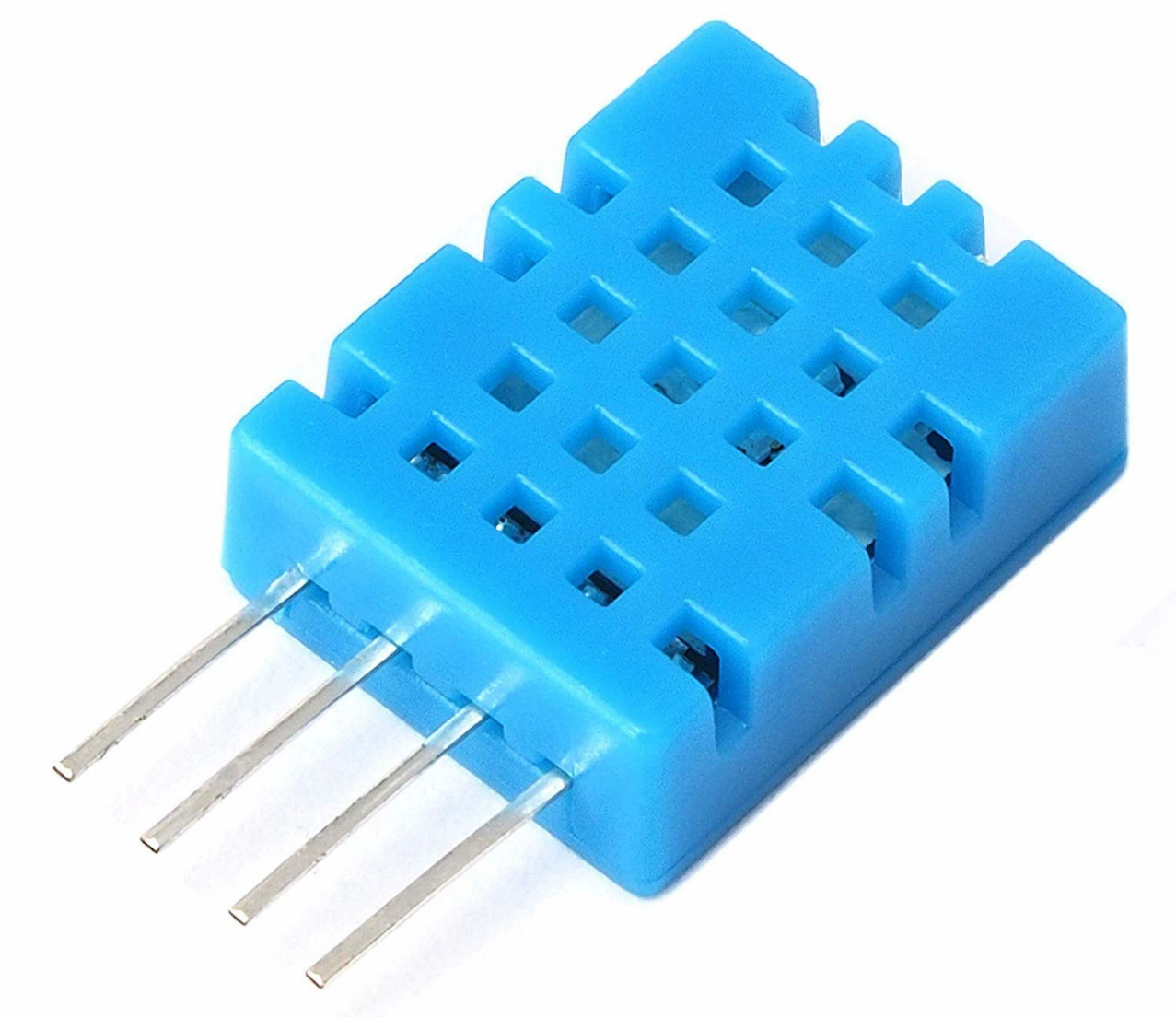
Welcome!

Thank you very much for purchasing our AZ-Delivery DHT11 Temperature Sensor. On the following pages, we will introduce you to how to use and setup this handy device.

Have fun!



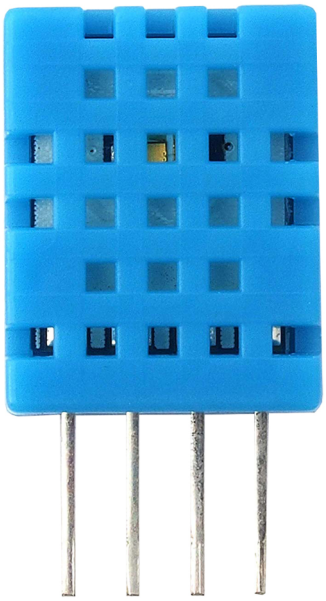
The DHT-11 is a relative humidity/temperature sensor that outputs a digital signal. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air.

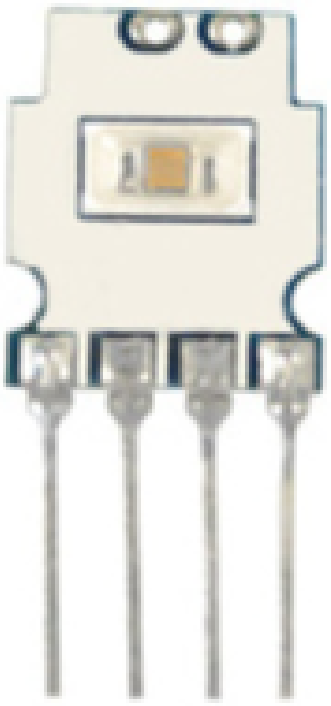
Temperature measuring range of the DHT11 is from 0°C to +50°C with ±2°C accuracy, and humidity measuring range, from 20% to 90% with accuracy from ±5%.

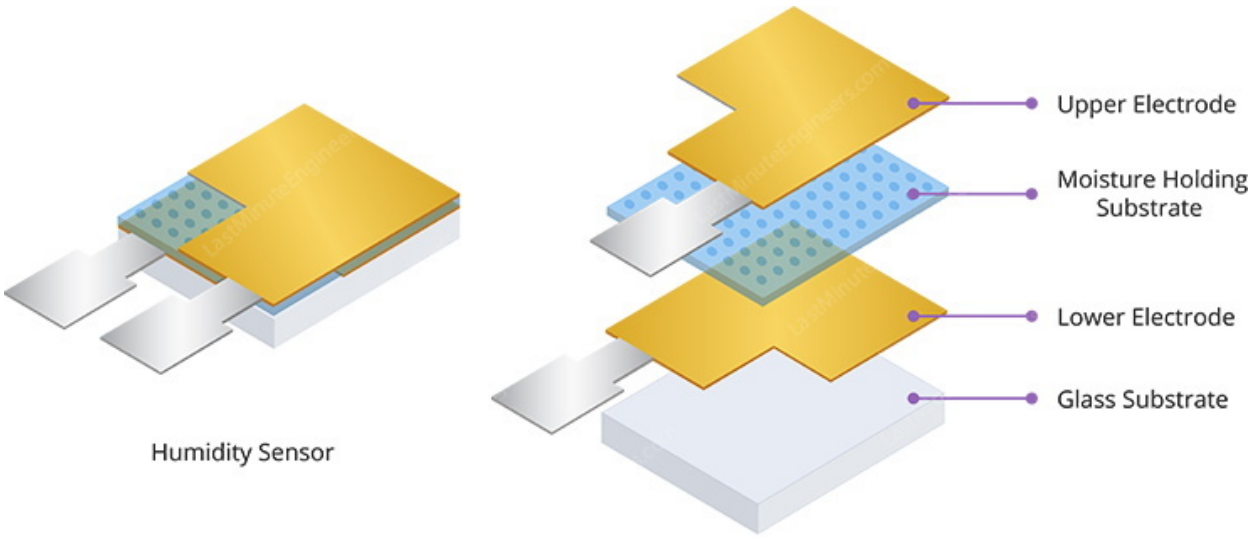
Technical Specifications:

Operating Voltage:	3 to 5V
Max Operating Current:	2.5mA max
Humidity Range:	20% - 90% with accuracy of 5%
Temperature Range:	0°C - 50°C with accuracy of ±2°C
Sampling Rate:	1Hz (reading every 1s)
Dimensions:	15x32x9mm

Inside the case, on the sensing side of DHT11 sensor, there is a humidity sensing component along with a NTC temperature sensor (or thermistor).

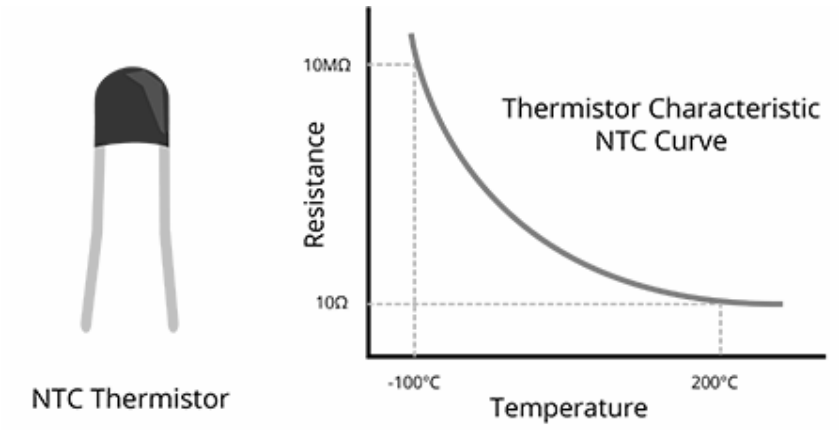




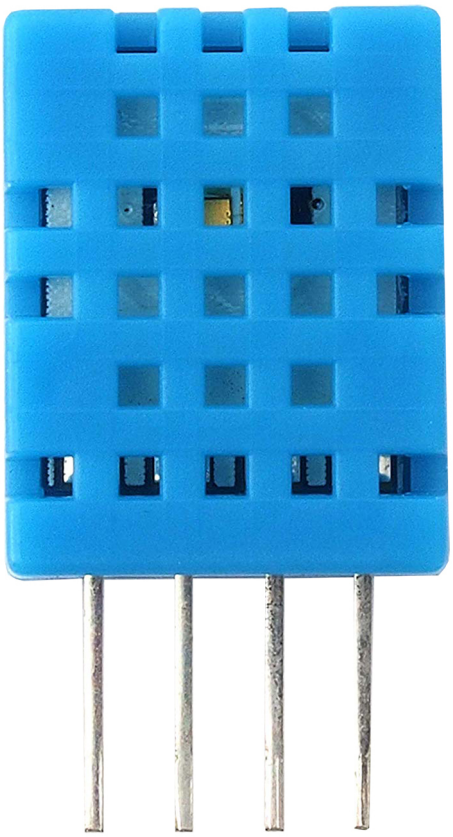


Humidity sensing component is used, of course to measure humidity, which has two electrodes with moisture holding substrate (usually a salt or conductive plastic polymer) sandwiched between electrodes. The ions are released by the substrate as water vapor is absorbed by it, which in turn increases the conductivity between the electrodes. The change in resistance between the two electrodes is proportional to the relative humidity. Higher relative humidity decreases the resistance between the electrodes, while lower relative humidity increases the resistance between the electrodes.

Temperature sensing part of the sensor consists of a NTC temperature sensor (thermistor) to measure temperature. A thermistor is a thermal resistor, a resistor that changes its resistance with temperature. Technically, all resistors are thermistors, their resistance changes slightly with temperature, but the change is usually small and difficult to measure. Thermistors are made so that the resistance changes drastically with temperature so that it can be 100Ω or more of change per degree of temperature. The term "*NTC*" means "*Negative Temperature Coefficient*", which means that the resistance decreases with the increase of temperature.



On the other side, there is a small PCB with an 8-bit SOIC-14 packaged IC. This IC measures and processes the analog signal with stored calibration coefficients, does analog to digital conversion and outputs a digital signal with the data that contains information for temperature and humidity.



VCC DATA NC GND

***"VCC"* pin** - supplies power for the sensor. Although supply voltage can range between 3.3V and 5.5V, 5V supply is recommended. In case of 5V power supply, you can use cable that connect sensor and microcontroller as long as 20 meters. However, with 3.3V supply voltage, cable length shall not be greater than one meter. Otherwise, the line voltage drop will lead to errors in measurement.

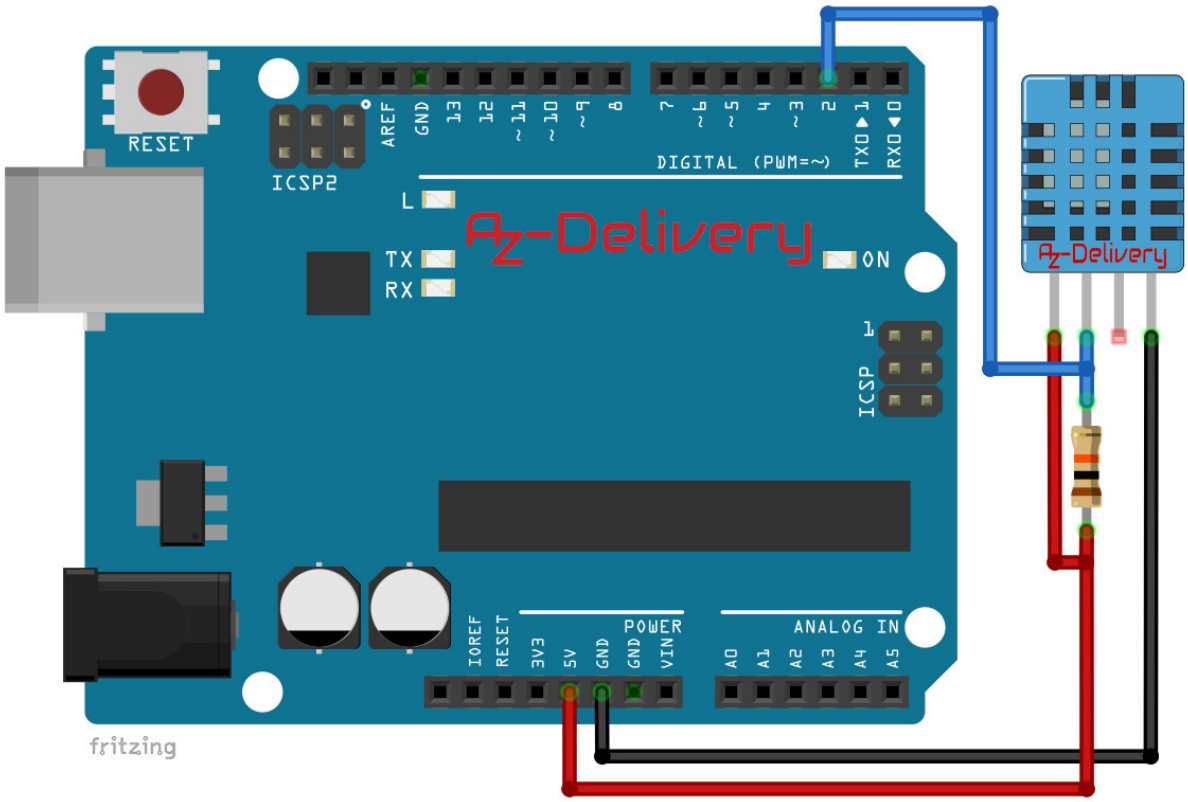
***"DATA"* pin** - is data pin, and is used to communication between the sensor and the microcontroller.

***"NC"* pin** - is Not Connected pin.

***"GND"* pin** - is ground pin and should be connected to the common ground, or 0V (on Atmega328P Board or Raspberry Pi).

Connecting the module with Atmega328P Board

Connect Atmega328P Board and DHT11 as shown on connection diagram below:



DHT11 pin	**>**	**Board pin**	
first pin	>	5V	**Red Wire**
second pin	>	D2	**Blue Wire**
third pin	>	Not connected	
fourth pin	>	GND	**Black Wire**

You have to connecte 10kΩ PULL UP resistor between second pin and 5V!!!

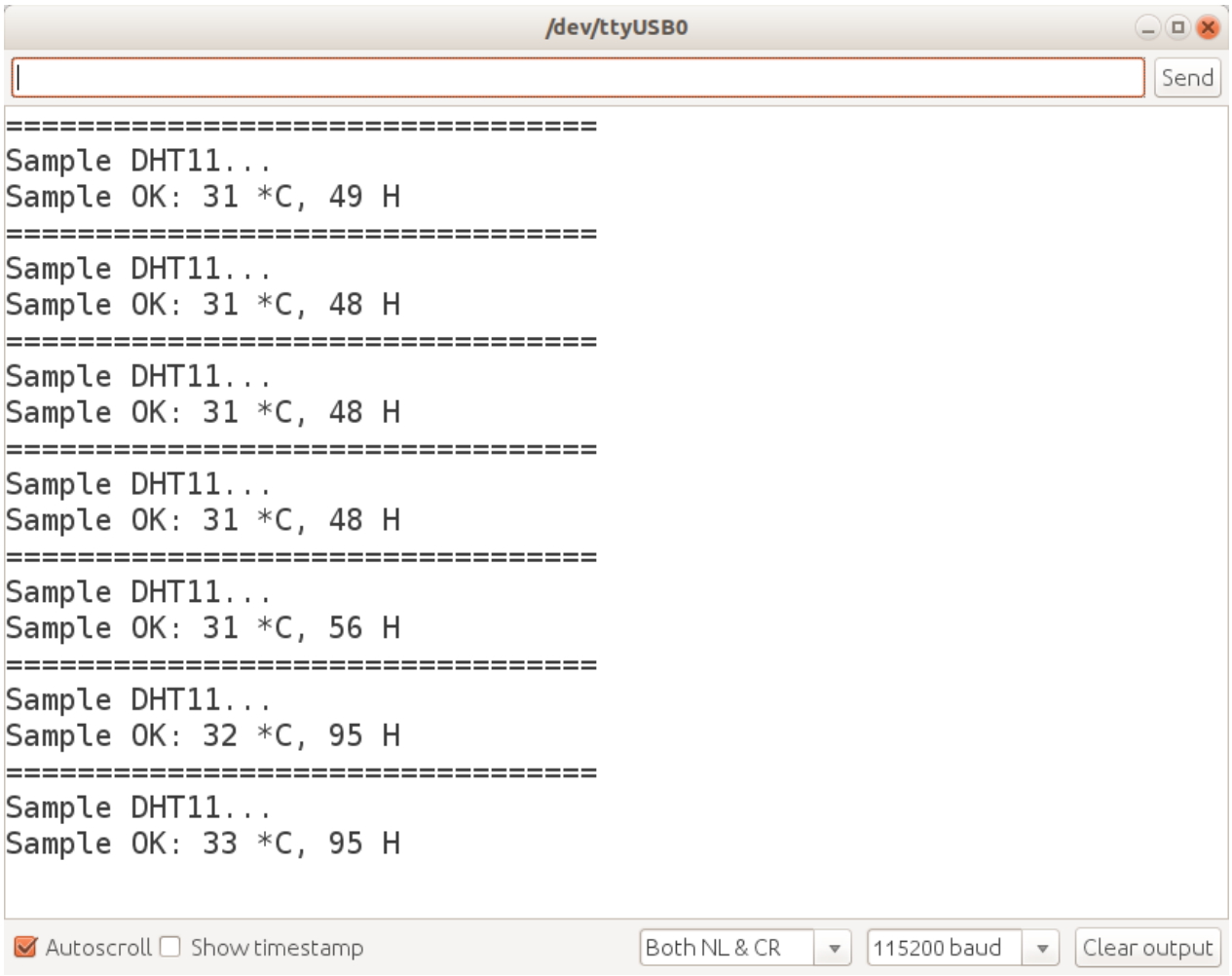
Sketch example

To write a sketch for DHT11 module we first need the library. The most simple library, we recommend, is SimpleDHT library which can be downloaded from: https://github.com/winlinvip/SimpleDHT .
When you download the ".zip" file, open Atmega328P Board and go to: *Sketch > Include Library > Add .ZIP Library* and add the downloaded zip file. After this go to: *File > Examples > SimpleDHT > DHT11Default* and open that sketch. Here is the sketch:

```
#include <SimpleDHT.h>
int pinDHT11 = 2;
SimpleDHT11 dht11(pinDHT11);
void setup() { Serial.begin(115200); }
void loop() {
  Serial.println("==================================");
  Serial.println("Sample DHT11...");
  float temperature = 0;
  float humidity = 0;
  int err = SimpleDHTErrSuccess;
  if((err=dht11.read2(&temperature, &humidity, NULL)) != SimpleDHTErrSuccess){
    Serial.print("Read DHT11 failed, err=");
    Serial.println(err);
    delay(2000);
    return;
  }
  Serial.print("Sample OK: ");
  Serial.print((float)temperature);
  Serial.print(" *C, ");
  Serial.print((float)humidity);
  Serial.println(" RH%");
```

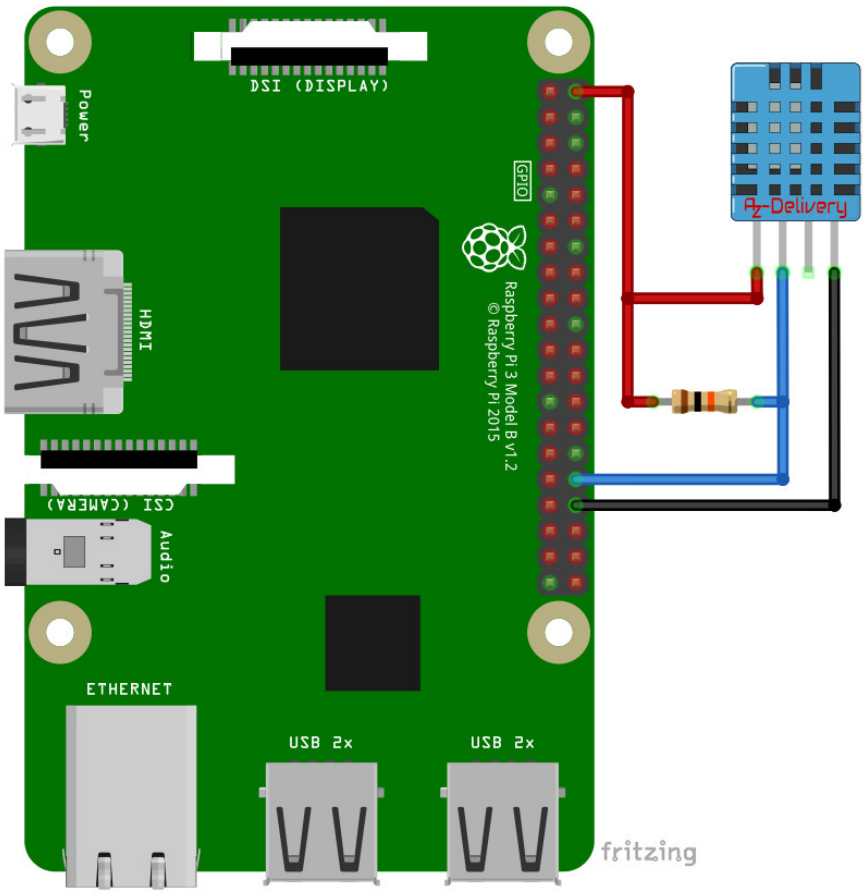
```
  delay(1500); // DHT11 sampling rate is 1HZ.
}
```

And when you open Serail Monitor (*Tools* > *Serail Monitor*), output should like this:



Connecting the module with Raspberry Pi

Connect Raspberry Pi and DHT11 as shown on connection diagram below:



DHT11 pin	**>**	**Raspberry Pi pin**		
VCC	>	5V	[PIN 2]	**Red Wire**
DATA	>	GPIO12	[PIN 32]	**Blue Wire**
GND	>	GND	[PIN 30]	**Black Wire**

Script example

Before we start creating scripts for DHT11, we first have to install a library. The library we are going to use is called *"Adafruit_DHT"*. To install it we first need to make sure Rasbian is up to date. Start your Raspberry Pi, open terminal and run these commands:

First command is for making the system up to date:

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

Second command is for installing python3-pip app. We will use pip app to install library:

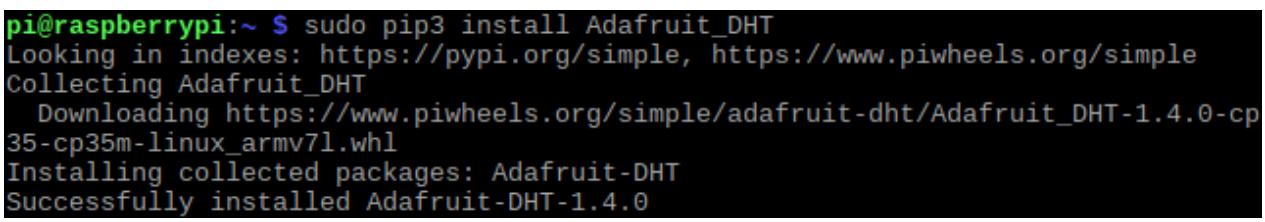
```
sudo apt-get install python3-pip
```

Third command is for installing other apps that pip app uses during installation:

```
sudo python3 -m pip install --upgrade pip setuptools wheel
```

And after this is completed, we can install library that we need. Run this command in terminal:

```
sudo pip3 install Adafruit_DHT
```



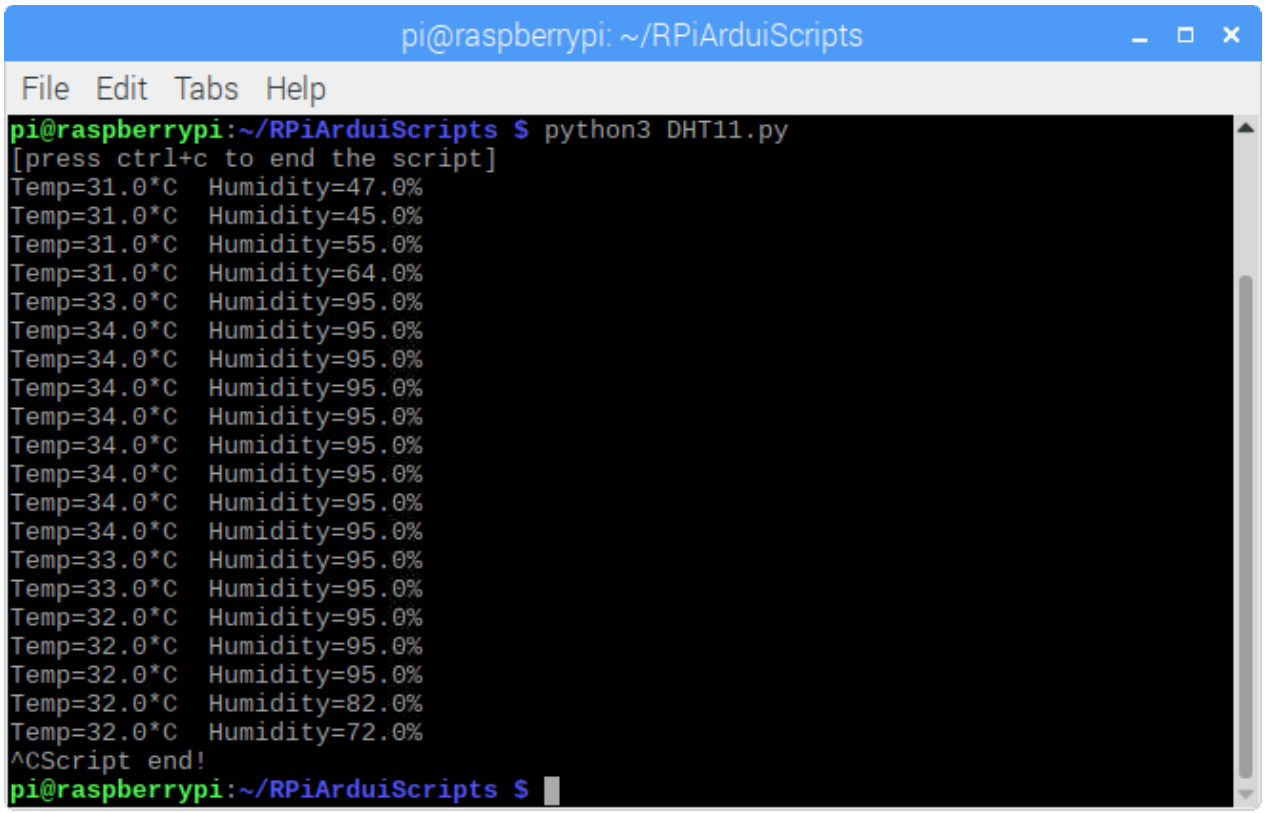
After everything is installed, we can start writing a script. Open text editor in Rasbian, and copy-paste this script:

```
import Adafruit_DHT
from time import sleep
sensor = Adafruit_DHT.DHT11
# DHT11 sensor connected to GPIO12.
pin = 12
print("[press ctrl+c to end the script]")
try: # Main program loop
   while True:
      humidity, temperature = Adafruit_DHT.read_retry(sensor,
                                                      pin)
      sleep(1.5)
      if humidity is not None and temperature is not None:
         print("Temp={0:0.1f}*C  Humidity={1:0.1f}%"
                              .format(temperature, humidity))
      else:
         print("Failed to get reading. Try again!")

# Scavenging work after the end of the program
except KeyboardInterrupt:
   print("Script end!")
```

Save this script as *"DHT11.py"* and to run it, run this command in terminal:
`python3 DHT11.py`

And the output should look like this:



You've done it, you can now use your module for your projects.

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

If you are looking for the Hochwertige Mikroelektronik und Zubehör, 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

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