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内藏T6963芯片的液晶显示模块驱动程序
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#include "c8051finit.h"          //单片机配置文件，本例程采用的是C8051F530
#include "cg_table.c"           //字模

/*****
引脚定义
*****/

//lcd引线定义，本程序采用间接方式

sbit cd = P1^2;                 //lcd命令数据选择线
sbit cs = P1^0;                 //lcd片选线
sbit rd = P1^3;                 //lcd读选择线
sbit wr = P1^1;                 //lcd写选择线

////////////////////////////////////

unsigned char test(void);       //读忙标志位
bit busy1( void);              //判断是否允许读写 1:允许; 0: 禁止
bit busy2( void);              //判断是否允许自动读写 1:允许; 0: 禁止
void w_byte(unsigned char bytes,bit m);
// 写入 (m=0) 数据, (m=1) 命令。
void initial (void);           //初始化
void clear(bit m,unsigned char t);//清屏
void delay(unsigned int m);
void w_c(unsigned char x,unsigned char y,unsigned char codes,
    unsigned char attr);
//在指定坐标写入字符,
//坐标为x, y写入字符codes, 字符属性attr
void cgram(unsigned char count,unsigned char *pl);
//建立CGRAM, count为字符数,*pl为字符表名
void w_ct(unsigned char x,unsigned char y,unsigned char cods,
    unsigned char attr_ct);
//在指定位置写入汉字, 文本方式
//x y 汉字代码
//cods汉字代码 (0x80~0xff)
//attr 显示方式
void w_cc(unsigned char x,unsigned char y,unsigned char cods,unsigned char *pl);
//在制定位置写入汉字 图形方式
//x y 汉字代码
//cods汉字代码 (0x00~0xff)
void highlcd(unsigned char x,unsigned char y,unsigned char x_length,
    unsigned char y_length,bit m);
//高亮 (反显) /清除显示某一区域
//x, y显示区域坐标
//x_length,y_length区域宽度

void w_p(unsigned char x,unsigned char y,unsigned char x_length,
    unsigned char y_length,unsigned char *pic);
//画图
//画图 x, y 坐标
//x_length, y_length 图片的长和宽
//*pic 图形数组指针
void w_m(unsigned char x,unsigned char y);
//画点

/*****
File Name: char test()
Function: 读忙标志位
Author: shgch
Date: 2008-8-30
*****/

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Explain : 返回状态标志位

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```
unsigned char test (void )
{
    wr = 1;
    P0 = 0xff;
    cd = 1;
    cs = 0;
    rd = 0;
    rd = 1;
    return (P0);
}
```

File Name: clear
Function: 查忙
Author: shgch
Date: 2008-8-30
Explain

*****/

```
bit busy1( void )          //查读写状态
{
    unsigned char buf;
    buf = test() & 0x03;
    if ( buf == 0x03 )
    {
        return (1);
    }
    else
    {
        return (0);
    }
}
```

```
bit busy2( void )          //查自动读写状态
{
    unsigned char buf;
    buf = test() & 0x0c;
    if ( buf == 0x0c )
    {
        return (1);
    }
    else
    {
        return (0);
    }
}
```

File Name: w_byte (unsigned char,bit)
Function: 命令或数据写入
Author: shgch
Date: 2008-8-30
Explain: byte--待写入数据或命令
m = 0; 数据
m = 1; 命令

*****/

```
void w_byte(unsigned char bytes,bit m)
{
    if ( busy1() == 1 )
    {
        if ( m == 0 )
        {
            cs = 0;
            cd=0;
            P0 = bytes;
            wr=0;
            wr=1;
        }
    }
}
```

```

    }
    if ( m == 1 )
    {
        cs = 0;
        cd = 1;
        P0 = bytes;
        wr = 0;
        wr = 1;
    }
}

/*****
File Name:   initial
Function:    初始化lcd
Author:     shgch
Date:       2008-8-31
Explain:    初始化配置如下:
            显示文本区首地址为: 0x0000; 文本显示区宽度为:20h (32) 个字节, 即256点
            图形显示 (或文本属性) 区首地址为: 0x1c00; 宽度为256点
            光标坐标为0, 0; 光标形状为: 下划线; 并关闭光标
            内部字符发生器有效, 文本与图形以逻辑”异或“的关系组合
            文本和图形显示均打开
*****/

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```

void initial (void)
{
    Init_Device();      //初始化单片机设置

    clear(0,0);        //清屏
    clear(1,0);

    w_byte(0x00,0);
    w_byte(0x00,0);
    w_byte(0x40,1);     //设置显示文本区

    w_byte(0x20,0);     //一行占20个字节
    w_byte(0x00,0);
    w_byte(0x41,1);     //设置文本显示区宽度

    w_byte(0x00,0);     //设置图形显示区首地址
    w_byte(0x08,0);     //或文本属性区域首地址
    w_byte(0x42,1);

    w_byte(0x20,0);     //图形显示区宽度
    w_byte(0x00,0);     //或文本属性区宽度
    w_byte(0x43,1);

    w_byte(0x00,0);     //光标地址设置
    w_byte(0x00,0);
    w_byte(0x21,1);

    w_byte(0x81,1);     //内部字符发生器有效
    w_byte(0xa0,1);     //光标形状设置
    w_byte(0x9c,1);     //显示设置开文本和图形显示
}

```

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/*****
File Name:   clear
Function:    清屏
Author:     shgch
Date:       2008-8-30
Explain:    m=0; 数据区清屏, m=1: 图形区清屏
            t: 清楚一个单元的时间, 通过修改时间可以实现
            平滑擦除
*****/

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void clear(bit m,unsigned char t)
{
    unsigned int i;

```

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i=1024*2;
if(m == 0)
{
    w_byte(0,0);
    w_byte(0,0);
    w_byte(0x24,1);
}
if(m == 1)
{
    w_byte(0,0);
    w_byte(0+0x08,0);
    w_byte(0x24,1);
}
w_byte(0xb0,1);
while(i--)
{
    w_byte(0,0);
    delay(t);
}
w_byte(0xb2,1);
}

/*****
File Name:   w_c(char, char, char, char)
Function:    西文字符写入
Author:      shgch
Date:        2008-8-31
Explain:     x - x方向坐标
              y - y方向坐标
              codes - 字符代码
              attr  - 字符属性代码
*****/

void w_c(unsigned char x,unsigned char y,unsigned char codes,unsigned char attr)
{
    unsigned int dat;
    unsigned char datlow,dathigh;
    dat = y * 0x20 +x;
    datlow = dat & 0x00ff;
    dathigh = ( dat & 0xff00 )>>8;

    w_byte(datlow,0);
    w_byte(dathigh,0);
    w_byte(0x24,1);           //设置地址指针

    w_byte(codes,0);
    w_byte(0xc4,1);          //写入数据地址不变

    w_byte(datlow,0);
    w_byte(dathigh + 0x08,0); //市地址指针指向属性区
    w_byte(0x24,1);          //设置地址指针

    w_byte(attr,0);
    w_byte(0xc4,1);          //写入属性参数
}

/*****
File Name:   delay(int)
Function:    延时
Author:      shgch
Date:        2008-8-31
Explain
*****/

void delay(unsigned int m)
{
    unsigned int i,j;
    for (i=0;i<m;i++)
    {
        for (j=0;j<m;j++);
    }
}

```

```

/*****
File Name:   cgram(char,*char)
Function:    建立CGRAM
Author:      shgch
Date:       2008-8-31
Explain:    count - 字符个数,pl - 字模表指针
*****/

void cgram(unsigned char count,unsigned char *pl )
{
    unsigned int i;
    w_byte(0x03,0);
    w_byte(0x00,0);
    w_byte(0x22,1);          //设置CGRAM偏置地址

    w_byte(0x00,0);
    w_byte(0x1c,0);
    w_byte(0x24,1);          //设置存储器地址指针

    w_byte(0xb0,1);          //设置自动写方式
    do
    { w_byte(pl[i],0);
      i++;
    }
    while(i<count*32);      //每次写入一个字节,一个汉字占16*16/8=32个字节
    w_byte(0xb2,1);
}

/*****
File Name:   w_ct(char,char,char,char)
Function:    文本方式下写入汉字
Author:      shgch
Date:       2008-8-31
Explain:    x - x方向坐标 (单位是字节)
            y - y方向坐标 (单位是字节)
            cods - 待写入字符的字符代码
            arrt_ct - 属性
*****/

void w_ct(unsigned char x,unsigned char y,unsigned char cods,unsigned char attr_ct)
{
    cods = cods*4 + 0x80;
    w_c(x,y,cods,attr_ct);
    w_c(x,y+1,cods+1,attr_ct);
    w_c(x+1,y,cods+2,attr_ct);
    w_c(x+1,y+1,cods+3,attr_ct);
}

/*****
File Name:   w_cc(char,char,char *char)
Function:    图形方式下写入汉字
Author:      shgch
Date:       2008-8-30
Explain:    x - x方向坐标
            y - y方向坐标
            cods - 待写入字符的字符代码
            pl-字模存放首地址
*****/

void w_cc(unsigned char x,unsigned char y,unsigned char cods,unsigned char *pl)
{
    unsigned int dat;
    unsigned char i,j;
    y=y*8;                                //x单位是字节,而y方向的单位
                                           //是位为了能以同样的单位计算
                                           //,所以y应乘以8

    for(i=0;i<=1;i++)
    {
        dat =2*y * 0x20 +2*x+i + 0x0800;
        for(j=0;j<=15;j++)

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```

    {
        w_byte((dat<<8)>>8, 0);
        w_byte(dat>>8, 0);           //图形显示区地址为0x0800
        w_byte(0x24, 1);           //设置地址指针

        w_byte(pl[cods*32+j+16*i], 0);
        w_byte(0xc4, 1);           //写入数据
        dat = dat+32;
    }
}

/*****
File Name:   w_p(char, char, char, char, *char)
Function:    画图
Author:      shgch
Date:        2008-8-31
Explain:     x y- x, y方向坐标 单位为字节
             x_length, y_lenghth 图形长度和宽度, 以位为单位
             pic—图形数组指针
*****/

void w_p(unsigned char x, unsigned char y, unsigned char x_length,
         unsigned char y_length, unsigned char *pic)
{
    unsigned int dat, dat_high;
    unsigned char i, j;
    y=y*8;                          //x单位是字节, 而y方向的单位
                                    //是位, 为了能以同样的单位计算
                                    //, 所以y应乘以8

    for(i=0; i<x_length/8; i++)
    {
        dat = y * 0x20 +x+i + 0x0800;
        dat_high = dat>>8;
        for(j=0; j<y_length; j++)
        {
            w_byte((dat<<8)>>8, 0);
            w_byte(dat>>8, 0);       //图形显示区地址为0x0800
            w_byte(0x24, 1);       //设置地址指针

            w_byte(pic[j+ y_length*i], 0);
            w_byte(0xc4, 1);       //写入数据
            dat = dat + 0x20;
        }
    }
}

/*****
File Name:   highlcd
Function:    高亮(反显)显示某一区域
Author:      shgch
Date:        2008-8-30
Explain:     x, y显示区域坐标
             x_length, y_length区域宽度
             m=0;高亮显示, m=1; 清除高亮显示
*****/

void highlcd(unsigned char x, unsigned char y, unsigned char x_length,
            unsigned char y_length, bit m)
{
    unsigned int dat;
    unsigned char i;
    y=y*8;
    y_length = y_length*8;

    while(y_length!=0)
    {
        dat = 2*x+y*0x20+0x0800;
        w_byte((dat<<8)>>8, 0);
        w_byte(dat>>8, 0);         //图形显示区地址为0x0800
        w_byte(0x24, 1);         //设置地址指针
        i=x_length*2;
    }
}

```

```
while(i!=0)
{
    if(m == 0)
    {
        w_byte(0xff, 0);           //图形方式下反显, 要求显示
    }                               //方式设置为逻辑异或关系
    if(m == 1)
    {
        w_byte(0x00, 0);           //图形方式下, 清除
    }
        w_byte(0xc0, 1);           //写入数据
        i--;
    }
    y++;
    y_length-- ;
}

/*****
File Name:   w_m(char, char)
Function:   画点子函
Author:     shgch
Date:      2008-8-30
Explain:
*****/

void w_m( unsigned char x, unsigned char y)
{
    unsigned int dat;
    y = y*8;
    dat = (x/8)+y*0x20;
    w_byte((dat<<8)>>8, 0);
    w_byte((dat>>8)+0x08, 0);           //图形显示区地址为0x0800
    w_byte(0x24, 1);
    w_byte(0xf8|(~(x%8)), 1);
}
```