Temperature Sensor Waterproof(DS18b20)

Overview

The Me Temperature Sensor module is a metal tube thermometer with DS18B20 detector. Featuring strong anti-interference ability and high accuracy, it is covered with waterproof rubber hose outside and able to measure temperature in the range -55℃~+125℃. It can be connected to the RJ25 Adapter module which is then connected to Makeblock Orion for temperature measurement.

Technical specifications

● Operating voltage: 5V DC

● Sensor type: DS18B20

● Temperature range: -55℃~125℃

● Control mode: Single bus port

● Dimension: 500 x 6 x 6mm

Functional characteristics

● 9~12 bits A/D conversion accuracy

● High precision: ±0.5℃ (-10℃~+85℃)

● Probe diameter 6 mm, length 50 mm approximately, total length 1 m (including line)

● Short time delay in temperature conversion, maximum 750ms

● Support multi-point networking

● Perfect waterproof property

● Support mBlock GUI programming, and applicable to users of all ages

Pin definition

The port of Me Temperature Sensor has three pins, and their functions are as follows:

No.	Pin	Color	Function
1	GND	Black	Grounding
2	VCC	Red	Power supply
3	SIG	Yellow	Output the temperature signal

Wiring mode

● Connecting with RJ25

If you want to connect to a thermometer through the RJ25 port, simply connect it to the RJ25 Adapter module, and then connect the module to Makeblock Orion as follows:
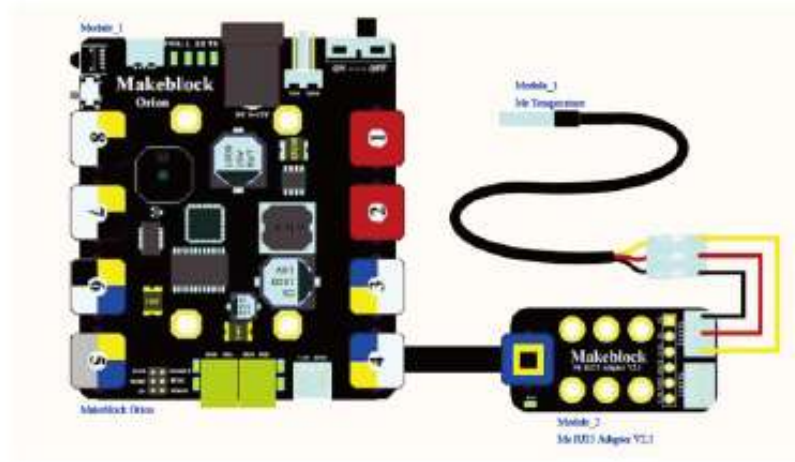
Figure 1 Connecting Me Temperature Sensor to Makeblock Orion

● Connecting with Dupont wire

When the Dupont wire is used to connect the module to the Arduino UNO Baseboard, its SIG pin should be connected to digital port as follows:
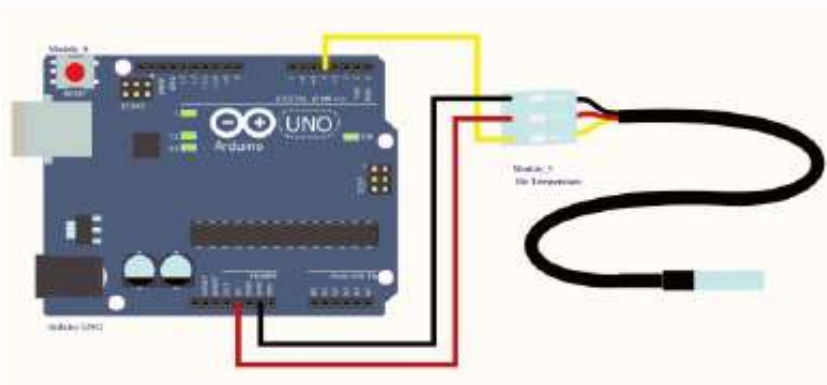

Figure 2 Connecting Me Temperature Sensor to Arduino UNO

Guide to programming

● Arduino programming

If you use Arduino to write a program, the library Makeblock-Library-master should be invoked to control the Me Temperature Sensor-Waterproof.

This program serves to read current temperature through Arduino programming.
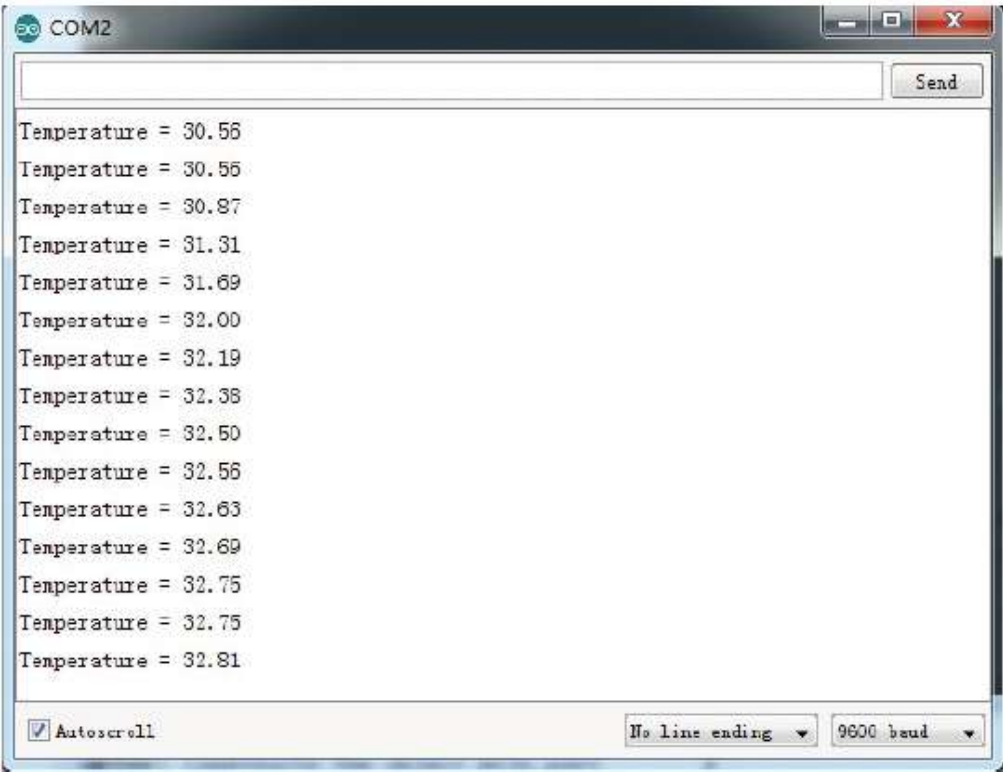
```
01    #include "MeOrion.h"
02    #include <Wire.h>
03    #include <SoftwareSerial.h>
04
05    MeTemperature myTemp(PORT_4, SLOT2);
06
07    void setup()
08    {
09        Serial.begin(9600);
10    }
11
12    void loop()
13    {
14        Serial.print("Temperature=");
15        Serial.println(myTemp.temperature() );
16        delay(1000);
17    }
```

Function List of Me Temperature Sensor-Waterproof

Function name	Function
MeTemperature(uint8_t port,uint8_t slot)	Select a port
reset(uint8_t port,uint8_t slot)	Reset the port and slot
temperature()	Read temperature value

The code segment serves to read the readings of Me Temperature Sensor and output the result to the serial monitor in Arduino IDE with the cycle of 1s.

Upload the code segment to Makeblock Orion, click the Arduino serial monitor and you will see the running result as follows:
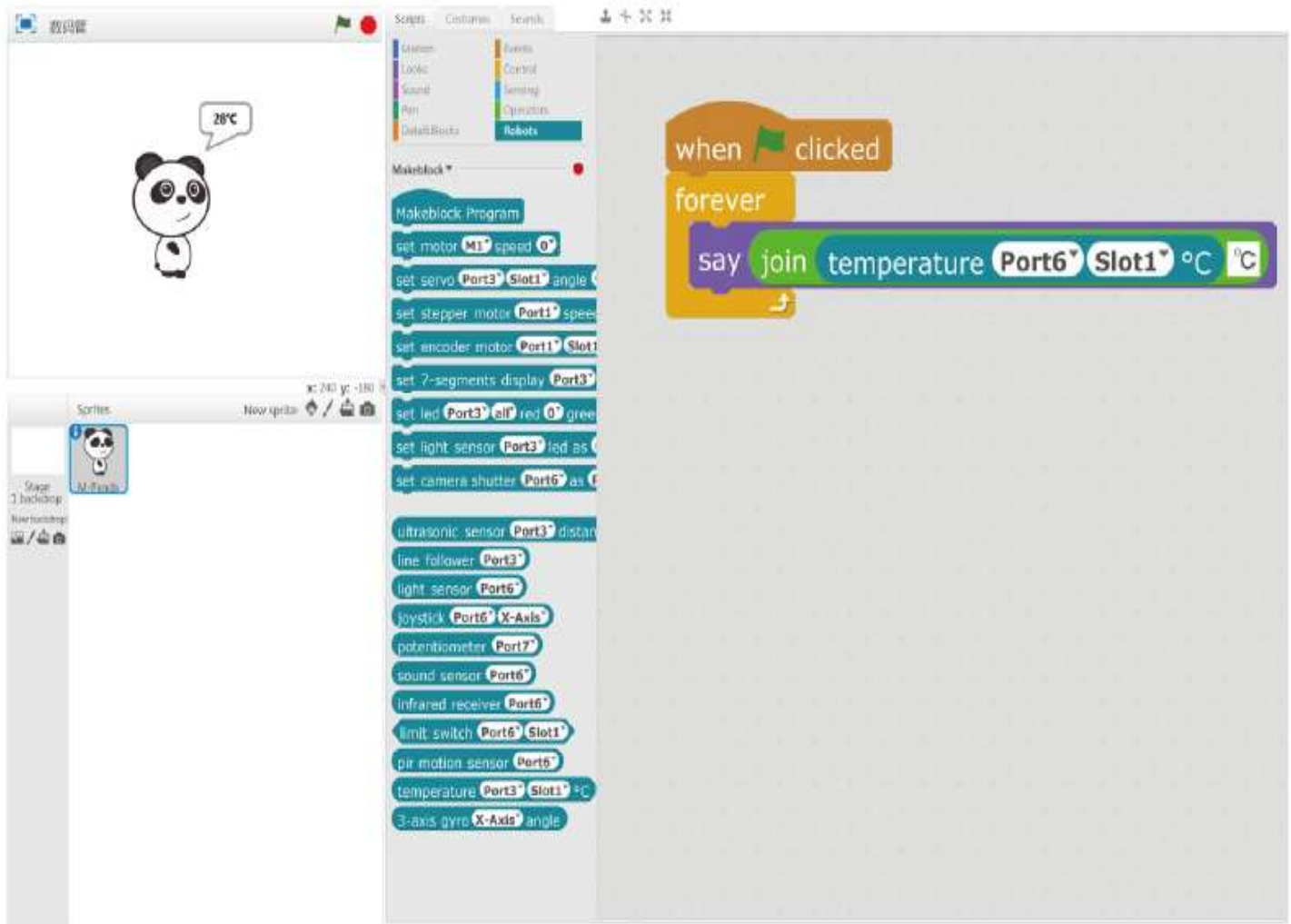
● mBlock programming

The Me Temperature Sensor-Waterproof module supports the mBlock programming environment and its instructions are introduced as follows:

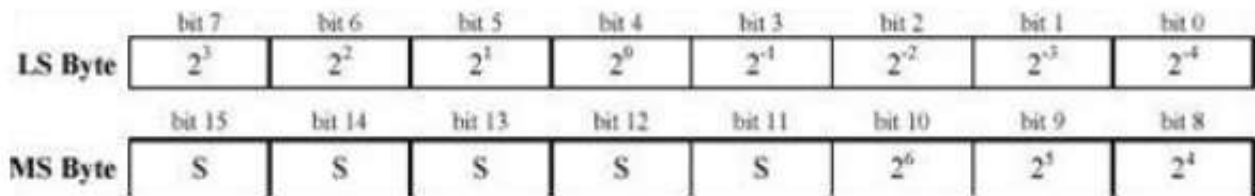| Programming description	Introduction
temperature Port3ˇ Slot1ˇ °C	Parameter 1: Select a port Parameter 2: Select a slot Function: Read the value of temperature

This is an example on how to use mBlock to control the Me Temperature Sensor module.

It will make the panda speaking out the value of temperature captured by the Me Temperature Sensor, and the running result is as follows:

Principle analysis

With the main component DS18B20, the Me Temperature Sensor module features miniaturization, low power consumption, high performance, strong anti-interference ability, and matching with microprocessor easily. Adopting unique single bus port mode, DS18B20 is in connection with a microprocessor by only a bus to implement two-way communication between the microprocessor and DS18B20. The module supports the function of multi-point networking, so several DS18B20 can be connected in parallel on the only three-line to implement multi-point temperature measurement, and the measurement results are transmitted in 9~12 bits serial digital mode. When communicated with a single chip computer, you can set the resolution by configuring the register.

The temperature sensor in DS18B20 implements measurement of temperature and provides results in 16-bit binary, in which S is the sign bit.

	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
LS Byte	2^3	2^2	2^1	2^0	2^{-1}	2^{-2}	2^{-3}	2^{-4}

	bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8
MS Byte	S	S	S	S	S	2^6	2^5	2^4

For example:

The digital output of +125℃ is 07D0H (For a positive temperature, directly convert the hexadecimal number into a decimal number).

The digital output of -55℃ is FC90H (For a negative temperature, invert the hexadecimal number and increase it by 1, and then convert into a decimal number).

温度/℃	二进制表示	十六进制表示
+125	00000111 11010000	07D0H
+25.0625	00000001 10010001	0191H
+10.125	00000000 10100010	00A2H
+0.5	00000000 00001000	0008H
0	00000000 00000000	0000H
-0.5	11111111 11111000	FFF8H
-10.125	11111111 01011110	FF5EH
-25.0625	11111110 01101111	FE6FH
-55	11111100 10010000	FC90H