

Assignment 008: Lab 8: 网络LED矩阵显示器

一、实验目的

- 1 掌握Linux设备驱动程序的开发过程；
- 2 理解I2C总线协议；
- 3 复习socket编程（网络原理课）；
- 4 实现一个网络访问的LED矩阵显示器。

二、实验器材

硬件

- pcDuino v2板一块；
- 5V/1A电源一个；
- microUSB线一根；
- 面包板一块；
- 8x8 LED矩阵一块（不带I2C控制器）；
- 360Ω 1/8W电阻8颗，或360Ω 排阻1颗；
- 面包线若干。

三、软件

wiringPi

四、实验步骤

1 下载wiringPi库，用来控制树莓派的GPIO接口；

```
pi@raspberrypi ~ $ 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 95 (delta 58)
Receiving objects: 100% (742/742), 264.40 KiB | 207 KiB/s, done.
Resolving deltas: 100% (537/537), done.
pi@raspberrypi ~ $
```

2 安装wiringPi

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

WiringPi Library
[UnInstall]
[Compile] wiringSerial.c
[Compile] wiringPi.c
```

3 查看wiringPi

```
pi@raspberrypi ~/wiringPi $ 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 B, Revision: 2, Memory: 512MB, Maker: Egoman
pi@raspberrypi ~/wiringPi $ gpio readall
```

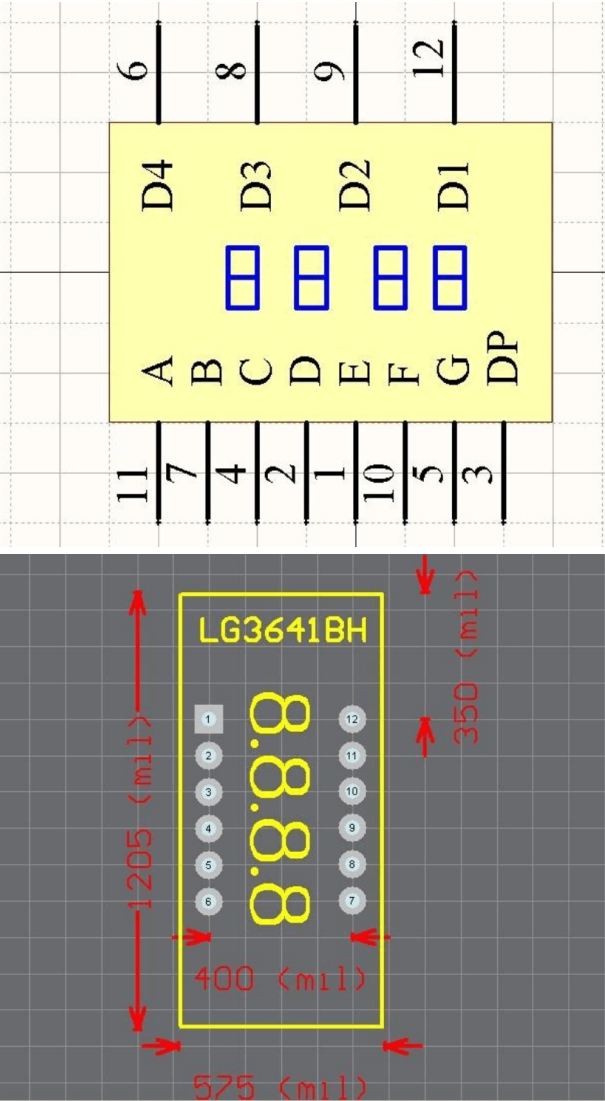
BCM	wPi	Name	Mode	V	Physical	V	Mode	Name	wPi	BCM
		3.3v			1	2		5v		
2	8	SDA.1	IN	1	3	4		5V		
3	9	SCL.1	IN	1	5	6		0v		
4	7	GPIO. 7	IN	1	7	8	1	ALT0 TxD	15	14
		0v			9	10	1	ALT0 RxD	16	15
17	0	GPIO. 0	IN	0	11	12	0	IN GPIO. 1	1	18
27	2	GPIO. 2	IN	0	13	14		0v		
22	3	GPIO. 3	IN	0	15	16	0	IN GPIO. 4	4	23
		3.3v			17	18	0	IN GPIO. 5	5	24
10	12	MOSI	IN	0	19	20		0v		
9	13	MISO	IN	0	21	22	0	IN GPIO. 6	6	25
11	14	SCLK	IN	0	23	24	1	IN CE0	10	8
		0v			25	26	1	IN CE1	11	7
28	17	GPIO.17	IN	0	51	52	0	IN GPIO.18	18	29
30	19	GPIO.19	IN	0	53	54	0	IN GPIO.20	20	31

4 由上图可知wiringPi的接口映射

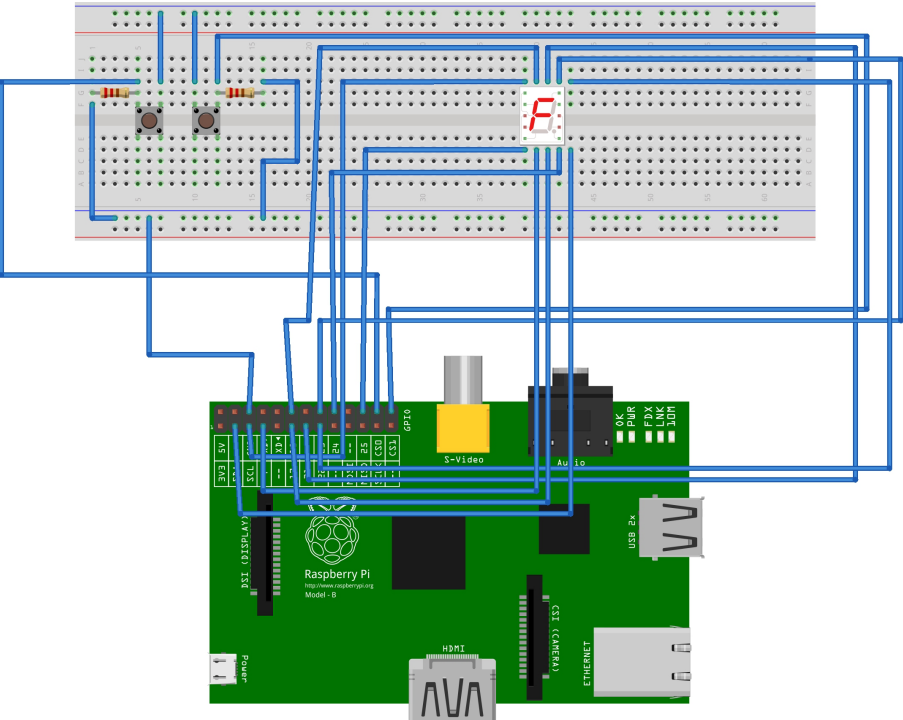
P1: The Main GPIO connector:

wiringPi Pin	BCM GPIO	Name	Header	Name	BCM GPIO	wiringPi Pin
—	—	3.3v	1 2	5v	—	—
8	R1:0/R2:2	SDA0	3 4	5v	—	—
9	R1:1/R2:3	SCL0	5 6	0v	—	—
7	4	GPIO7	7 8	TxD	14	15
—	—	0v	9 10	RxD	15	16
0	17	GPIO0	11 12	GPIO1	18	1
2	R1:21/R2:27	GPIO2	13 14	0v	—	—
3	22	GPIO3	15 16	GPIO4	23	4
—	—	3.3v	17 18	GPIO5	24	5
12	10	MOSI	19 20	0v	—	—
13	9	MISO	21 22	GPIO6	25	6
14	11	SCLK	23 24	CE0	8	10
—	—	0v	25 26	CE1	7	11
wiringPi Pin	BCM GPIO	Name	Header	Name	BCM GPIO	wiringPi Pin

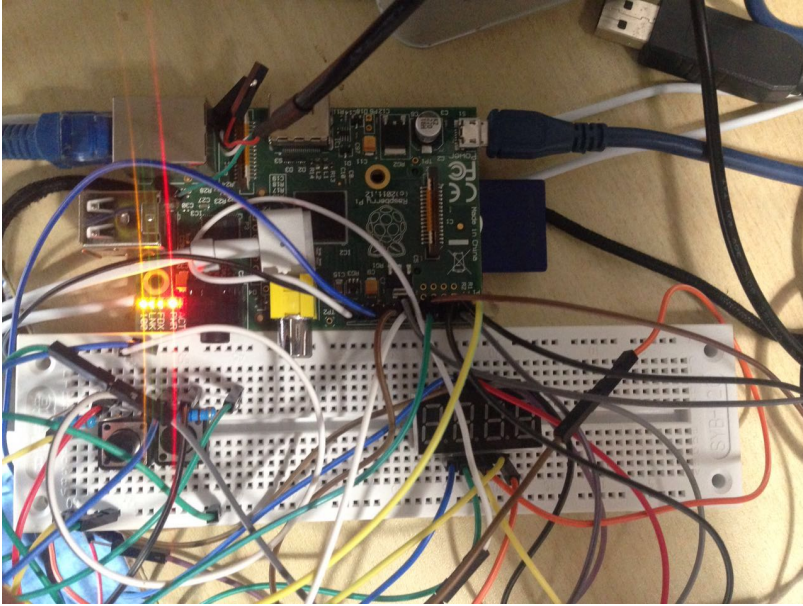
5 LG3641BH引脚定义



6 具体布线



7 实际布线



8 代码

```
#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[6][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},
};

int main()
{
    int pin;
    int m = 0, n = 0;
    int flag = 1;
    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
```

9 编译，运行

```
pi@raspberrypi ~ $ gcc -o led led.cpp -l wiringPi
pi@raspberrypi ~ $ ./led
wiringPiSetup: Must be root. (Did you forget sudo?)
pi@raspberrypi ~ $ sudo ./led
```

10 结果

