Lesson 14 DHT11 Temperature and Humidity Sensor

Introduction

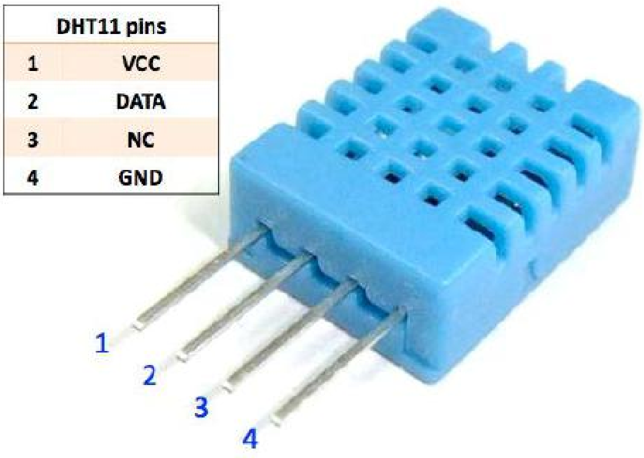
In this lesson, you will learn how to use a DHT11 Temperature and Humidity Sensor.

Hardware Required

- ✓ 1 * RuiiGuu UNO R3
- ✓ 1 * DHT11 Temperature and Humidity module
- ✓ 3 * F-M Jumper Wires

Principle

DHT11 Temperature and Humidity Sensor



DHT11 pins	
1	VCC
2	DATA
3	NC
4	GND

DHT11 output calibrated digital signal. It applies exclusive digital-signal-collecting-technique and humidity sensing technology, assuring its reliability and stability. Its sensing elements are connected with an 8-bit single-chip computer. Every sensor of this model is temperature compensated and calibrated in an accurate calibration chamber and the calibration-coefficient is saved in the type of program in OTP memory when the sensor is detecting, it will cite the coefficient from memory.

Small size & low consumption & long transmission distance(100m) enable DH T11 to be suited in all kinds of
harsh application occasions. Single-row packaged with four pins, making the c onnection very convenient.

Supply voltage: DC 3.3 to 5.5V

Measuring range (T) : -20 to +60 Celsius(-4 to +140 Fahrenheit)

Measuring range (RH): 5 to 95% relative humidity

Typ. Temperature accuracy: ±2 Celsius

Typ. Humidity accuracy: ±5%RH at 25 Celsius

Long term drift(T): <1 Celsius/year

Long term drift(RH) : <1%RH/year

Resolution(T): 0.1 Celsius

Resolution(RH): 1%RH

Sensor Type: Capacitive sensor

Interface: One line digital

Housing material: ABS

Net weight: 1g

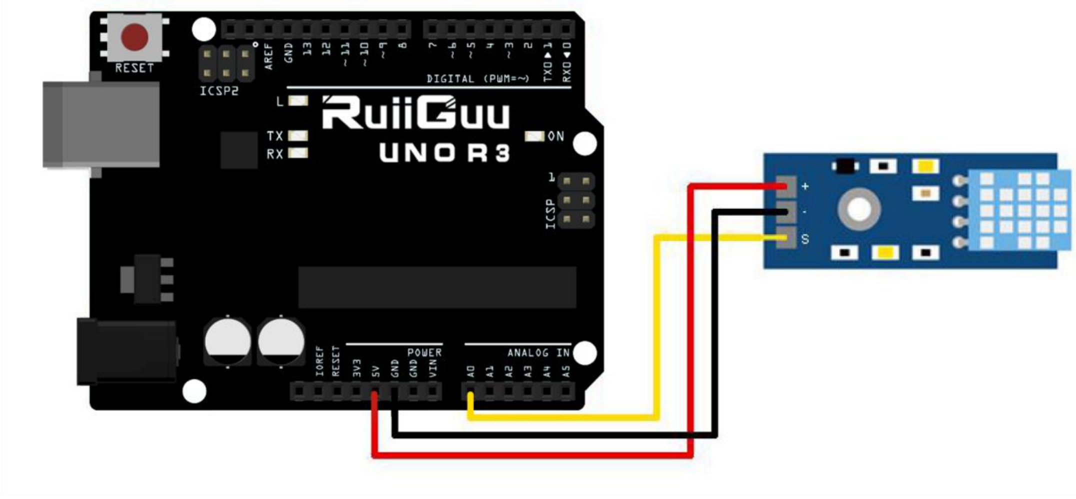
Code interpretation

```
#define DHT11_PIN 0 // pin A0

byte read_dht11_dat()

{
  byte i = 0;

  byte result=0;

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

  while(!(PINC & _BV(DHT11_PIN))); // wait for 50us

  delayMicroseconds(30);

  if(PINC & _BV(DHT11_PIN))

  result |=(1<<(7-i));

  while((PINC & _BV(DHT11_PIN))); // wait '1' finish

  }

  return result;

}

void setup()

{

  DDRC |= _BV(DHT11_PIN);

  PORTC |= _BV(DHT11_PIN);

  Serial.begin(19200);

  Serial.println("Ready");

}

void loop()

{

  byte dht11_dat[5];

  byte dht11_in;
  byte i;
  // start condition
  // 1. pull-down i/o pin from 18ms
  PORTC &= ~_BV(DHT11_PIN);
  delay(18);
  PORTC |= _BV(DHT11_PIN);
  delayMicroseconds(40);
  DDRC &= ~_BV(DHT11_PIN);
  delayMicroseconds(40);
  dht11_in= PINC & _BV(DHT11_PIN);
  if(dht11_in){
  Serial.println("dht11 start condition 1 not met");
  return;
  }
  delayMicroseconds(80);
  dht11_in = PINC & _BV(DHT11_PIN);
  if(!dht11_in){
  Serial.println("dht11 start condition 2 not met");
  return;
  }
  delayMicroseconds(80);
  // now ready for data reception
```

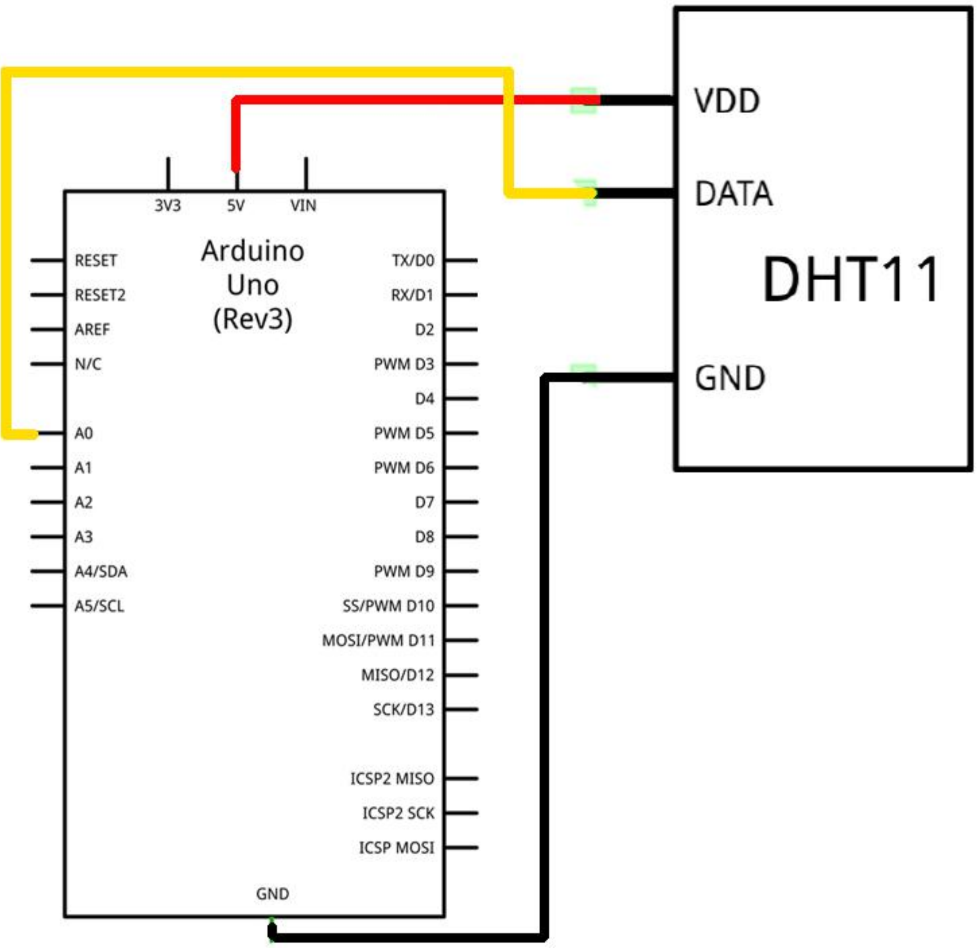
```
 for (i=0; i<5; i++)

 dht11_dat[i] = read_dht11_dat();

 DDRC |= _BV(DHT11_PIN);

 PORTC |= _BV(DHT11_PIN);

 byte dht11_check_sum =
dht11_dat[0]+dht11_dat[1]+dht11_dat[2]+dht11_dat[3];

 // check check_sum

 if(dht11_dat[4]!= dht11_check_sum)

 {

 Serial.println("DHT11 checksum error");

 }

 Serial.print("Current humdity = ");

 Serial.print(dht11_dat[0], DEC);

 Serial.print(".");

 Serial.print(dht11_dat[1], DEC);

 Serial.print("% ");

 Serial.print("temperature = ");

 Serial.print(dht11_dat[2], DEC);

 Serial.print(".");

 Serial.print(dht11_dat[3], DEC);

 Serial.println("C ");

 delay(2000);

}
```

Experimental Procedures

Step 1: Build the circuit

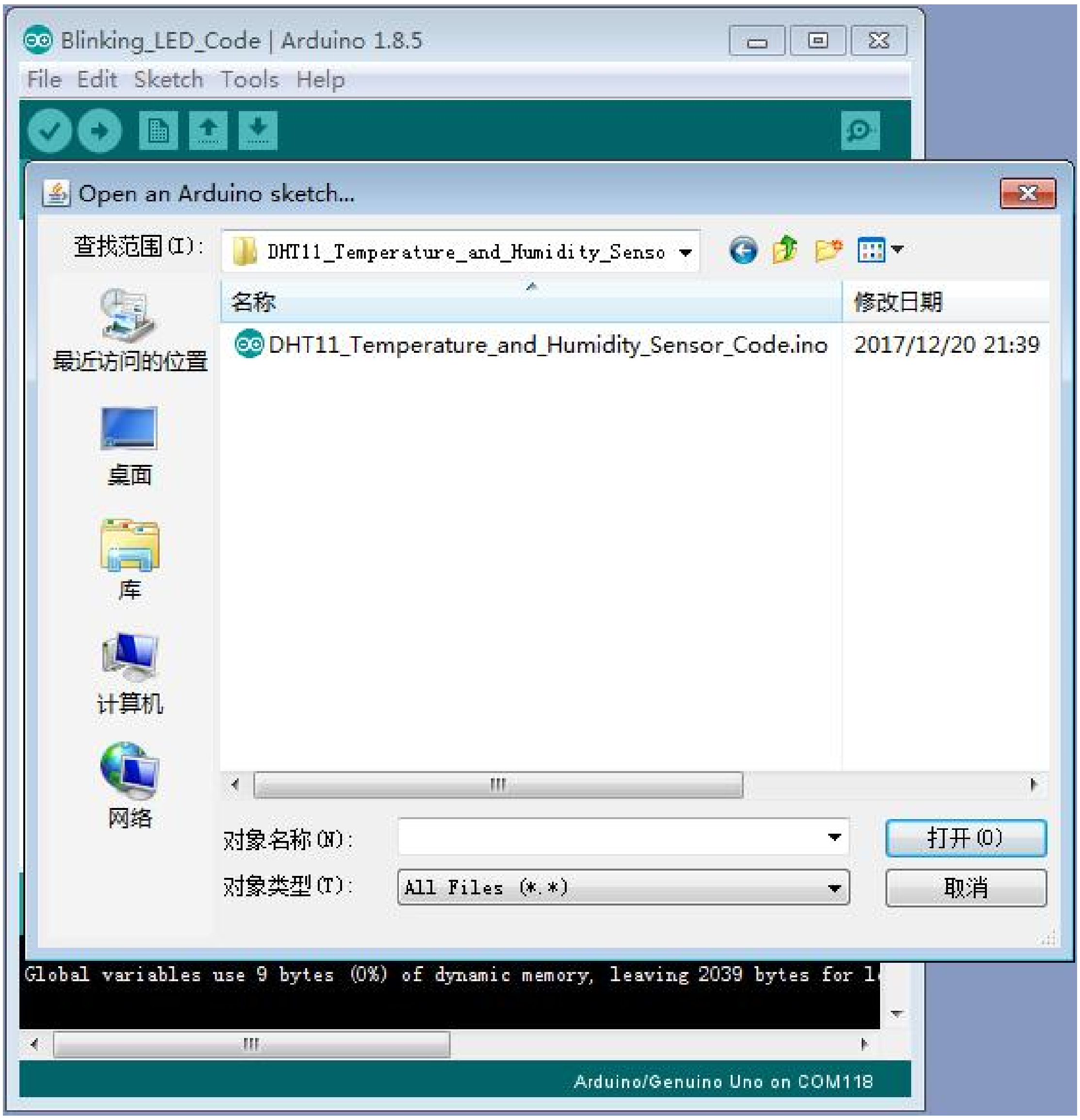


Schematic Diagram



Step 2: Open the code:

DHT11_Temperature_and_Humidity_Sensor_Code



Blinking_LED_Code | Arduino 1.8.5
File Edit Sketch Tools Help
Open an Arduino sketch...
查找范围(I):
DHT11_Temperature_and_Humidity_Senso
最近访问的位置
桌面
库
计算机
网络
名称
修改日期
DHT11_Temperature_and_Humidity_Sensor_Code.ino
2017/12/20 21:39
对象名称(N):
对象类型(T):
All Files (*.*)
打开(O)
取消
Arduino/Genuino Uno on COM118

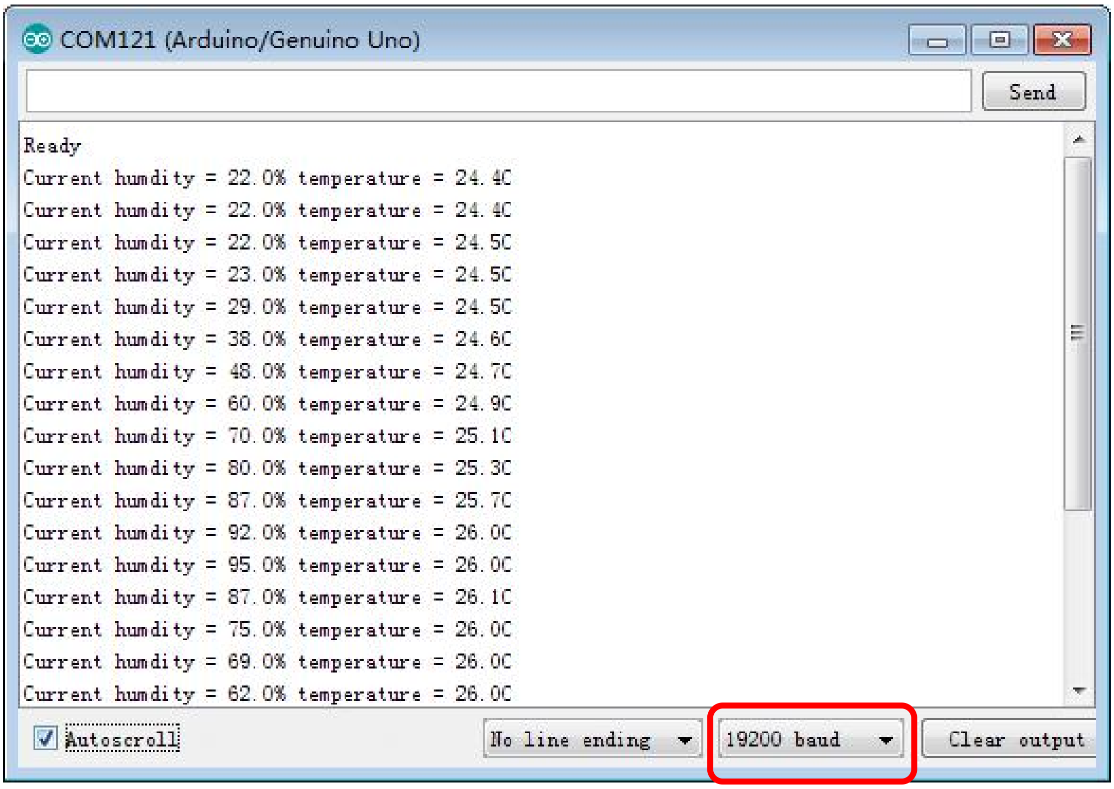
```
Global variables use 9 bytes (0%) of dynamic memory, leaving 2039 bytes for l
```

Step 3: Attach Arduino UNO R3 board to your computer via USB cable and check that the 'Board Type' and 'Serial Port' are set correctly.

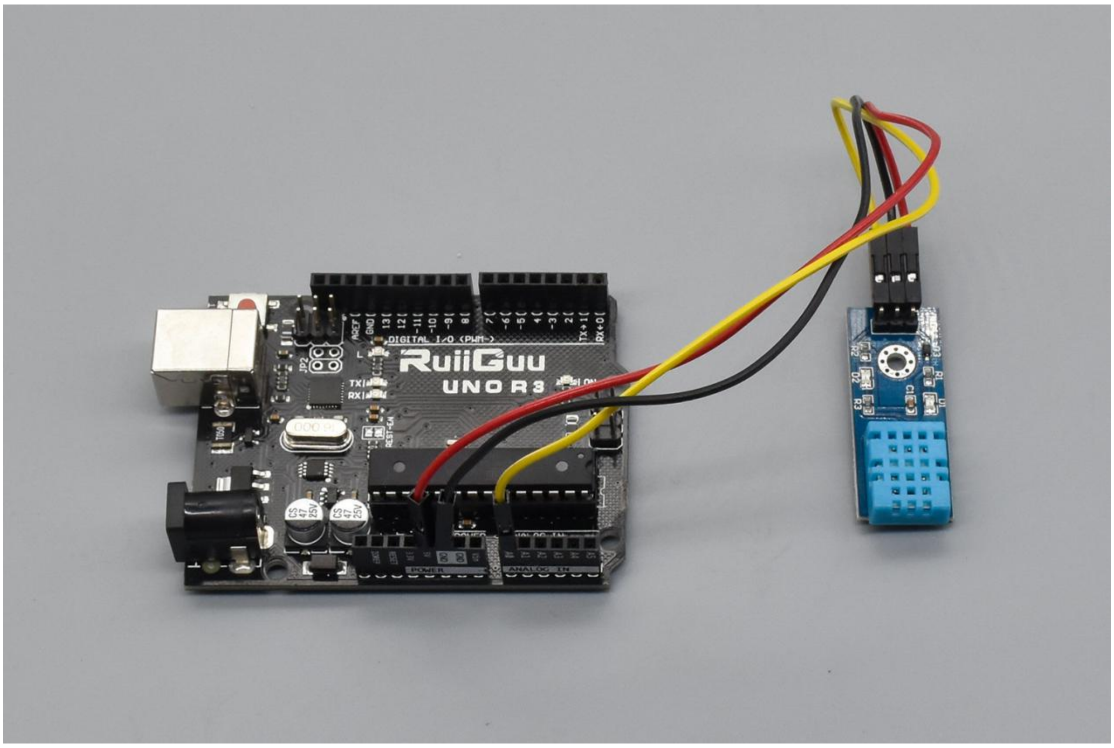
Step 4: Upload the code to the RuiiGuu UNO R3 board.

Step 5: Open the Serial Monitor, alter the baud rate to 19200, then you can see the data as below:

(How to use the Serial Monitor is introduced in details in Lesson 0 Preface)



```
Ready
Current humdity = 22.0% temperature = 24.4C
Current humdity = 22.0% temperature = 24.4C
Current humdity = 22.0% temperature = 24.5C
Current humdity = 23.0% temperature = 24.5C
Current humdity = 29.0% temperature = 24.5C
Current humdity = 38.0% temperature = 24.6C
Current humdity = 48.0% temperature = 24.7C
Current humdity = 60.0% temperature = 24.9C
Current humdity = 70.0% temperature = 25.1C
Current humdity = 80.0% temperature = 25.3C
Current humdity = 87.0% temperature = 25.7C
Current humdity = 92.0% temperature = 26.0C
Current humdity = 95.0% temperature = 26.0C
Current humdity = 87.0% temperature = 26.1C
Current humdity = 75.0% temperature = 26.0C
Current humdity = 69.0% temperature = 26.0C
Current humdity = 62.0% temperature = 26.0C
```



If it isn’t working, make sure you have assembled the circuit correctly, verified and uploaded the code to your board. For how to upload the code and install the library, check Lesson 0 Preface.