

# CS1202 3120104385 徐中豪

## 数码管骰子实验

### 实验要求

使用实验板实现一个数码管筛子，数字筛子的基本要求是数码管（只需要一个数字）快速在1-8之间循环跳 动，当按下按键时，数码管定格在当前的数字上，不再跳动。

### 实验器材

#### 硬件

- 实验板一块；
- 5V/1A电源一个；
- microUSB线一根；
- USB-TTL串口线一根（FT232RL芯片或PL2303芯片）。
- 七段数码管
- 相关外围期间
- 以下为自备（可选）器材：
- PC（Windows/Mac OS/Linux）一台；
- 以太网线一根（可能还需要路由器等）。

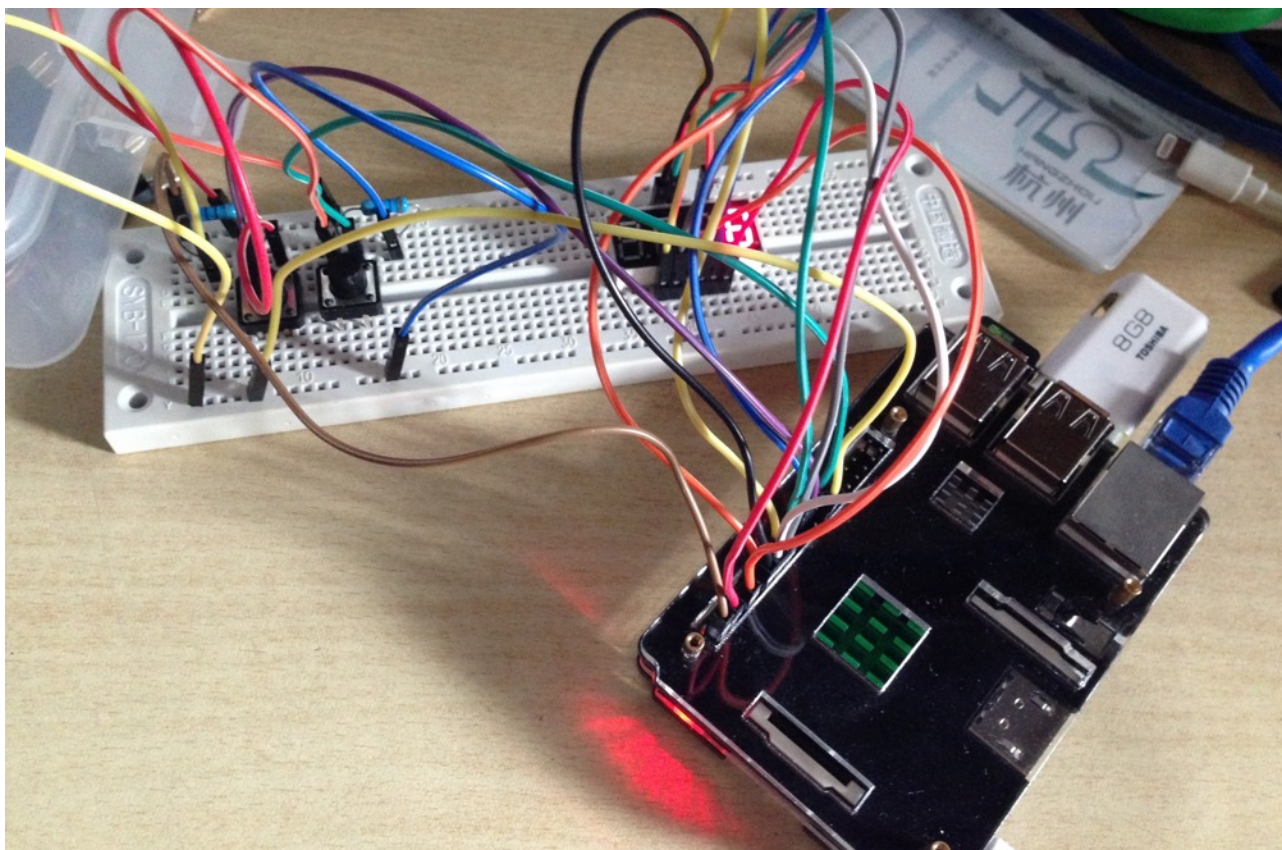
#### 软件

- PC上的USB-TTL串口线配套的驱动程序；
- PC上的串口终端软件，如minicom、picocom、putty等；
- PC上的SSH软件，如putty等。

#### 自选扩展内容

- 1 用不同的输出方式。

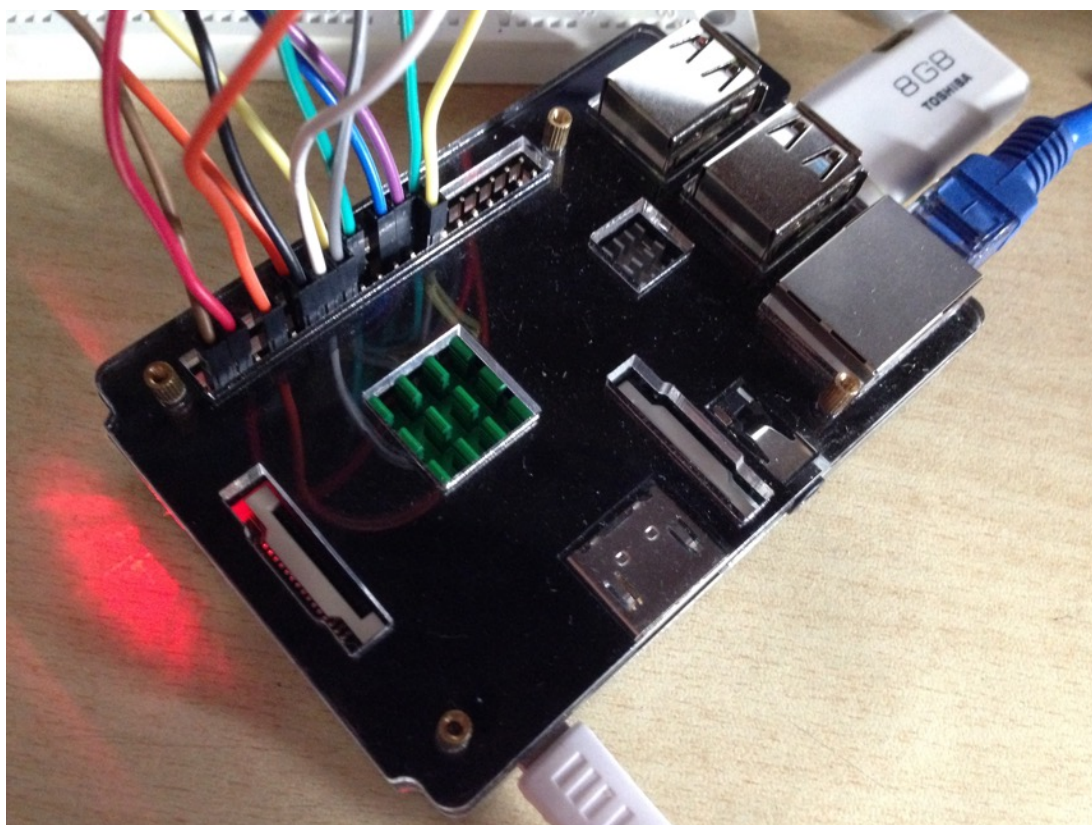
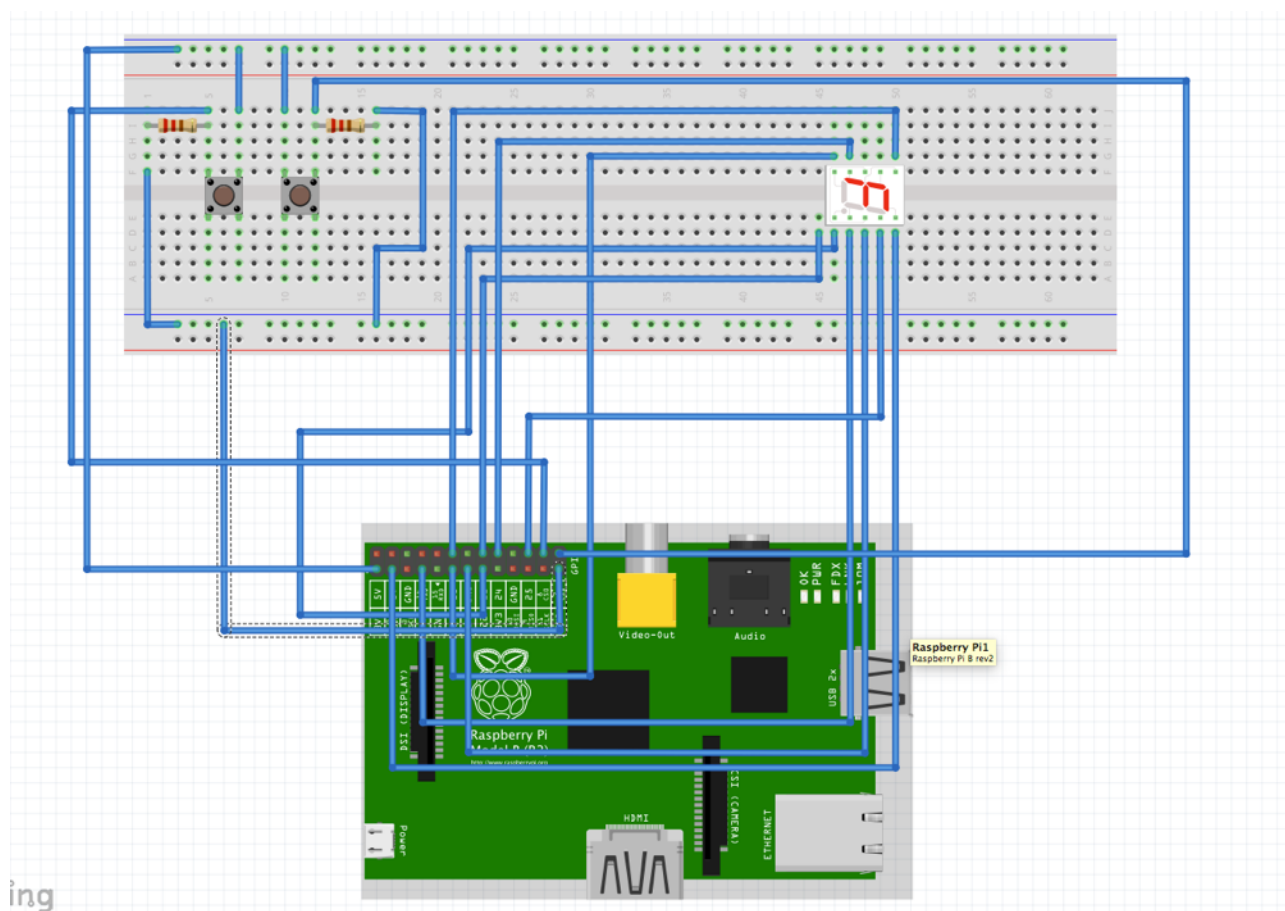
1 画出你所实际实施的连接示意图；



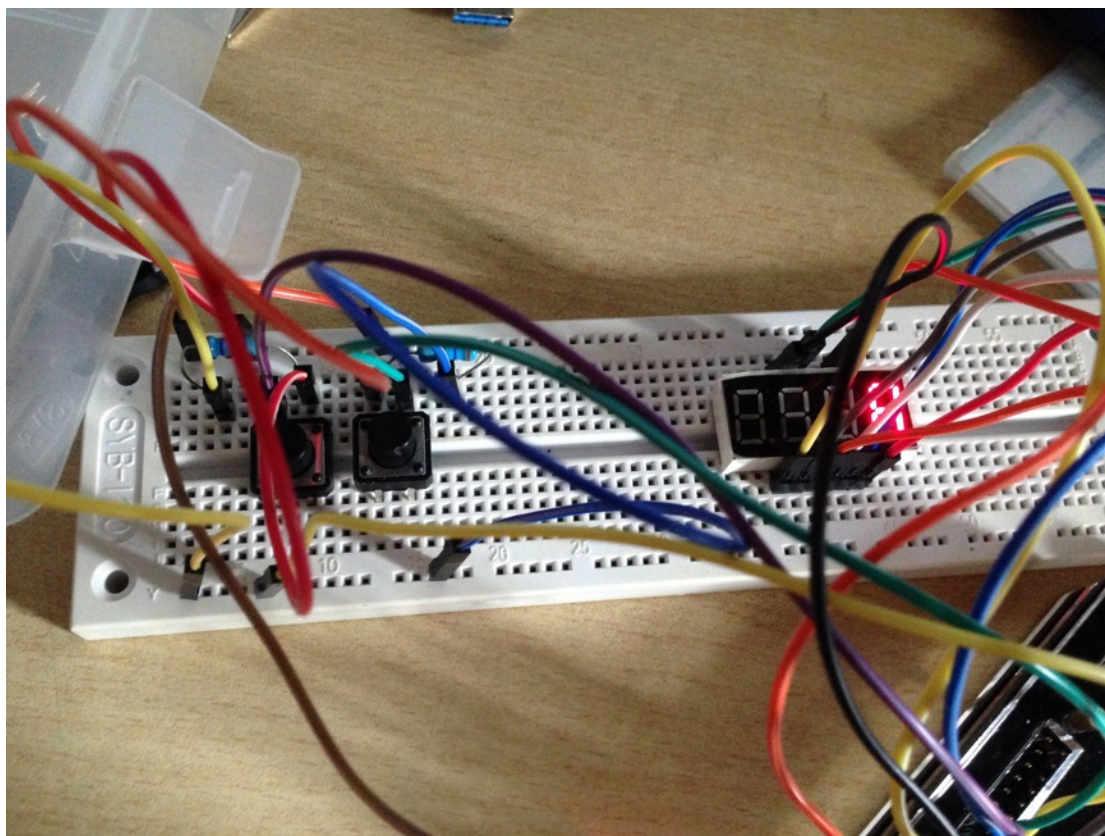
2 给出所用的器材的列表；

- pcDuino v2板一块；
- 5V/1A电源一个；
- microUSB线一根；
- 面包板一块；
- 两位7段数码管（共阳）一颗；
- 8段LED柱状显示器一颗；
- $360\Omega$  1/8W电阻8颗；
- $10k$  1/8W电阻2颗；
- 按钮两个；
- 面包线若干。
- PC（Windows/Mac OS/Linux）一台
- 以太网线一根（可能还需要路由器等）；

3 用Fritzing画出外部设备的连线图，附实物照片；







4 描述所做的实验步骤，给出各步操作的命令和结果；

#### 1、安装wiringPi

成熟的库如wiringPi可以用来控制树莓派的GPIO接口。安装过程如下：

输入命令： `git clone git://git.drogon.net/wiringPi`

```
PrinceMacbook:~ Prince$ git clone git://git.drogon.net/wiringPi
Cloning into 'wiringPi'...
remote: Counting objects: 742, done.
remote: Compressing objects: 100% (676/676), done.
remote: Total 742 (delta 537), reused 94 (delta 58)
Receiving objects: 100% (742/742), 262.96 KiB | 68.00 KiB/s, done.
Resolving deltas: 100% (537/537), done.
Checking connectivity... done.
```

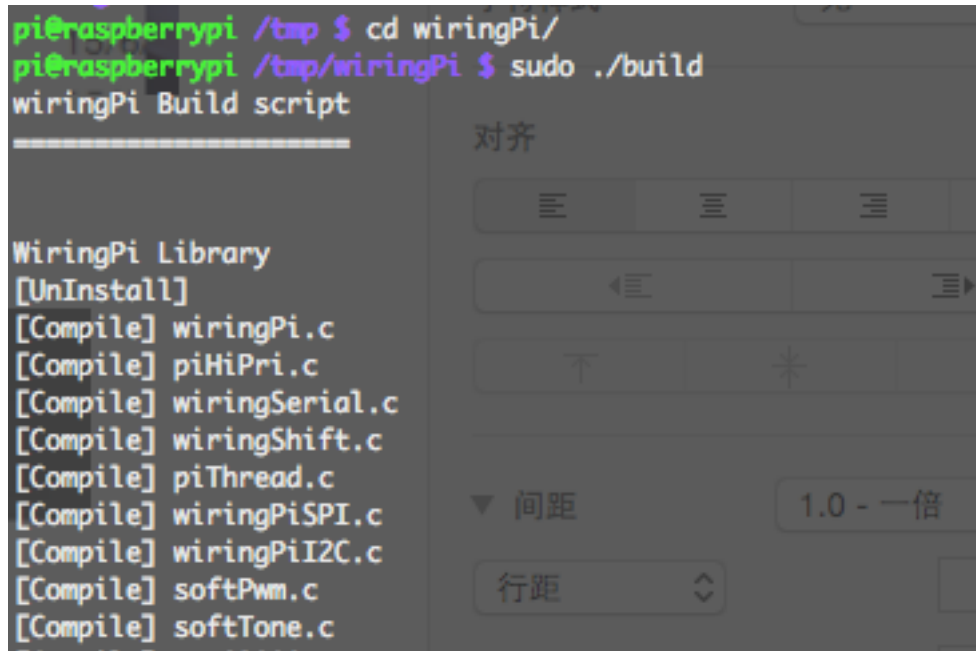
通过sftp放到树莓派上



移动到系统临时文件夹/tmp

```
pi@raspberrypi /tmp $ mv ~/Desktop/wiringPi/ /tmp/
pi@raspberrypi /tmp $ ls
wiringPi
pi@raspberrypi /tmp $
```

```
cd wiringPi
sudo ./build
```

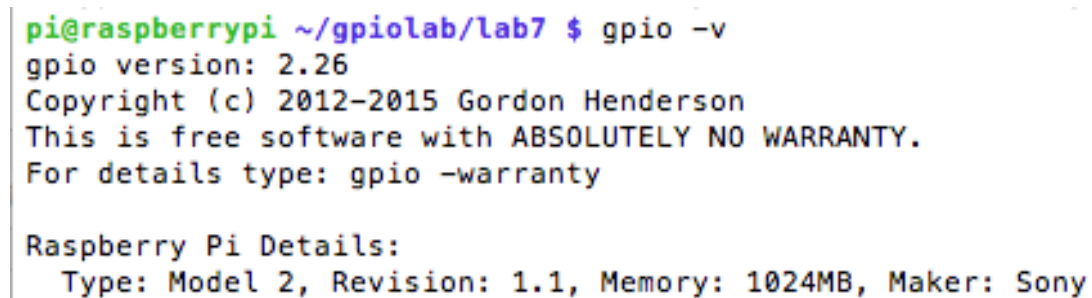


```
pi@raspberrypi /tmp $ cd wiringPi/
pi@raspberrypi /tmp/wiringPi $ sudo ./build
wiringPi Build script

WiringPi Library
[UnInstall]
[Compile] wiringPi.c
[Compile] piHiPri.c
[Compile] wiringSerial.c
[Compile] wiringShift.c
[Compile] piThread.c
[Compile] wiringPiSPI.c
[Compile] wiringPiI2C.c
[Compile] softPwm.c
[Compile] softTone.c
```

输入以下命令验证wiringPi是否安装成功：

```
gpio -v
```



```
pi@raspberrypi ~/gpiolab/lab7 $ gpio -v
gpio version: 2.26
Copyright (c) 2012-2015 Gordon Henderson
This is free software with ABSOLUTELY NO WARRANTY.
For details type: gpio -warranty

Raspberry Pi Details:
  Type: Model 2, Revision: 1.1, Memory: 1024MB, Maker: Sony
```

gpio readall

```
pi@raspberrypi ~/gpiolab/lab7 $ gpio readall
```

Pi 2												
BCM	wPi	Name	Mode	V	Physical	V	Mode	Name	wPi	BCM		
		3.3v			1	2		5v				
2	8	SDA.1	OUT	1	3	4		5V				
3	9	SCL.1	IN	1	5	6		0v				
4	7	GPIO. 7	OUT	1	7	8	1	ALT0	TxD	15	14	
		0v			9	10	1	ALT0	RxD	16	15	
17	0	GPIO. 0	OUT	0	11	12	0	OUT	GPIO. 1	1	18	
27	2	GPIO. 2	OUT	0	13	14		0v				
22	3	GPIO. 3	OUT	0	15	16	0	OUT	GPIO. 4	4	23	
		3.3v			17	18	0	OUT	GPIO. 5	5	24	
10	12	MOSI	IN	0	19	20		0v				
9	13	MISO	IN	0	21	22	0	OUT	GPIO. 6	6	25	
11	14	SCLK	IN	0	23	24	0	IN	CE0	10	8	
		0v			25	26	0	IN	CE1	11	7	
0	30	SDA.0	IN	1	27	28	1	IN	SCL.0	31	1	
5	21	GPIO.21	IN	1	29	30		0v				
6	22	GPIO.22	IN	1	31	32	0	IN	GPIO.26	26	12	
13	23	GPIO.23	IN	0	33	34		0v				
19	24	GPIO.24	IN	0	35	36	0	IN	GPIO.27	27	16	
26	25	GPIO.25	IN	0	37	38	0	IN	GPIO.28	28	20	
		0v			39	40	0	IN	GPIO.29	29	21	
BCM	wPi	Name	Mode	V	Physical	V	Mode	Name	wPi	BCM		
Pi 2												

- 5 说明所用的GPIO库的来源;  
[git://git.drogon.net/wiringPi](https://git.drogon.net/wiringPi)  
wiringPi.h

wiringPi的接口映射（来自<https://projects.drogon.net/raspberry-pi/wiringpi/pins/>）：

6 给出代码并解释；

```
#include <wiringPi.h>
```

```
#include <stdio.h>
```

```
#include <stdlib.h>
```

```
#define DIGIT0 8
```

```
#define DIGIT1 9
```

```
#define BTN0 10
```

```
#define BTN1 11
```

```
char digit[10][8] = //The increasing number
```

```
{
    {0,0,0,0,0,0,1,1}, //0
    {1,0,0,1,1,1,1,1}, //1
    {0,0,1,0,0,1,0,1}, //2
    {0,0,0,0,1,1,0,1}, //3
    {1,0,0,1,1,0,0,1}, //4
    {0,1,0,0,1,0,0,1}, //5
    {0,1,0,0,0,0,0,1}, //6
    {0,0,0,1,1,1,1,1}, //7
    {0,0,0,0,0,0,0,1}, //8
    {0,0,0,0,1,0,0,1} //9
};
```

```
char loop[10][8] = //the loop-running bar in the left windows
```

```
{
    {0,1,1,1,1,1,1,1},
    {1,0,1,1,1,1,1,1},
    {1,1,0,1,1,1,1,1},
    {1,1,1,0,1,1,1,1},
    {1,1,1,1,0,1,1,1},
    {1,1,1,1,1,0,1,1},
    {1,1,1,1,1,1,0,1},
};
```

```
void main()
```

```
{
```

```
    int pin;
```

```
    int m = 0, n = 0;
```

```
    int flag = 1;
```

```
//display numbers when flag is 1 and cycle light when flag is 0
```

```

int run = 0;
unsigned int time0 = 0, time1 = 0;

if (wiringPiSetup () == -1) //test the install status of wiringPi
{
    exit (1) ;
}

for (pin = 0 ; pin < 8 ; ++pin)
{
    pinMode (pin, OUTPUT) ;
    digitalWrite(pin, HIGH);
}

pinMode(DIGIT0, OUTPUT); //The left number
//pinMode(DIGIT1, OUTPUT); //The right number
pinMode(BTN0, INPUT); //The start button
pinMode(BTN1, INPUT); //The stop button

while (1)
{
    time1 = millis();

    if (digitalRead(BTN0) && run == 0)
    {
        puts("Start!");
        run = 1;  //change the running state
        m = 0;
        n = 0;
        time0 = millis();
    }
    else if (digitalRead(BTN1) && run == 1)
    {
        puts("Stop!");
        run = 0;
    }
}

```



```

if (time1 - time0 >= 50 && run == 1)
{
    time0 = time1;
    printf("%d\n", n);           //shell outputs
    m = ++m % 6;
    n = ++n % 8;
}

for (pin = 0; pin < 8; pin++)
{
    digitalWrite(pin, flag ? digit[n+1][pin] : loop[m][pin]); //write pins
}
digitalWrite(DIGIT0, 1);
//digitalWrite(DIGIT1, flag);
delay(150);
}

```

7 将所做作品拍摄视频上传到优酷，给出优酷的视频网址；  
运行视频：

审核已通过

[http://v.youku.com/v\\_show/id\\_XMTI1OTk1OTQ1Ng==.html](http://v.youku.com/v_show/id_XMTI1OTk1OTQ1Ng==.html)

8 说明其他所做的扩展内容的情况。