

# DHT11 Humidity and Temperature Sensor

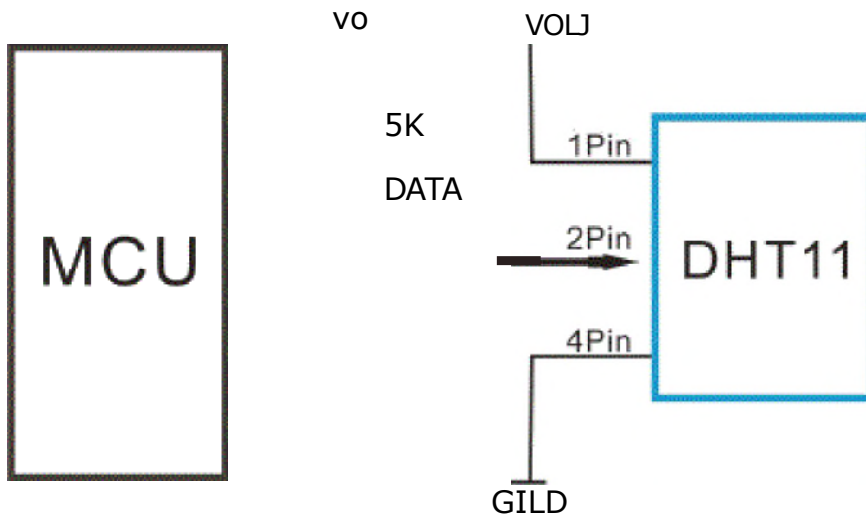
## Introduction

This *DHT11 Temperature and Humidity Sensor* features a calibrated digital signal output with the temperature and humidity sensor complex. Its technology ensures the high reliability and excellent long-term stability. A high-performance 8-bit microcontroller is connected. This sensor includes a resistive element and a sense of wet NTC temperature measuring devices. It has excellent quality, fast response, anti-interference ability and high cost performance advantages.

Each DHT11 sensors features extremely accurate calibration of humidity calibration chamber. The calibration coefficients stored in the OTP program memory, internal sensors detect signals in the process, we should call these calibration coefficients. The single-wire serial interface system is integrated to become quick and easy. Small size, low power, signal transmission distance up to 20 meters, making it a variety of applications and even the most demanding applications. The product is 4-pin single row pin package. Convenient connection, special packages can be provided according to users need.

## Specification

- Supply Voltage: +5 V
- Temperature range :0-50 °C error of  $\pm 2$  °C
- Humidity :20-90% RH  $\pm 5\%$  RH error
- Interface: Digital



## Sample Code

We recommend to use the third demo code here, because it comes from Arduino site.

### Demo code 1

```
#define DHT11_PIN 0 // define analog port 0

byte read_dht11_dat()

byte i = 0;
byte result=0;
for(i=0; i< 8; i++)

    while(!(PINC & _BV(DHT11_PIN)))

}; // wait forever until analog input port 0 is '1' (NOTICE: PINC reads all the analog input ports
//and _J31700 is the macro operation which pull up position 'X' to '1' and the rest positions to '0'. it is e
delayMicroseconds(30);
if(PINC & BV(DHT11_PIN)) //if analog input port 0 is still '1' after 30 us
    result I=(1<<(7-i)); //this position is 1
while((PINC & _BV(DHT11_PIN))); // wait '1' finish

return result;

void setup()

DDRC 1= BV(DHT11_PIN); //let analog port 0 be output port
PORTC 1= BV(DHT11_PIN); //let the initial value of this port be '1'
Serial.begin(9600);
Serial.println("Ready");

void loop()

byte dht11_dat[5];
byte dht11_in;
byte i; // start condition

PORTC &= _BV(DHT11_PIN);          1.    pull-down i/o pin for 18ms
delay(18);
PORTC 1= BV(DHT11_PIN);          2.    pull-up i/o pin for 40us
delayMicroseconds(1);
DDRC &= _BV(DHT11_PIN);          //let analog port 0 be input port
delayMicroseconds(40);

dht11_in = PINC & _BV(DHT11_PIN); // read only the input port 0
(dht11_in)
Serial.println("dht11 start condition 1 not met"); // wait for DHT response signal: LOW
delay(1000);
return;
```

```

delayMicroseconds(80);
dhtll_in = PINC & _BV(DHT11_PIN); //
if(!dhtll_in)
1
  Serial.println("dhtll start condition 2 not met"); //wait for second response signal:HIGH return;

delayMicroseconds(80); // now ready for data reception
for (i=0; i<5; i++)
{
  dhtll_dat[i] = read_dhtll_dat();
  //recieved 40 bits data. Details are described in datasheet

  DDRC 1= BV(DHT11_PIN); //let analog port 0 be output port after all the data have been received
  PORTC 1= IXT(DHT11_PIN); //let the value of this port be '1' after all the data have been received
  byte dhtll check sum = dhtll dat[0]+dhtll dat[1]+dhtll dat[2]+dhtll dat[3]; // check check sum
  if(dhtll_dt[4]!= dhtll_checic_sum)
  {
    Serial.println("DHT11 checksum error");
    Serial.print("Current humidity = ");
    Serial.print(dhtll_dat[0], DEC);
    Serial.print(".");
    Serial.print(dhtll_dat[1], DEC);
    Serial.print("% ");
    Serial.print("temperature = ");
    Serial.print(dhtll_dat[2], DEC);
    Serial.print(".");
    Serial.print(dhtll_dat[3], DEC);
    Serial.println("C ");
    delay(2000); //fresh time
  }
}

```

## Code 2

This code contributed **by:Camel**

```

#define dhtll_pin 14 //Analog port 0 on Arduino Uno
//ifdefine dhtll_pin 54 //Analog port 0 on Arduino Mega2560

byte read_dhtll_dat()

{
  byte i = 0;
  byte result=0;
  for(i=0; i< 8; i++)

  {
    while (!digitalRead(dhtll_pin));
    delayMicroseconds(30);
    if (digitalRead(dhtll_pin) != 0 )
      bitSet(result, 7-i);
    while (digitalRead(dhtllpin));
  }
  return result;
}

void setup()

{
  pinMode(dhtll_pin, OUTPUT);
  digitalWrite(dhtllpin, HIGH);
  Serial.begin(9600);
  Serial.println("Ready");
}

void loop()

{
  byte dhtll_dat[5];
  byte dhtll_in;
  byte i; // start condition
}

```

```

digitalWrite(dht11_pin, LOW);
delay(18);
digitalWrite(dht11_pin, HIGH);
delayMicroseconds(1);
pinMode(dht11_pin, INPUT);
delayMicroseconds(40);

if (digitalRead(dht11_pin))

    Serial.println("dht11 start condition 1 not met"); // wait for DHT response signal: LOW delay(1000);
    return;
1
delayMicroseconds(80);
if (!digitalRead(dht11_pin))

    Serial.println("dht11 start condition 2 not met"); //wait for second response signal:HIGH return;
1

delayMicroseconds(80); // now ready for data reception
for (i=0; i<5; i++)
{ dht11dat[i] = readDHT11dat();} //recieved 40 bits data. Details are described in datasheet

pinMode(dht11_pin, OUTPUT);
digitalWrite(dht11_pin, HIGH);
byte dht11_check_sum = dht11_dat[0]+dht11_dat[2]; // check check_sum
if(dht11_dat[4]!= dht11_check_sum)

    Serial.println("DHT11 checksum error");
1
Serial.print("Current humidity = ");
Serial.print(dht11_dat[0], DEC);
Serial.print("% ");
Serial.print("temperature = ");
Serial.print(dht11_dat[2], DEC);
Serial.println("C ");
delay(2000); //fresh time

```

## Code 3

Code From: <http://playground.arduino.cc/Main/DHT11Lib>

```
#include <dht11.h>
'dht11 DHT11;
#define DHT11PIN 3 //DHT11 PIN 3 connect to UNO 3

void setup()

  Serial.begin(115200);
  Serial.println("DHT11 TEST PROGRAM ");
  Serial.print("LIBRARY VERSION: ");
  Serial.println(DHT11LIB_VERSION);
  Serial.println();

void loop()

  Serial.println("\n");

  int chk = DHT11.read(DHT11PIN);

  Serial.print("Read sensor: ");
  switch (chk)

    case DHTLIB_OK:
      Serial.println("OK");
      break;
    case DHTLIB_ERROR_CHECKSUM:
      Serial.println("Checksum error");
      break;
    case DHTLIB_ERROR_TIMEOUT:
      Serial.println("Time out error");
      break;

    default:
      Serial.println("Unknown error");
      break;

  1
  Serial.print("Humidity (%): ");
  Serial.println((float)DHT11.humidity, 2);
  Serial.print("Temperature (oC): ");
  Serial.println((float)DHT11.temperature-2, 2);
  delay(2000);
```