嵌入式实验实验报告

Assignment 203: 做一个网络时钟

一.个人信息

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二.实验目的

- 做一个网络时钟，通过ntp从一个互联网服务器得到时间，实时在7段数码管或LCD上显示时间

三.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；
- 两位7段数码管（共阳）一颗；
- 8段LED柱状显示器一颗；
- 360Ω 1/8W电阻8颗；
- 10k 1/8W电阻2颗；
- 按钮两个；
- 面包线若干

以下可自选

- PC（Windows/Mac OS/Linux）一台；
- USB-TTL串口线一根（FT232RL芯片或PL2303芯片）；
- 以太网线一根（可能还需要路由器等）；
- 1602 LCD一块（带配套的5k微调电阻）；
- 9g伺服电机一只；
- 8x8 LED矩阵一个；
- 8颗各色LED（5mm）。

软件：

- 编译软件；

- Fritzing。

四.实验步骤

- 通过ssh登陆树莓派
- 安装ntp服务器

```
sudo apt-get install ntpdate
```

```
pi@raspberrypi ~ $ sudo apt-get install ntpdate
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following extra packages will be installed:
  liblockfile-bin liblockfile1 lockfile-progs
The following NEW packages will be installed:
  liblockfile-bin liblockfile1 lockfile-progs ntpdate
0 upgraded, 4 newly installed, 0 to remove and 0 not upgraded.
Need to get 122 kB of archives.
After this operation, 409 kB of additional disk space will be used.
Do you want to continue [Y/n]? Y
Get:1 http://mirrordirector.raspbian.org/raspbian/ wheezy/main liblockfile-bin a
rmhf 1.09-5 [17.9 kB]
Get:2 http://mirrordirector.raspbian.org/raspbian/ wheezy/main liblockfile1 armh
f 1.09-5 [14.4 kB]
Err http://mirrordirector.raspbian.org/raspbian/ wheezy/main ntpdate armhf 1:4.2
.6.p5+dfsg-2+deb7u3
  404  Not Found
Get:3 http://mirrordirector.raspbian.org/raspbian/ wheezy/main lockfile-progs ar
mhf 0.1.17 [10.6 kB]
Fetched 42.9 kB in 2s (17.7 kB/s)
```

- 修改时区，输入tzselect

```
pi@raspberrypi ~ $ tzselect
Please identify a location so that time zone rules can be set correctly.
Please select a continent or ocean.
 1) Africa
 2) Americas
 3) Antarctica
 4) Arctic Ocean
 5) Asia
 6) Atlantic Ocean
 7) Australia
 8) Europe
 9) Indian Ocean
10) Pacific Ocean
11) none - I want to specify the time zone using the Posix TZ format.
```

- 按照自己的时区修改

```
#? 5
Please select a country.
 1) Afghanistan           18) Israel              35) Palestine
 2) Armenia               19) Japan               36) Philippines
 3) Azerbaijan            20) Jordan              37) Qatar
 4) Bahrain               21) Kazakhstan          38) Russia
 5) Bangladesh            22) Korea (North)       39) Saudi Arabia
 6) Bhutan                23) Korea (South)       40) Singapore
 7) Brunei                24) Kuwait              41) Sri Lanka
 8) Cambodia              25) Kyrgyzstan          42) Syria
 9) China                 26) Laos                43) Taiwan
10) Cyprus                27) Lebanon             44) Tajikistan
11) East Timor            28) Macau               45) Thailand
12) Georgia               29) Malaysia            46) Turkmenistan
13) Hong Kong             30) Mongolia            47) United Arab Emirates
14) India                 31) Myanmar (Burma)     48) Uzbekistan
15) Indonesia             32) Nepal               49) Vietnam
16) Iran                  33) Oman                50) Yemen
17) Iraq                  34) Pakistan
#?
```

- 设置成功

```
12) Georgia               29) Malaysia            46) Turkmenistan
13) Hong Kong             30) Mongolia            47) United Arab Emirates
14) India                 31) Myanmar (Burma)     48) Uzbekistan
15) Indonesia             32) Nepal               49) Vietnam
16) Iran                  33) Oman                50) Yemen
17) Iraq                  34) Pakistan
#? 9
Please select one of the following time zone regions.
1) Beijing Time
2) Xinjiang Time
#? 1

The following information has been given:

        China
        Beijing Time

Therefore TZ='Asia/Shanghai' will be used.
Local time is now:      Sun Jun 14 13:35:11 CST 2015.
Universal Time is now:  Sun Jun 14 05:35:11 UTC 2015.
Is the above information OK?
1) Yes
2) No
#?
```

- 配置网络对时(cn.pool.ntp.org是国内ntp服务器)

```
sudo ntpdate cn.pool.ntp.org
```

```
pi@raspberrypi ~ $ sudo ntpdate cn.pool.ntp.org
14 Jun 05:37:53 ntpdate[2701]: the NTP socket is in use, exiting
pi@raspberrypi ~ $
```

- 通过date命令查看现在的时间，已经被校准

```
pi@raspberrypi ~ $ sudo ntpdate cn.pool.ntp.org
14 Jun 05:37:53 ntpdate[2701]: the NTP socket is in use, exiting
pi@raspberrypi ~ $
```

- 编写程序，获得系统时间，然后通过七段码显示

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

#define DIGIT0 8
#define DIGIT1 9
#define BTN0 10
#define BTN1 11
#define DIGIT2 12
#define DIGIT3 13

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},
};
void main()
{
    int pin;
    int m = 0, n = 0;
    int flag = 0;
    int run = 0;
    unsigned int time0 = 0, time1 = 0;
    time_t nowtime;
    int hour,min;
    struct tm *timeinfo;
    time( &nowtime );
    timeinfo = localtime( &nowtime );
    hour=timeinfo->tm_hour;
    min=timeinfo->tm_min;
    n=hour*100+min;
    printf("n:%d\n",sn);
```

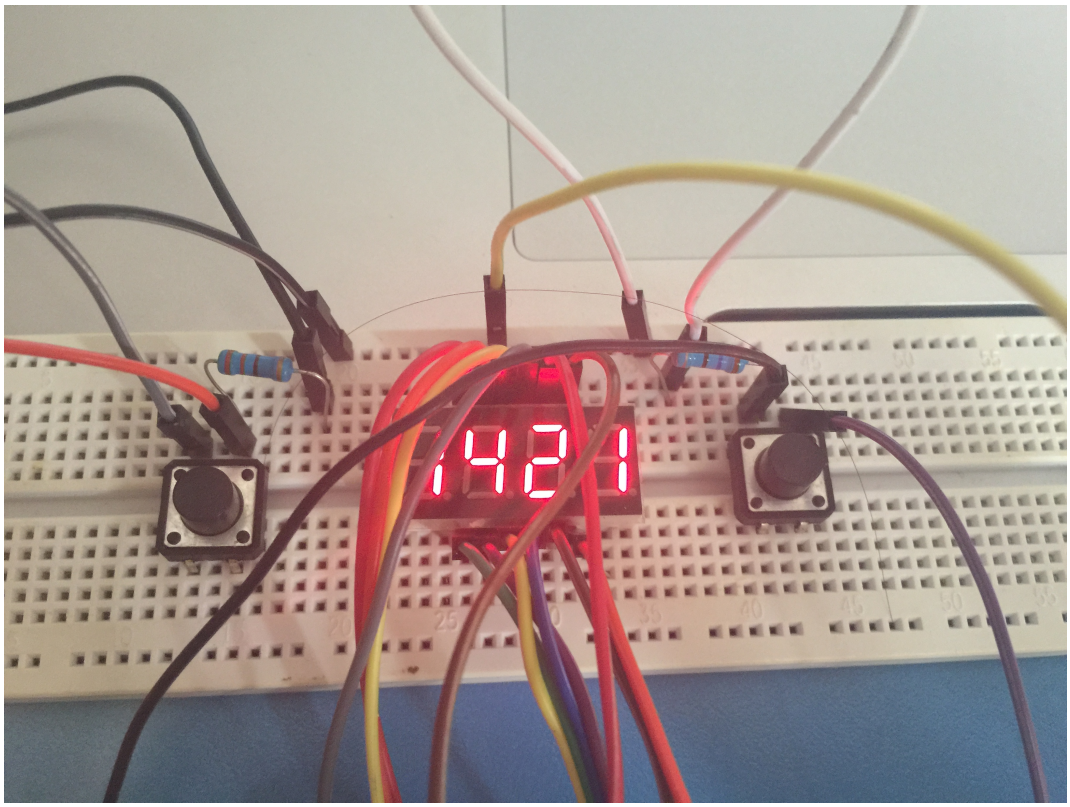
```
 if (wiringPiSetup () == -1) //test the install status of wiringPi
 {
    exit (1) ;
 }

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

pinMode(DIGIT0, OUTPUT); //The firstnumber
pinMode(DIGIT1, OUTPUT); //The second number
pinMode(DIGIT2, OUTPUT); //The third number
pinMode(DIGIT3, OUTPUT); //The fourth number

pinMode(BTN0, INPUT); //The start button
pinMode(BTN1, INPUT); //The stop button


while (true)
{
time1 = millis();

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

if (time1 - time0 >= 50 && run == 1)
{
    time0 = time1;
    printf("%d\n", n);
}

switch(flag){
    case 0:
        for (pin = 0; pin < 8; pin++)
            digitalWrite(pin,  digit[n/1000][pin]);
        digitalWrite(DIGIT0, 1);
        digitalWrite(DIGIT1, 0);
        digitalWrite(DIGIT2, 0);
        digitalWrite(DIGIT3, 0);
        break;
```

```
        case 1:
            for (pin = 0; pin < 8; pin++)
                digitalWrite(pin,  digit[n/1000][pin]);
            digitalWrite(DIGIT0, 0);
            digitalWrite(DIGIT1, 1);
            digitalWrite(DIGIT2, 0);
            digitalWrite(DIGIT3, 0);
            break;
        case 2:
            for (pin = 0; pin < 8; pin++)
                digitalWrite(pin, digit[(n/100)%10][pin]);
            digitalWrite(DIGIT0, 0);
            digitalWrite(DIGIT1, 0);
            digitalWrite(DIGIT2, 1);
            digitalWrite(DIGIT3, 0);
            break;
        case 3:
            for (pin = 0; pin < 8; pin++)
                digitalWrite(pin, digit[n/1000][pin]);
            digitalWrite(DIGIT0, 0);
            digitalWrite(DIGIT1, 0);
            digitalWrite(DIGIT2, 0);
            digitalWrite(DIGIT3, 1);
            break;
        default:
            puts("error flag!");
            digitalWrite(DIGIT0, 0);
            digitalWrite(DIGIT1, 0);
            digitalWrite(DIGIT2, 0);
            digitalWrite(DIGIT3, 0);
            break;
    }
    flag=(flag+1)%4;
    delay(10);
```

    }

}
* 当前时间:

- LED显示: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