockwise direction decreases the sensitivity of the module.

## The pinout

The rain sensor module consists of two boards, a sensor board and a control board. The sensor board has two pins, and the control board has six pins. The pinouts of these two boards are shown on the image:



This sensor board does not have polarity, which means that two pins from the sensor board can be connected either way, on the control board SENSOR INPUT pins.

## How to set-up Arduino IDE

If the Arduino IDE is not installed, follow the [link](#) and download the installation file for the operating system of choice.

### Download the Arduino IDE



The screenshot shows the Arduino IDE download page. On the left, there is a teal circle with a white infinity symbol containing a minus and a plus sign. To its right, the text reads: **ARDUINO 1.8.9**  
The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software.  
This software can be used with any Arduino board. Refer to the [Getting Started](#) page for Installation instructions.

On the right side, there are links for different operating systems: **Windows** Installer, for Windows XP and up; **Windows** ZIP file for non admin install; **Windows app** Requires Win 8.1 or 10 with a 'Get' button; **Mac OS X** 10.8 Mountain Lion or newer; **Linux** 32 bits; **Linux** 64 bits; **Linux** ARM 32 bits; **Linux** ARM 64 bits. At the bottom right, there are links for Release Notes, Source Code, and Checksums (sha512).

For *windows* users, double click on the downloaded .exe file and follow the instructions in the installation window.

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For *Linux* users, download a file with the extension `.tar.xz`, which has to be extracted. When it is extracted, go to the extracted directory and open the terminal in that directory. Two `.sh` scripts have to be executed, the first called `arduino-linux-setup.sh` and the second called `install.sh`.

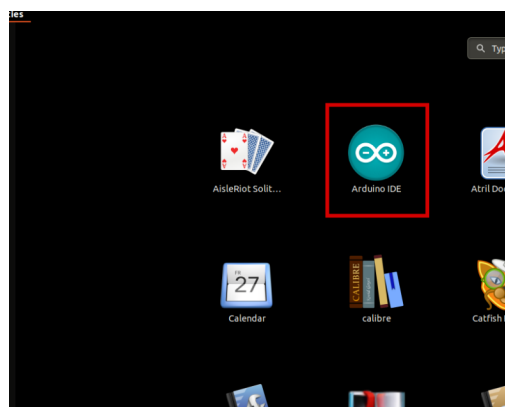
To run the first script in the terminal, open the terminal in the extracted directory and run the following command:

```
sh arduino-linux-setup.sh user_name
```

**user\_name** - is the name of a superuser in the Linux operating system. A password for the superuser has to be entered when the command is started. Wait for a few minutes for the script to complete everything.

The second script, called `install.sh`, has to be used after the installation of the first script. Run the following command in the terminal (extracted directory): **sh install.sh**

After the installation of these scripts, go to the *All Apps*, where the *Arduino IDE* is installed.



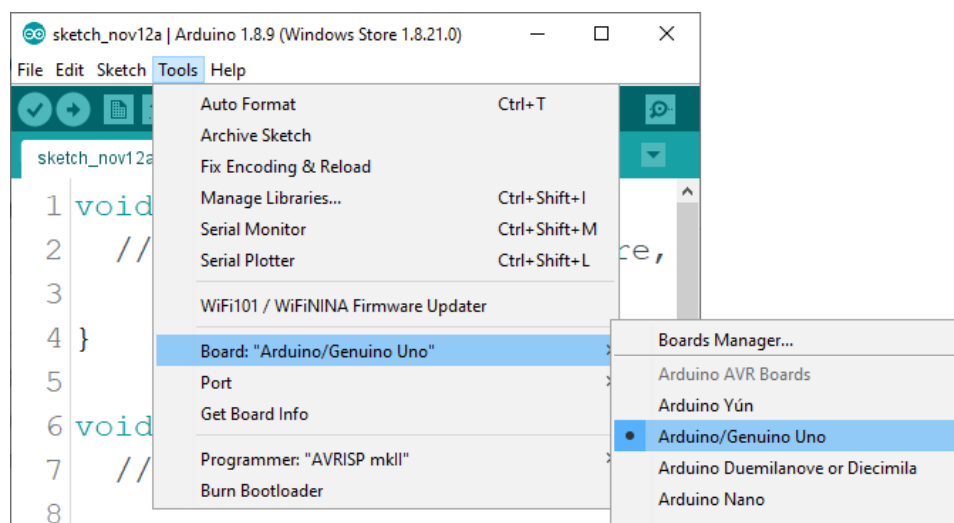
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Almost all operating systems come with a text editor preinstalled (for example, *Windows* comes with *Notepad*, *Linux Ubuntu* comes with *Gedit*, *Linux Raspbian* comes with *Leafpad*, etc.). All of these text editors are perfectly fine for the purpose of the eBook.

Next thing is to check if your PC can detect an Atmega328p board. Open freshly installed Arduino IDE, and go to:

*Tools > Board > {your board name here}*

*{your board name here}* should be the *Arduino/Genuino Uno*, as it can be seen on the following image:



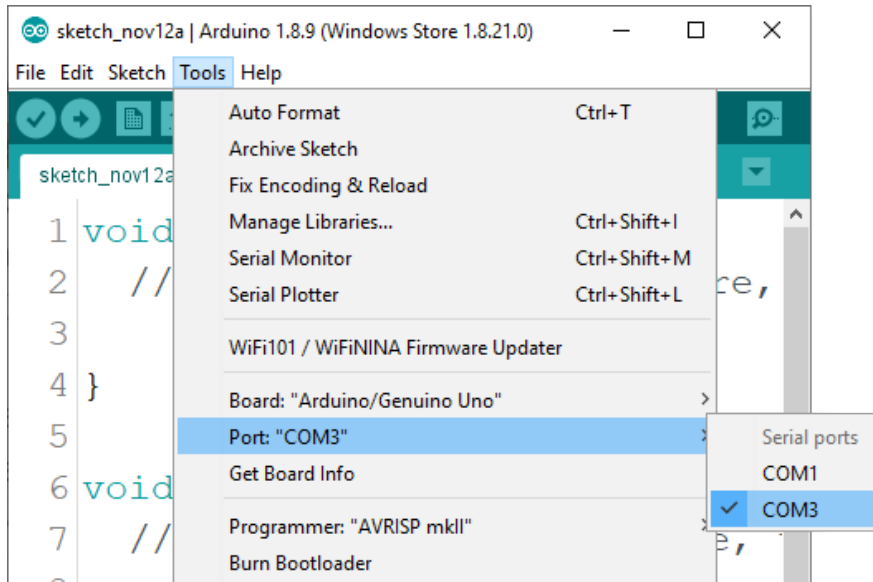
The port to which the Atmega328p board is connected has to be selected.

Go to: *Tools > Port > {port name goes here}*

and when the Atmega328p board is connected to the USB port, the port name can be seen in the drop-down menu on the previous image.



If the Arduino IDE is used on Windows, port names are as follows:



For *Linux* users, for example port name is `/dev/ttyUSBx`, where *x* represents integer number between 0 and 9.



## How to set-up the Raspberry Pi and Python

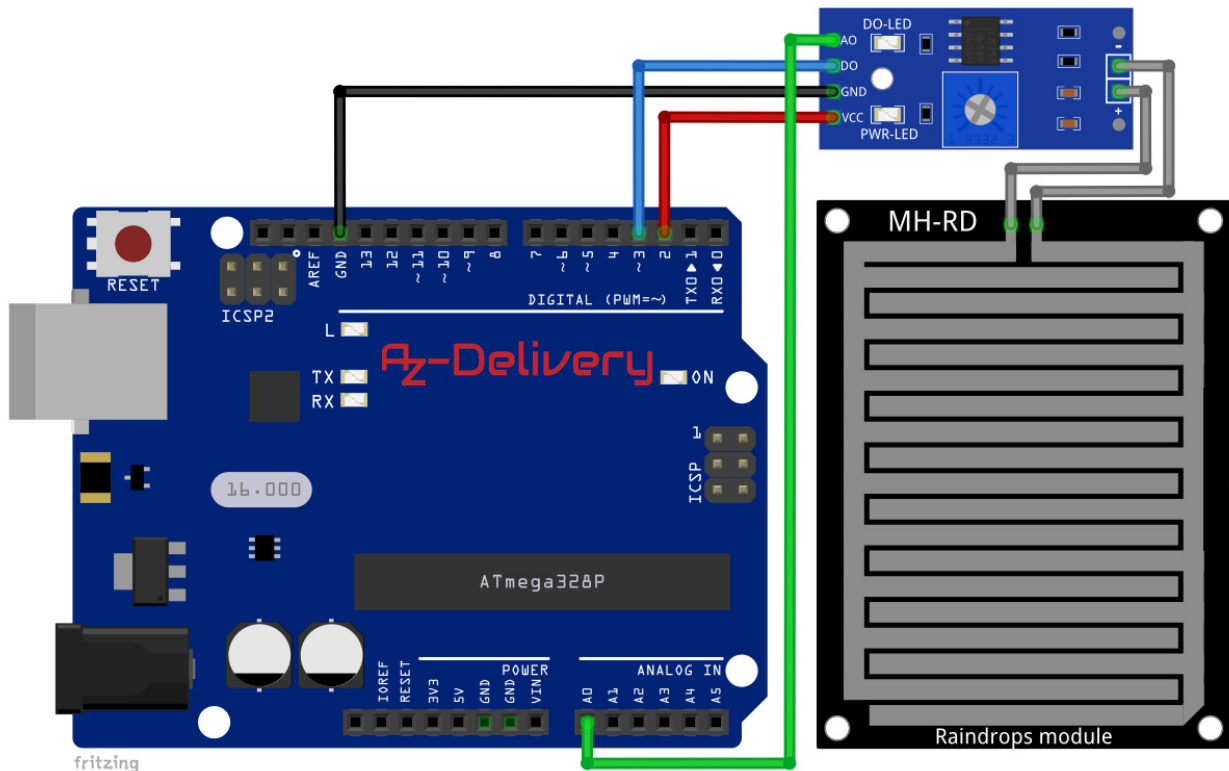
For the Raspberry Pi, first the operating system has to be installed, then everything has to be set-up so that it can be used in the *Headless* mode. The *Headless* mode enables remote connection to the Raspberry Pi, without the need for a *PC* screen Monitor, mouse or keyboard. The only things that are used in this mode are the Raspberry Pi itself, power supply and internet connection. All of this is explained minutely in the free eBook:

[Raspberry Pi Quick Startup Guide](#)

The *Raspbian* operating system comes with *Python* preinstalled.

## Connecting the module with Atmega328p

Connect the module with the Atmega328p as shown on the following image:



Control board pin	Mc pin	Wire color
VCC	D2	Red wire
DO	D3	Green wire
AO	A0	Blue wire
GND	GND	Black wire

**NOTE:** Connect the sensor module with the control board via jumper cables that come with the module.

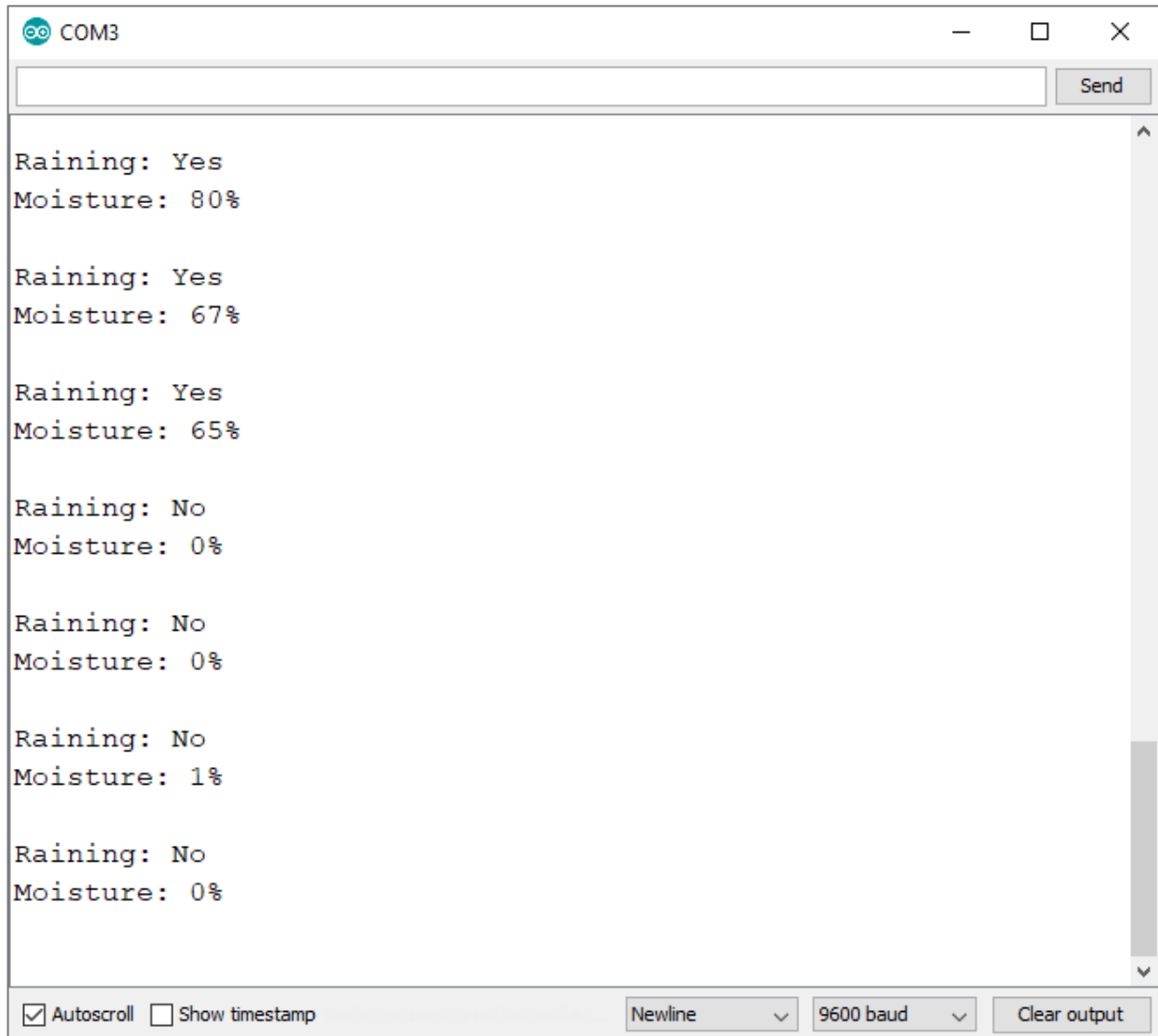
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## Sketch example

```
#define DIGITAL_PIN 3
#define ANALOG_PIN 0
#define SENSOR_POWER 2
uint16_t rainVal;
boolean isRaining = false;
String raining;
void setup() {
    Serial.begin(9600);
    pinMode(DIGITAL_PIN, INPUT);
    pinMode(SENSOR_POWER, OUTPUT);
    digitalWrite(SENSOR_POWER, LOW);
}
void loop() {
    digitalWrite(SENSOR_POWER, HIGH);
    delay(10);
    rainVal = analogRead(ANALOG_PIN);
    isRaining = digitalRead(DIGITAL_PIN);
    digitalWrite(SENSOR_POWER, LOW);
    if (isRaining) {
        raining = "No";
    }
    else {
        raining = "Yes";
    }
    rainVal = map(rainVal, 0, 1023, 100, 0);
    Serial.print("Raining: ");
    Serial.println(raining);
    Serial.print("Moisture: ");
    Serial.print(rainVal);
    Serial.println("%\n");
    delay(1000);
}
```

# Az-Delivery

Upload the sketch to the Atmega328p and run the Serial Monitor (*Tools > Serial Monitor*). The result should look like as on the following image:



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The sketch starts with defining and creating three macros called *DIGITAL\_PIN*, *ANALOG\_PIN* and *SENSOR\_POWER*.

The *DIGITAL\_PIN* represents the digital pin of Atmega328p that is used for connecting the sensors digital output pin.

The *ANALOG\_PIN* represents the analog input pin of Atmega328p that is used for connecting the sensors analog output pin.

The *SENSOR\_POWER* represents the digital pin of Atmega328p that is used for powering the module control board in predefined time intervals. This is done only for testing purposes and it is not recommended if more than one device is connected to the Atmega328p. To power the module from the digital pin, the transistor or MOS-FET should be used which is not in the scope of this eBook.

The module data can be read in two ways. The one is by reading the analog output pin of the module, and the other is by reading the digital output pin of the module. To read the analog output pin of the module, the variable called *rainVal* is used to store return value from the *analogRead()* function. The return value is an integer number in the range from 0 to 1023. To convert it into a percentage, the *map()* function is used. This is a built-in function of the Arduino IDE. It has five arguments and returns an integer value.

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For example:

```
rainVal = map(input, in_min, in_max, out_min, out_max)
```

First argument is the *input* value, which is in the range from the *in\_min* to *in\_max*. The return value is an integer number in the range from *out\_min* to *out\_max*. This function maps one number in the input range, to another number which is in the different range.

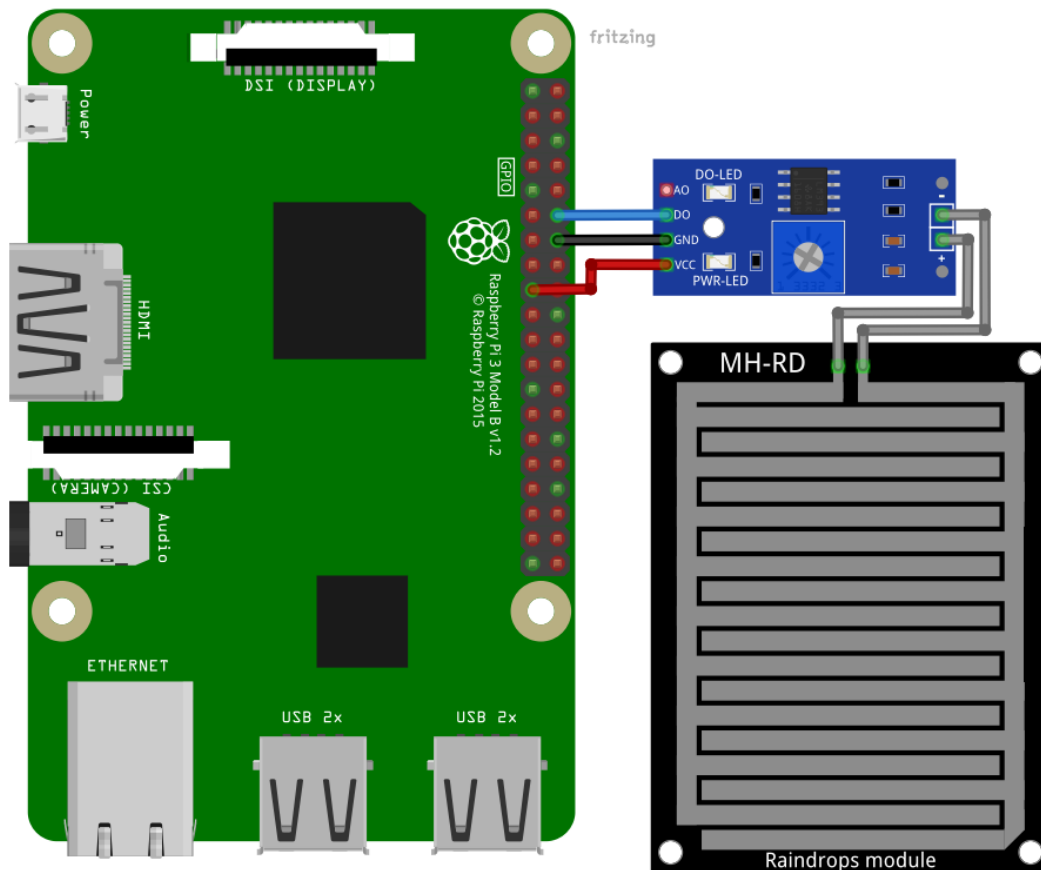
To read the digital output pin of the module, the *isRaining* variable is used to store the return value of the *digitalRead()* function.

At the end of the *loop()* function, the data is displayed in the Serial Monitor. Between two measurements there is a 1 second pause:

```
delay(1000);
```

## Connecting the module with Raspberry Pi

Connect the module with the Raspberry Pi as shown on the following image:



Module pin	Raspberry Pi pin	Physical pin	Wire color
DO	GPIO18	12	Blue wire
GND	GND	14	Black wire
VCC	3V3	17	Red wire

**NOTE:** Connect the sensor module with the control board via jumper cables that come with the module.





## **Libraries and tools for Python**

To use the module with the Raspberry Pi, the library RPi.GPIO has to be installed. If the library is already installed, running the installation command only updates the library to a newer version.

To install the library, open the terminal and run the following commands, one by one:

```
sudo apt-get update && sudo apt-get upgrade
```

```
sudo apt-get install python3-rpi.gpio
```

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## Python script

```
import time
import RPi.GPIO as GPIO

GPIO.setmode(GPIO.BCM)
GPIO.setwarnings(False)

DIGITAL_PIN = 18
GPIO.setup(DIGITAL_PIN, GPIO.IN)
time.sleep(2)

print('[Press CTRL + C to end the script!]\n')
try: # Main program loop
    while True:
        if GPIO.input(DIGITAL_PIN)==0:
            print('Raining!')
            time.sleep(2)
        else:
            print('Not raining!')
            time.sleep(2)

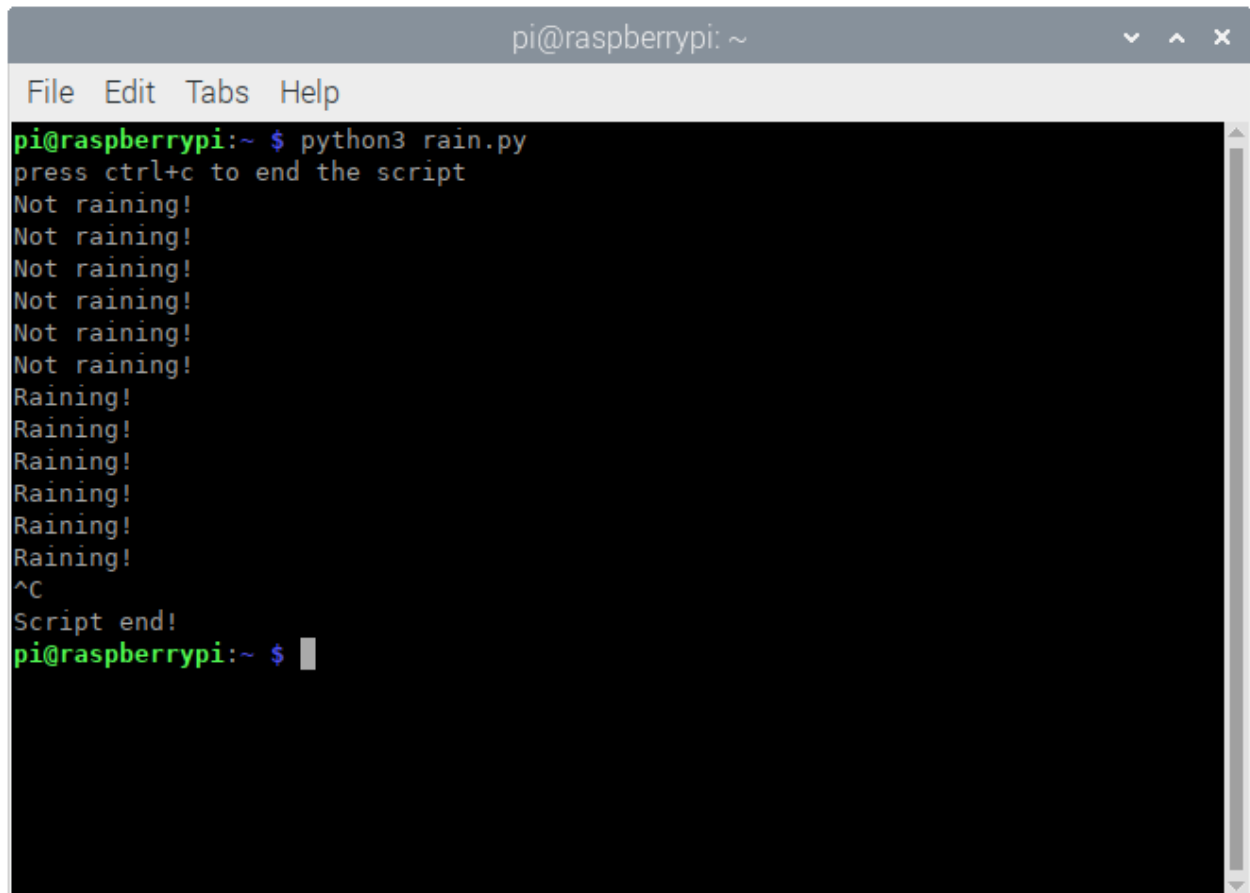
except KeyboardInterrupt:
    print('\nScript end!')
finally:
    GPIO.cleanup()
```

# Az-Delivery

Save the script by the name *rain.py*. To run the script, open the terminal in the directory where the script is saved and run the following command:

**python3 rain.py**

The result should look like as on the following image:



```
pi@raspberrypi: ~  
File Edit Tabs Help  
pi@raspberrypi:~ $ python3 rain.py  
press ctrl+c to end the script  
Not raining!  
Not raining!  
Not raining!  
Not raining!  
Not raining!  
Not raining!  
Raining!  
Raining!  
Raining!  
Raining!  
Raining!  
Raining!  
^C  
Script end!  
pi@raspberrypi:~ $
```

To stop the script press 'CTRL + C' on the keyboard.



Now it is the time to learn and make your own projects. You can do that with the help of many example scripts and other tutorials, which can be found on the internet.

**If you are looking for the high quality microelectronics and accessories, AZ-Delivery Vertriebs GmbH is the right company to get them from. You will be provided with numerous application examples, full installation guides, eBooks, libraries and assistance from our technical experts.**

<https://az-delivery.de>

Have Fun!

Impressum

<https://az-delivery.de/pages/about-us>