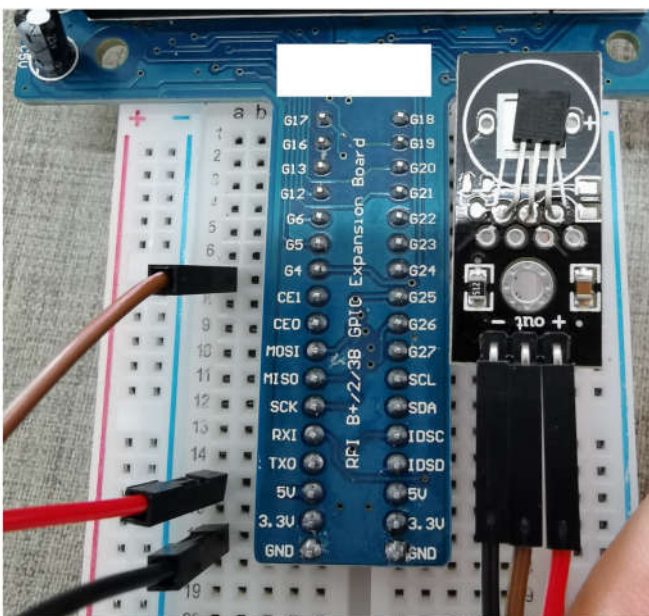


智能系统与控制

树莓派：单总线温度传感器 ds18b20



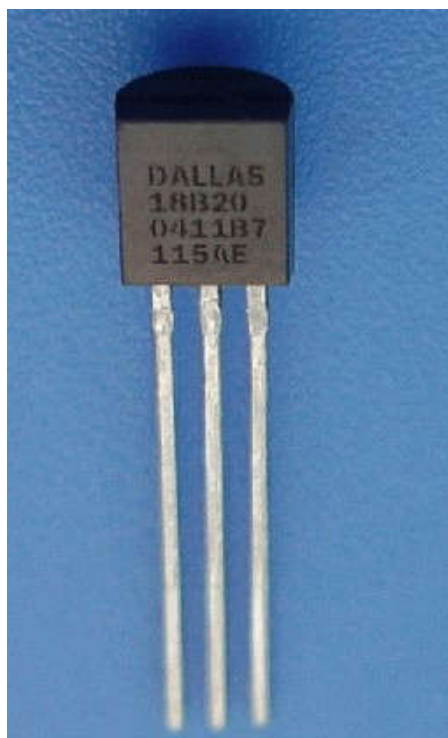
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ds18b20



DS18b20 是最常见的数字温度传感器，

体积小；精度高（0.625 摄氏度）；

接线简单，无需外围短路（信号引脚加一个上拉电阻）；

DS18b20 采用了独特的**单总线接**口，只需要一个引脚就可以和微处理器之间进行双向通信，

但是其**工作时序比较复杂**。稍有不慎（例如延时函数的使用不够恰当）就可能导致其整个传感器的工作时序混乱。

树莓派中内置了适用于 DS18b20 的单总线接口使得我们可以很方便的实现DS18b20 温度数据的读取。

设置:

sudo raspi-config

```
Raspberry Pi Software Configuration Tool (raspi-config)

1 Change User Password Change password for the 'pi' user
2 Network Options       Configure network settings
3 Boot Options          Configure options for start-up
4 Localisation Options  Set up language and regional settings to match your location
5 Interfacing Options   Configure connections to peripherals
6 Overclock             Configure overclocking for your Pi
7 Advanced Options      Configure advanced settings
8 Update                Update this tool to the latest version
9 About raspi-config    Information about this configuration tool

<Select>                                <Finish>
```

```
Raspberry Pi Software Configuration Tool (raspi-config)

P1 Camera      Enable/Disable connection to the Raspberry Pi Camera
P2 SSH         Enable/Disable remote command line access to your Pi using SSH
P3 VNC         Enable/Disable graphical remote access to your Pi using RealVNC
P4 SPI         Enable/Disable automatic loading of SPI kernel module
P5 I2C         Enable/Disable automatic loading of I2C kernel module
P6 Serial      Enable/Disable shell and kernel messages on the serial connection
P7 1-Wire      Enable/Disable one-wire interface
P8 Remote GPIO Enable/Disable remote access to GPIO pins

<Select>                                <Back>
```

Would you like the one-wire interface to be enabled?

<Yes>

<No>

查看配置文件:

`cat /boot/config.txt`

```
[all]
#dtoverlay=vc4-fkms-v3d
dtoverlay=w1-gpio
dtoverlay=i2c3
dtoverlay=i2c4
dtoverlay=i2c-gpio,bus=7

dtoverlay=gpio-ir,gpio_pin=17
```

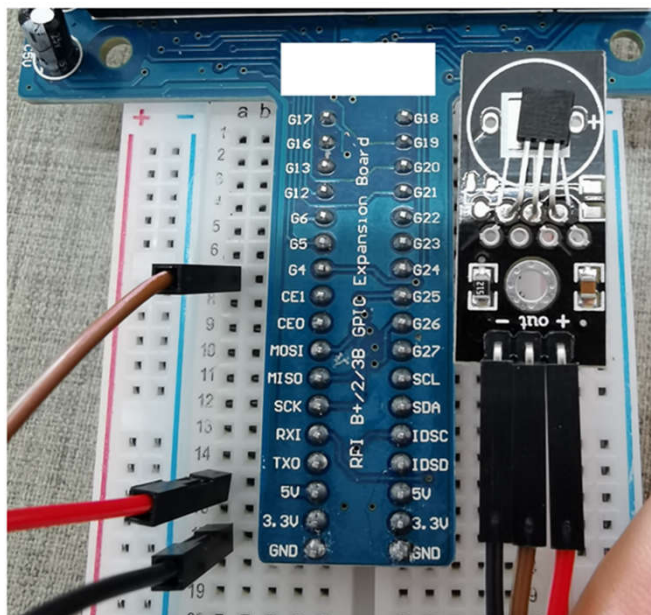
查看引脚说明

`cat /boot/overlays/README`

```
Name:    w1-gpio
Info:    Configures the w1-gpio 1Wire interface module.
          Use this overlay if you *don't* need a GPIO to drive an external pullup.
Load:    dtoverlay=w1-gpio,<param>=<val>
Params:  gpiopin      GPIO for I/O (default "4")
          pullup      Now enabled by default (ignored)
```

默认4号引脚

测试:



运行

```
cd /sys/bus/w1/devices
```

```
ls
```

```
pi@raspberrypi:~ $ cd /sys/bus/w1/devices
pi@raspberrypi:/sys/bus/w1/devices $ ls
28-0300a2794829 w1_bus_master1
```

设备号

```
cd 28-0300a2794829
```

```
ls
```

```
cat w1_slave
```

```
pi@raspberrypi:/sys/bus/w1/devices $ cd 28-0300a2794829
pi@raspberrypi:/sys/bus/w1/devices/28-0300a2794829 $ ls
driver hwmon id name power subsystem uevent w1_slave
pi@raspberrypi:/sys/bus/w1/devices/28-0300a2794829 $ cat w1_slave
5d 01 55 05 7f a5 a5 66 13 : crc=13 YES
5d 01 55 05 7f a5 a5 66 13 t=21812
```

温度 21.812

```
import RPi.GPIO as GPIO
import os
import time
```

```
class Ds18b20(object):
```

```
    def __init__(self, str_id):
        self.str_id = str_id
```

```
    def read(self):
```

```
        # 读取温度传感器的数值
```

```
        location = os.path.join( "/sys/bus/w1/devices", self.str_id, "w1_slave" )
```

```
        if os.path.exists(location):
```

```
            with open(location) as tf:
```

```
                lines = tf.read().splitlines()
```

```
            text = lines[-1]
```

```
            temperaturedata = text.split(" ")[-1]
```

```
            temperature = float(temperaturedata[2:])
```

```
            return temperature/1000.0
```

```
        else:
```

```
            return False
```

```
pi@raspberrypi:/sys/bus/w1/devices $ cd 28-0300a2794829
pi@raspberrypi:/sys/bus/w1/devices/28-0300a2794829 $ ls
driver hwmon id name power subsystem uevent w1_slave
pi@raspberrypi:/sys/bus/w1/devices/28-0300a2794829 $ cat w1_slave
5d 01 55 05 7f a5 a5 66 13 : crc=13 YES
5d 01 55 05 7f a5 a5 66 13 t=21812
```

打开文件

读取最后一行，
最后一个字符串

读取 t= 后面的部分

```
if __name__ == "__main__":
```

```
    str_id = "28-0300a2794829"
```

```
    m_ds18b20 = Ds18b20(str_id)
```

```
    try:
```

```
        while True:
```

```
            t = m_ds18b20.read()
```

```
            if t:
```

```
                print("\r温度: %2.2f"%(t),end="")
```

```
            else:
```

```
                print("error")
```

```
            time.sleep(1)
```

```
    except KeyboardInterrupt:
```

```
        print("\n Ctrl + C Quite")
```