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DS18B20 Temperature Sensor

Sensor

📅 November 1, 2012 by 👤 AngliaYi

Introduction

The DS18B20 digital thermometer provides 9-bit to 12-bit Celsius temperature measurements and has an alarm function with nonvolatile user-programmable upper and lower trigger points. The DS18B20 communicates over a [1-Wire® bus](#) that by definition requires only one data line (and ground) for communication with a

from the data line (parasite power), eliminating the need for an external power supply.

Each DS18B20 has a unique 64-bit serial code, which allows multiple DS18B20s to function on the same 1-Wire bus. Thus, it is simple to use one microcontroller to control multiple DS18B20s distributed over a large area. Applications that can benefit from this feature include HVAC environmental controls, temperature monitoring systems inside buildings, equipment, or machinery, process monitoring and control systems.

Key Features

- Unique 1-Wire Interface Requires Only One Pin for Communication
- Each Device has a Unique 64-Bit Serial Code Stored in an On-Board ROM
- Multidrop Capability Simplifies Distributed Temperature-Sensing Applications
- Requires No External Components
- Can Be Powered from Data Line; Power Supply Range is 3.0V to 5.5V, for long distance, power is necessary.
- Measures Temperatures from -55°C to $+125^{\circ}\text{C}$ (-67°F to $+257^{\circ}\text{F}$)
- $\pm 0.5^{\circ}\text{C}$ Accuracy from -10°C to $+85^{\circ}\text{C}$
- Thermometer Resolution is User Selectable from 9 to 12 Bits
- Converts Temperature to 12-Bit Digital Word in 750ms (Max)
- User-Definable Nonvolatile (NV) Alarm Settings
- Alarm Search Command Identifies and Addresses Devices Whose Temperature is Outside Programmed • • • Limits (Temperature Alarm Condition)
- Available in 8-Pin SO (150 mils), 8-Pin μSOP , and 3-Pin TO-92 Packages
- Software Compatible with the DS1822

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**Cytron Technolo
Sdn Bhd**

on Thursday

"The three most dangerous things in the world are a program without a soldering iron, a hardware without a program patch and an idea without an idea." — Rick

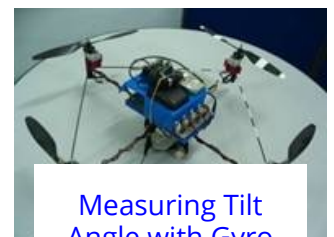
Boleh kami tahu, antara lain siapa yang ada soldering ataupun tools di rumah/ kantin masing? 🤔👤

Kepada yang masih belum berani risau 🤖 kami ada

Popular Post



SK40C +
PIC18F4550 as
Pinguino



Measuring Tilt
Angle with Gyro
and
Accelerometer

- Thermally Sensitive System

Hardware required:

- [DS18B20](#) Temperature Sensor x1



- [SK40C + PIC16F877A](#) with LCD x1



Software required:

- [MPLAB IDE & HITECH C PRO Installation](#)
- [PICKIT 2](#)

Related References:



[Getting Started with CIKU](#)

How to create a project

- [Getting Started with SK40C](#)
- [Temperature Sensor Datasheet](#)

Project:

Using DS18B20 temperature sensor

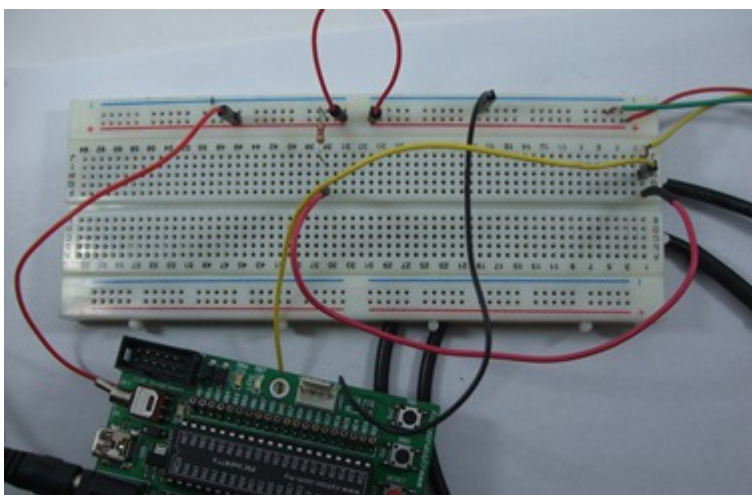
Procedure:

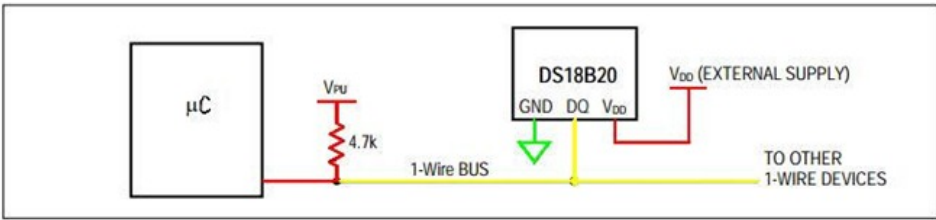
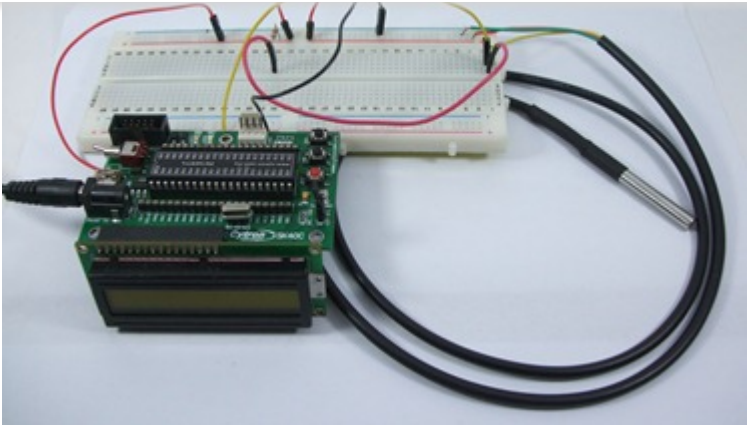
In this project, we are going to measuring the environment temperature using the [water proof DS18B20 temperature sensor](#). This type of sensor are quite special since it only use the One-Wire-protocol to read the temperature and to write any command into the sensor.

Since it only use 1 wire for signal and give command, so I will use RB0 as the only port to control the temperature sensor and to read it.

Connection

The connection for my project is as below





The colour of the sensor are following the colour of the diagram

Sensor	Colour
Red	Vin
Green	Gnd
Yellow	Data

Programming and Result

Let’s take a look at the sample code before we proceed to explanation.

This is the main body of the sample coding. In this part we are setting up the sensor and at the second part, we are accepting the reading from the sensor and convert it further publish the value to the LCD screen,


```

write(Convert_1);
delay_ms(750);

reset();
write(Skip_ROM);
write(Read_scratchpad);

tempL = read(); //read low temp value
tempH = read(); //read high temp value
i=((unsigned int)tempH << 8) + (unsigned int)tempL; //put both value in one variable
i = (float)i * 6.25; //calculation from the table provided
lcd_goto(0xc0);
lcd_bcd(5,i); //display the temperature in LCD
}
}

```

We need to 1st reset the sensor. This is to check the availability of the sensor present in the communication line. If the sensor is present we will proceed to the read temperature step.

```

unsigned char reset()
{
    Tx_18B20; // Tris = 0 (output)
    Port_18B20 = 0; // set pin# to low (0)
    __delay_us(480); // 1 wire require time delay
    Rx_18B20; // Tris = 1 (input)
    __delay_us(60); // 1 wire require time delay

    if (Port_18B20 == 0) // if there is a presence pluse
    {
        __delay_us(480);
        return 0; // return 0 ( 1-wire is presence)
    }
    else
    {
        __delay_us(480);
        return 1; // return 1 ( 1-wire is NOT presence)
    }
}

```

The reading function.

```

unsigned char read()
{
    char i,result = 0;
    Rx_18B20; // TRIS is input(1)
    for(i = 0; i < 8; i++)
    {
        Tx_18B20; // TRIS is output(0)
        Port_18B20 = 0; // generate low pluse for 2us
        __delay_us(2);
        Rx_18B20; // TRIS is input(1) release the bus
        if(Port_18B20 != 0)
            result |= 1<<i;
        __delay_us(60); // wait for recovery time
    }
    return result;
}

```

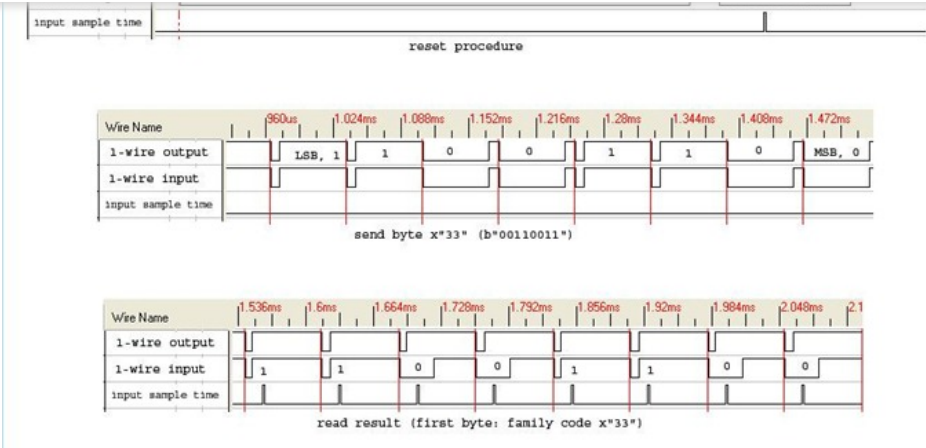
```
void write(char WRT)
{
    char i,Cmd;
    Cmd=WRT;
    Rx_18B20; // set pin# to input (1)

    for(i = 0; i < 8; i++)
    {
        if((Cmd & (1<<i))!= 0)
        {
            // write 1
            Tx_18B20; // set pin# to output (0)
            Port_18B20 = 0; // set pin# to low (0)
            __delay_us(1); // 1 wire require time delay
            Rx_18B20; // set pin# to input (release the bus)
            __delay_us(60); // 1 wire require time delay
        }
        else
        {
            //write 0
            Tx_18B20; // set pin# to output (0)
            Port_18B20 = 0; // set pin# to low (0)
            __delay_us(60); // 1 wire require time delay
            Rx_18B20; // set pin# to input (release the bus)
        }
    }
}
```

Explanation

Maybe you are curious to know why one wire can do so many thing including read (receive) and write(transmit). Actually this sensor utilize the one wire protocol. Referring to the figure below, try to understand how the read and write works.

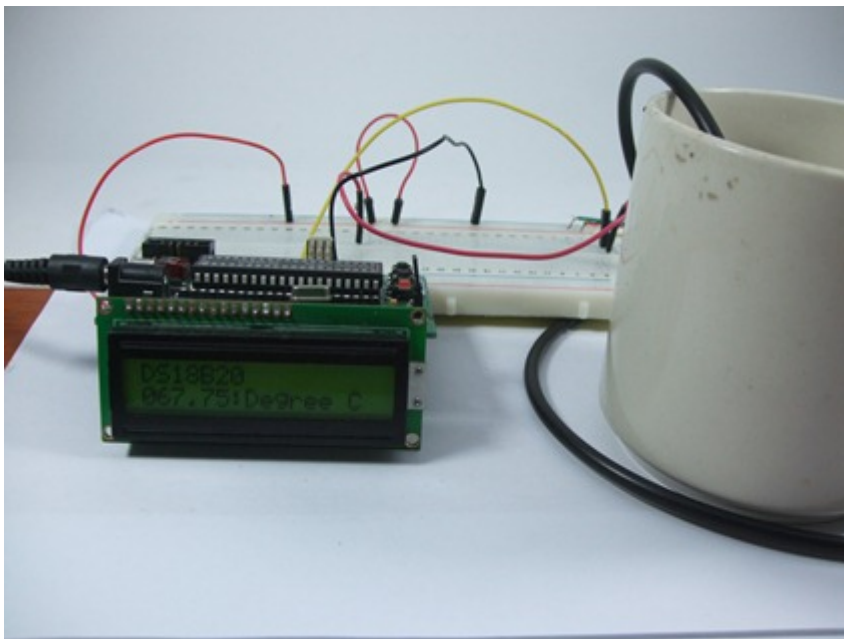
It is hard for me to explain here since it will consume few pages of words 😊 I would strongly suggest you to read it at Wikipedia pages [HERE](#)



RESULT



Initial condition for the sensor to sense room temperature



HOT WATER AROUND ~68 degree Celsius..... Yes, you can submerge it in to water or liquid 😊 Quite fun!

This sensor is perfect due to water proof feature and simple interface. Besides, you can also do multiple sensor in a network as it has unique address.

PROBLEM MAY OCCUR

- Please do take care of the voltage polarity, supplying wrong polarity of power will damage the sensor permanently.

tutorial 😊

Sample Coding

- [DS18B20 Example Code](#)

Buy

 [BUY THE PARTS](#)

 [DS18B20, SK40C, Temperature sensor](#)

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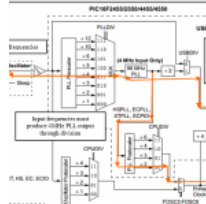
Getting Started with Temperature Sensor (Celsius) (SN-LM35DZ)



Control and Monitor via SMS Part 2



Simple steps to control Stepper Motor using 2Amp Motor Driver Shield and CIKU



PIC16F VS PIC18F: Analysis of PIC Mid-Range 8 bit family and Advanced 8-bits Family

13 thoughts on “DS18B20 Temperature Sensor”



zack says:

November 11, 2012 at 11:31 pm

can i use this component to measure hot oil?i want to measure cooking oil temperature



ober says:

November 13, 2012 at 9:28 am

Not really sure. What is the expected temperature for the oil when it is cooked? Because the maximum operating temperature for this sensor is +125 degree Celsius. Besides, we do not know will the shrinking material that wrap the sensor react with the cooking oil.



AGPDL says:

January 30, 2013 at 5:47 pm

When I try to “rebuild” the code in MPLAB, the build failed with message :
“Error [712] H:\Arduino\Projects-PIC\DS18B20\Example Code\lcd.c: 295. can’t

What could be the problem ?

Thank you.



IT says:

June 5, 2013 at 4:36 pm

What are the functions:

Skip_ROM
Read_Scrachpad
Convert_T



rubaan says:

October 28, 2013 at 8:51 am

hi,
do you have any codes for multiple DS8S20 in a 1-
wire
or any help you can give me?



Xac says:

August 8, 2015 at 10:25 am

Yo,
Just bought this months ago and I tried to use the
file to run on Arduino but failed. Can this be run on
it? Thanks!



ober says:

August 9, 2015 at 11:56 am

Just search Arduino DS18B20 in google, I am sure
you will get plenty of example 😊



Can i ask you ,how to get the reading with using a programmable logic controlled (PLC),and how to convert the output voltage from the sensor to the degree of calcius



Hello. I need to rename my sensors rather than having just a serial number. Can you point me in the right direction?



hi can i use this sensor with pic18f452 microcontroller?



Hi, of course you can. But we don't have sample code for that.



Hi friends i'm stuck trying to program PIC16F877A to read temperature from a temp sensor and display the result on an Lcd. The design with a C-code successfully simulated on proteus but i've not

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