【Energia 开发环境】MSP430 LAUNCHPAD 学习笔记 7--4 位驱动 1602 液晶显示

材料：

- MSP-EXP430G2 553LaunchPad
- LCD1602字符液晶

1602LCD 主要技术参数：

显示容量为16×2个字符；

芯片工作电压为4.5～5.5V；

工作电流为2.0mA（5.0V）;

模块最佳工作电压为5.0V；

字符尺寸为2.95×4.35（W×H）mm。

MSP430 LAUNCHPAD 提供3.57V 的电压也是能够正常驱动1602的。

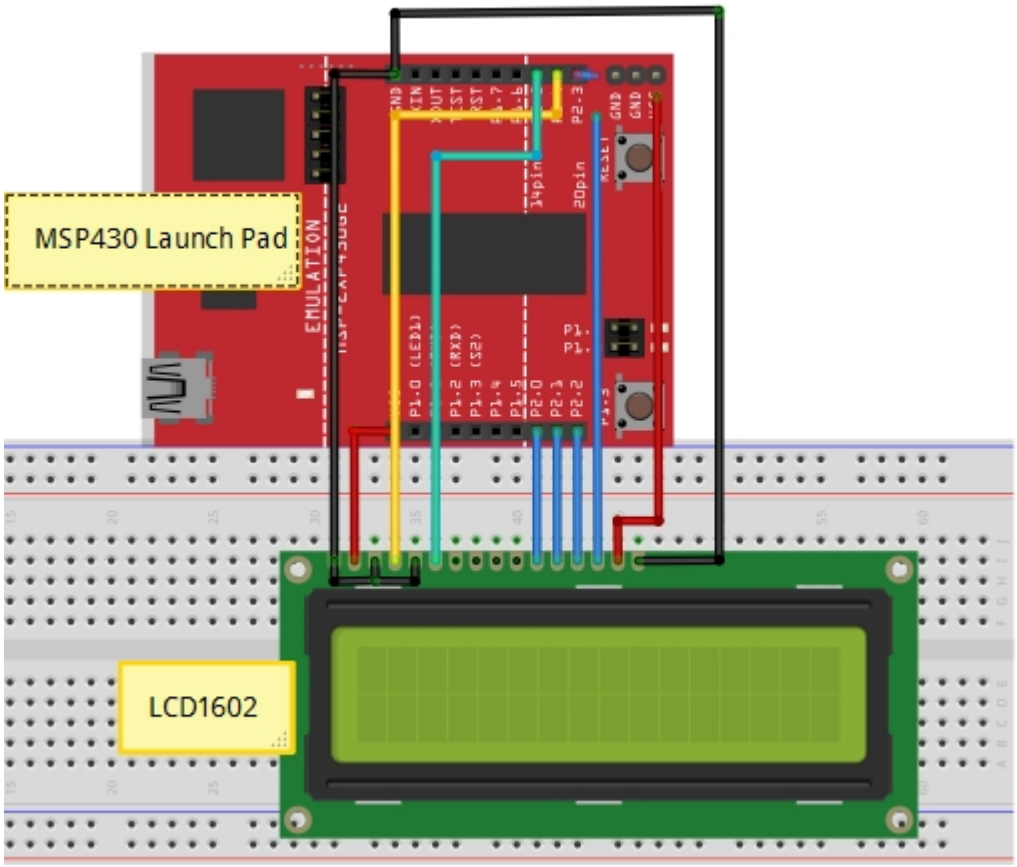
1602液晶接口引脚定义 ：

编号	符号	引脚说明	编号	符号	引脚说明
1	VSS	电源地	9	D2	Data I/O
2	VDD	电源正极	10	D3	Data I/O
3	VL	液晶显示偏压信号	11	D4	Data I/O
4	RS	数据/命令选择端（H/L）	12	D5	Data I/O
5	R/W	读/写选择端（H/L）	13	D6	Data I/O
6	E	使能信号	14	D7	Data I/O
7	D0	Data I/O	15	BLA	背光源正极
8	D1	Data I/O	16	BLK	背光源负极

除了1脚（VSS）2脚（VDD）需要接外，15脚和16脚也需要接正负极，3号脚

最好接 GND，不接的话，会看不到显示的字。

4位接法的硬件连接图：



源程序:

```
/*****************************************************************************
  1602液晶显示
  【Energia 开发环境】MSP430 LAUNCHPAD 学习笔记7--1602液晶显示
  网址： http://home.eeworld.com.cn/?action-bbs
  Autor: qinkaiabc
  *  液晶1602.c--4线驱动
```

```
   *  Created on: 2013-7-27
   *  Author: Qinkai
   *  P2_0 -> D4
   *  P2_1 -> D5
   *  P2_2 -> D6
   *  P2_3 -> D7
   *  P2_5 -> EN
   *  P2_4 -> RS
   *  VO(VL) ->GND
   *  RW  -> GND

**********************************************************************/

int D4 = P2_0;
int D5 = P2_1;
int D6 = P2_2;
int D7 = P2_3;
int RS = P2_4;
int EN = P2_5;
//引脚定义，从头文件可知
int a[6] = { 8, 9, 10, 11,12,13};
void LCD_Command_Write(int command)
{
  int i,temp;
  digitalWrite( RS,LOW);
```

```
  digitalWrite( EN,LOW);
  delayMicroseconds(1);
  digitalWrite( EN,HIGH);
  temp = command & 0xf0;
  for(i=a[3];i>7;i--)  //写高四位
  {
     digitalWrite(i,temp & 0x80);
     temp <<= 1;
  }
  digitalWrite( EN,HIGH);
  delayMicroseconds(1);
  digitalWrite( EN,LOW);
  temp=(command & 0x0f) << 4;
  for(i=a[3];i>7;i--)  //写低四位
  {
     digitalWrite(i,temp & 0x80);
     temp <<= 1;
  }
  digitalWrite( EN,HIGH);
  delayMicroseconds(1);
  digitalWrite( EN,LOW);
}
void LCD_Data_Write(int dat)
{
```

```
int i,temp;
digitalWrite( RS,HIGH);
digitalWrite( EN,LOW);
delayMicroseconds(1);
digitalWrite( EN,HIGH);
temp = dat & 0xf0;
for(i=a[3];i>7;i--)  //写高四位
{
   digitalWrite(i,temp & 0x80);
   temp <<= 1;
}
digitalWrite( EN,HIGH);
delayMicroseconds(1);
digitalWrite( EN,LOW);

temp=(dat & 0x0f) << 4;
for(i=a[3];i>7;i--)  //写低四位
{
   digitalWrite(i,temp & 0x80);
   temp <<= 1;
}
digitalWrite( EN,HIGH);
delayMicroseconds(1);
digitalWrite( EN,LOW);
```

```
}
//显示字符
void LCD_write_int(unsigned int x,unsigned int y,unsigned int data)
{
  unsigned int address;  //写地址
  if (y == 0)
  {
    address = 0x80 + x;
  }
  else
  {
    address = 0xc0 + x;
  }
  LCD_Command_Write( address);
  delayMicroseconds(1);
  LCD_Data_Write(data);
}
//LCD 在任意位置写字符串
//列 x=0~15,行 y=0,1
void LCD_write_string(unsigned int x,unsigned int y,char *s)
{
  unsigned int address;  //写地址
  if (y == 0)
  {
```

```
    address = 0x80 + x;
  }
  else
  {
    address = 0xc0 + x;
  }
  LCD_Command_Write( address);
  delayMicroseconds(1);
  while (*s) // 显示字符
  {
    LCD_Data_Write( *s );
    delayMicroseconds(1);
    s++;
  }
}
//lcd 初始化程序
void LCD1602_Init()
{
  int i=0;
  for(i=8;i<14;i++)//初始化 P2引脚为输出
  {
    pinMode(i,OUTPUT);
  }
  delay(100);
```

```
  LCD_Command_Write(0x28);
  delay(50);
  LCD_Command_Write(0x06);
  delay(50);
  LCD_Command_Write(0x0c);
  delay(50);
  LCD_Command_Write(0x80);
  delay(50);
  LCD_Command_Write(0x01);
  delay(50);
}
void setup()
{
  LCD1602_Init();

}
void loop()
{
  LCD_Command_Write(0x01);
  delay(50);
  LCD_write_string(0,0,"Hello! EEWORLD!");
  LCD_write_string(0,1,"MSP430 LAUNCHPAD");
  delay(5000);
  LCD_write_string(0,0,"EnergiaforMSP430");
```

```
  LCD_write_string(0,1,"www.eeworld.com.cn");
  delay(5000);
}
```

从头文件中看出 MSP430 Launch Pad 的管脚定义如下：

```
/*************************************************************************
  * pins_energia.h
  * Energia core files for MSP430
  *        Copyright (c) 2012 Robert Wessels. All right reserved.
  *        Contribution: Rei VILO
//                            +-\/-+
//                     VCC     1|       |20    GND
//             (A0)    P1.0    2|       |19    XIN
//             (A1)    P1.1    3|       |18    XOUT
//             (A2)    P1.2    4|       |17    TEST
//             (A3)    P1.3    5|       |16    RST#
//             (A4)    P1.4    6|       |15    P1.7    (A7) (SCL) (MISO) depends on chip
//             (A5)    P1.5    7|       |14    P1.6    (A6) (SDA) (MOSI)
//                     P2.0    8|       |13    P2.5
//                     P2.1    9|       |12    P2.4
//                     P2.2 10|       |11    P2.3
//                            +----+
// Pin names based on the silkscreen
static const uint8_t P1_0 = 2;
static const uint8_t P1_1 = 3;
```

```
static const uint8_t P1_2 = 4;

static const uint8_t P1_3 = 5;

static const uint8_t P1_4 = 6;

static const uint8_t P1_5 = 7;

static const uint8_t P2_0 = 8;

static const uint8_t P2_1 = 9;

static const uint8_t P2_2 = 10;

static const uint8_t P2_3 = 11;

static const uint8_t P2_4 = 12;

static const uint8_t P2_5 = 13;

static const uint8_t P1_6 = 14;

static const uint8_t P1_7 = 15;

static const uint8_t P2_7 = 18;

static const uint8_t P2_6 = 19;

static const uint8_t RED_LED = 2;

static const uint8_t GREEN_LED = 14;

static const uint8_t PUSH2 = 5;

static const uint8_t TEMPSENSOR = 10; // depends on chip

   ************************************************************************/
```

所以在上面的初始化引脚和写命令及写数据，可以直接通过对数字操作。

By qinkaiabc