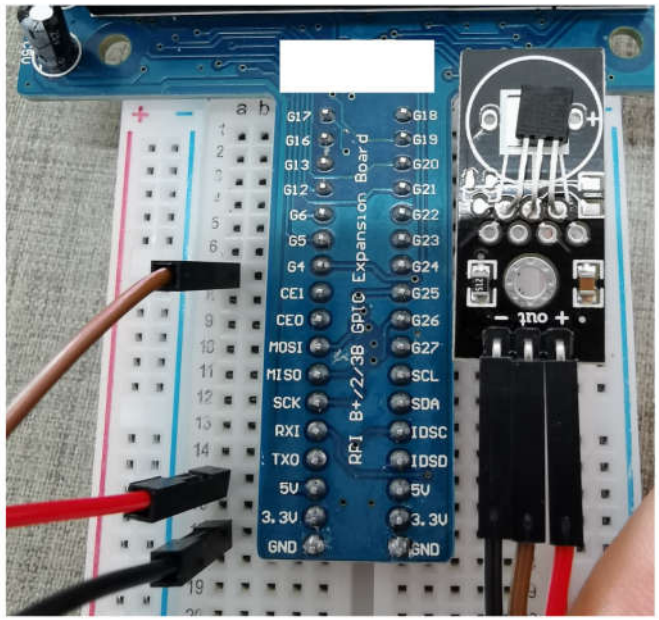
智能系统与控制

树莓派：单总线温度传感器 ds18b20



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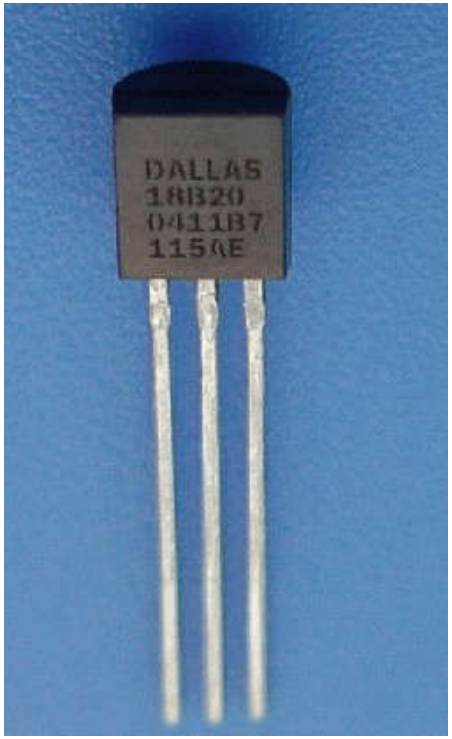
ds18b20



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)；

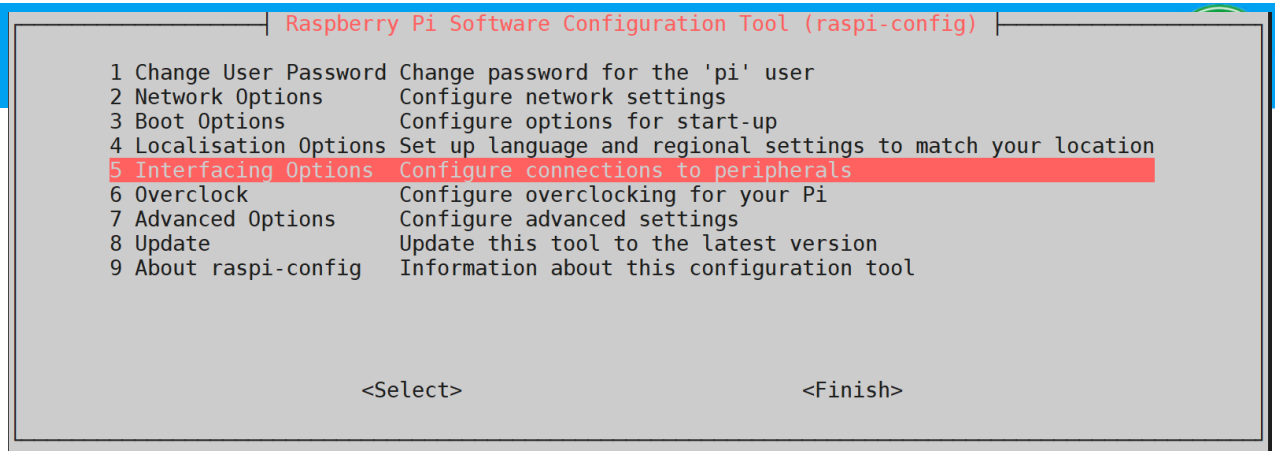
DS18b20 采用了独特的单总线接口，只需要一个引脚就可以和微处理器之间进行双向通信，

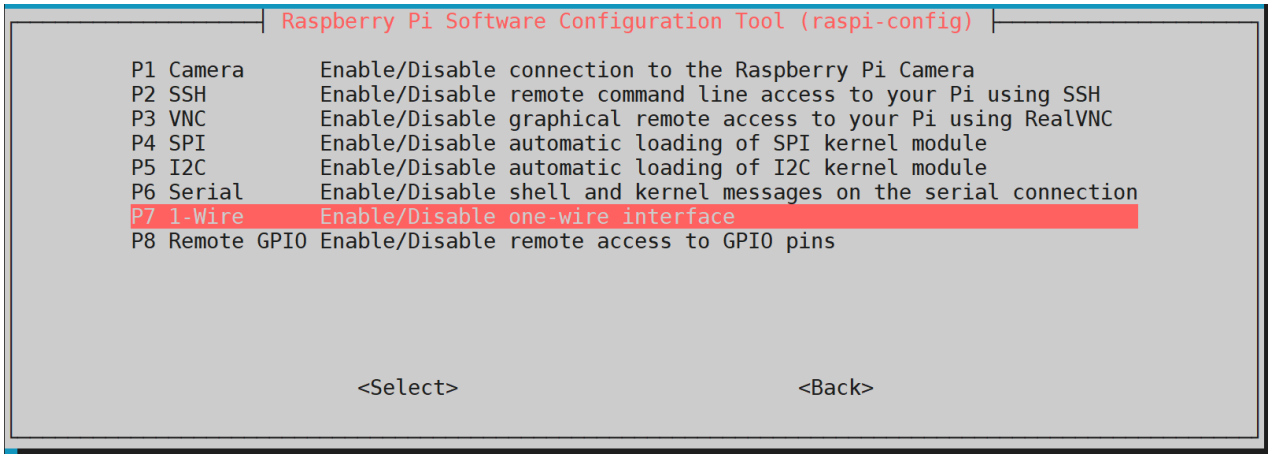
但是其工作时序比较复杂。稍有不慎（例如延时函数的使用不够恰当）就可能导致其整个传感器的工作时序混乱。

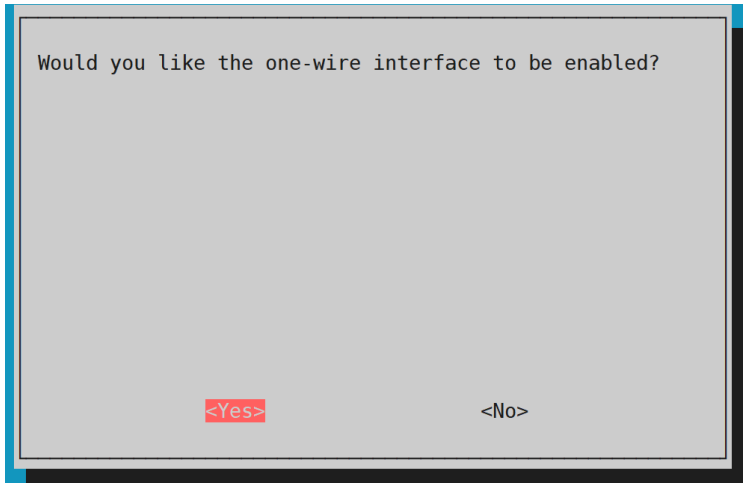
树莓派中内置了适用于 DS18b20 的单总线接口使得我们可以很方便的实现DS18b20 温度数据的读取。

设置:

sudo raspi-config







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
```

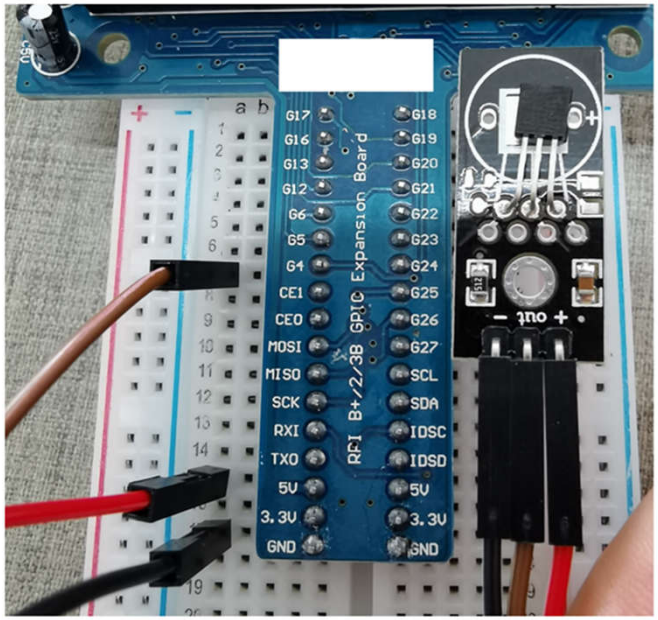
查看引脚说明

cat /boot/overlays/README

```
Name:   w1-gpio
Info:   Configures the w1-gpio Onewire 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

```
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
```

```python
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
```

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

```python
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")
```