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I2C 程序模块

作者：梦入华为 出处：《匠人的百宝箱》

```
/******  
*项目:××××  
*模块:I2C.c //I2C 程序模块  
*说明:I2C 程序, SCL, 及 SDA 在主程序中定义为 MCUIO  
    该模块共有:  
    1, I2CDelay (); //延时程序, 给 I2C 总线提供必要的延时  
    2, I2CStart (); //开始程序  
    3, I2CStop (); //结束程序  
    4, I2CSendByte (); //送一个字节  
    5, I2CReceiveByte (); //接收一个字节  
    6, I2CReceiveACK (); //接受应答信号  
    7, I2CAcknowledge (); //发送应答信号  
    8, I2CSendWord (); //送字  
    9, I2CReceiveWord (); //接受字  
    10, I2CPageWrite (); //发送页  
    11, I2CReceiveWords (); //接收多字  
    使用 MSP430F149 完成该功能, P3.0 作为 SCL, P3.1 作为 SDA  
*作者:DreamHW  
*创建日期:2006.09.05  
*修改日期:2006.9.14  
*****/  
#include "msp430x14x.h"  
//#define SDA P3.1  
//#define SCL P3.0  
  
#define SDA_1 P3OUT |= BIT1 //SDA = 1  
#define SDA_0 P3OUT &= ~BIT1 //SDA = 0  
#define SCL_1 P3OUT |= BIT0 //SCL = 1  
#define SCL_0 P3OUT &= ~BIT0 //SCL = 0  
#define DIR_IN P3DIR &= ~BIT1 //I/O 口为输入  
#define DIR_OUT P3DIR |= BIT1 //SDA 输出数据  
#define SDA_IN ((P3IN >> 1) & 0x01)  
#define TIME 5 //I2C 时序延时时间  
  
unsigned int uiSendDataBuffer[8];  
unsigned int uiReceiveDataBuffer[8];  
/******  
*FUNCTION NAME: I2CDelay();  
*CREATE DATE:2006.09.07  
*CREATED BY:DreamHW  
*FUNCTION: I2C 总线必要的延时程序
```

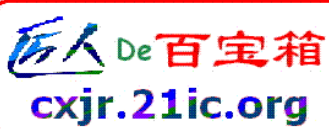


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```
*MODIFY DATE:
*INPUT:n->延时时间数 相当于指令周期数
*OUTPUT:nop
*RETURN:nop
*****/
void I2CDelay(unsigned int n)
{
    unsigned int i;
    for(i = 0;i < n;i++)
    {
        ;
    }
}

/*****
*FUNCTION NAME: I2CStart();
*CREATE DATE:2006.09.07
*CREATED BY:DreamHW
*FUNCTION:I2C 总线启动时序
*MODIFY DATE:
*INPUT:nop
*OUTPUT:nop
*RETURN:nop
*****/
void I2CStart(void)
{
    DIR_OUT;
    SDA_1;
    I2CDelay(TIME);
    SCL_1;
    I2CDelay(TIME);
    SDA_0;
    I2CDelay(TIME);
    SCL_0;
}

/*****
*FUNCTION NAME: I2CStop();
*CREATE DATE:2006.09.07
*CREATED BY:DreamHW
*FUNCTION:I2C 总线停止时序
*MODIFY DATE:
*INPUT:nop
*OUTPUT:nop
```



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```
*RETURN:nop
*****/
void I2CStop(void)
{
    DIR_OUT;
    SDA_0;
    I2CDelay(TIME);
    SCL_1;
    I2CDelay(TIME);
    SDA_1;
}

/*****
*FUNCTION NAME: I2CSendByte();
*CREATE DATE: 2006.09.08
*CREATED BY:DreamHW
*FUNCTION:I2C 送一个字节的的数据
*MODIFY DATE:
*INPUT:ucWRData
*OUTPUT:nop
*RETURN:nop
*****/
void I2CSendByte(unsigned char ucWRData)
{
    DIR_OUT;
    unsigned int i;
    for(i = 0;i < 8;i++)
    {
        SCL_0;
        I2CDelay(TIME);
        if((ucWRData >> 7) & 0x01) SDA_1;//最高位是否为 1,为则 SDA= 1
        else SDA_0;                //否则 SDA=0
        I2CDelay(TIME);
        SCL_1;
        I2CDelay(TIME);
        ucWRData <<= 1; //数据左移一位,进入下一轮送数
    }
    SCL_0; //
    SDA_1; //等待 ack
    I2CDelay(TIME);
}

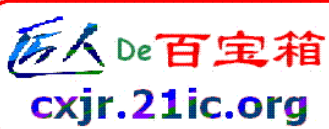
/*****
*FUNCTION NAME: I2CReceiveACK();
```



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```
*CREATE DATE: 2006.09.08
*CREATED BY:DreamHW
*FUNCTION:等待接受 ACK 信号,完成一次操作
*MODIFY DATE:
*INPUT:nop
*OUTPUT:nop
*RETURN:nop
*****/
void I2CReceiveACK(void)
{
    SCL_1;
    I2CDelay(TIME);//
    DIR_IN;
    while(SDA_IN);
    DIR_OUT;
    SCL_0;
    I2CDelay(TIME);
}

/*****
*FUNCTION NAME: I2CReceiveByte();
*CREATE DATE:2006.09.08
*CREATED BY:DreamHW
*FUNCTION:接受一个字节的数据
*MODIFY DATE:
*INPUT:nop
*OUTPUT:ucRData
*RETURN:ucRData
*****/
unsigned char I2CReceiveByte(void)
{
    unsigned char i;
    unsigned char ucRData = 0;//返回值
    unsigned char ucDataBit = 0;//每一个 clk 接受到的数据
    SCL_0;
    I2CDelay(TIME);
    SDA_1;
    DIR_IN;
    for(i = 0;i < 8;i++)
    {
        SCL_1;
        I2CDelay(TIME);
        ucDataBit = SDA_IN;
        I2CDelay(TIME);
    }
}
```



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```
        ucRDData = ((ucRDData << 1) | ucDataBit); //将数据依次存入 ucRDData
        SCL_0;
        I2CDelay(TIME);
    }
    return(ucRDData);
}
```

```
/******  
*FUNCTION NAME: I2CAcknowledge();  
*CREATE DATE: 2006.09.08  
*CREATED BY: DreamHW  
*FUNCTION: 接受数据后发送一个 ACK 信号  
*MODIFY DATE:  
*INPUT: nop  
*OUTPUT: nop  
*RETURN: nop  
*****/
```

```
void I2CAcknowledge(void)
{
    SCL_0;
    DIR_OUT;
    SDA_0;
    I2CDelay(TIME);
    SCL_1;
    I2CDelay(TIME);
    SCL_0;
}
```

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

```
void I2CAcknowledge(void)
{
    SCL_0;
    DIR_OUT;
    SDA_0;
    I2CDelay(TIME);
    SCL_1;
    I2CDelay(TIME);
    SCL_0;
}
```

```
/******  
*FUNCTION NAME: I2CSendWord();  
*CREATE DATE: 2006.09.12  
*CREATED BY: DreamHW  
*FUNCTION: 送一个双字节程序  
*MODIFY DATE:  
*INPUT: ucWRAAddress`usWRData  
*OUTPUT: nop  
*RETURN: nop  
*****/
```

```
void I2CSendWord(unsigned char ucWRAAddress, unsigned int uiWRData)
{
    unsigned char ucLowData;
    unsigned char ucHighData;
    ucLowData = uiWRData & 0x00ff;
    uiWRData >>= 8;
```

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

```
void I2CSendWord(unsigned char ucWRAAddress, unsigned int uiWRData)
{
    unsigned char ucLowData;
    unsigned char ucHighData;
    ucLowData = uiWRData & 0x00ff;
    uiWRData >>= 8;
```



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```
ucHighData = uiWRData;
I2CStart();
I2CSendByte(0xa0);
I2CReceiveACK();
I2CSendByte(ucWRAddress);
I2CReceiveACK();
    //送数据
I2CSendByte(ucLowData);
I2CReceiveACK();
I2CSendByte(ucHighData);
I2CReceiveACK();
I2CStop();
}

/*****
*FUNCTION NAME: I2CReceiveWord();
*CREATE DATE:2006.09.12
*CREATED BY:DreamHW
*FUNCTION:接受双字节程序
*MODIFY DATE:
*INPUT:ucRAddress
*OUTPUT:uiDataReg
*RETURN:uiDataReg
*****/
unsigned int I2CReceiveWord(unsigned char ucRAddress)
{
    unsigned char ucLowData;//接收到的低位数据
    unsigned char ucHighData;//接收到的高位数据
    unsigned int uiDataReg;//ReceiveWord
    //启动 送地址
    I2CStart();
    I2CSendByte(0xa0); //DEVICE DATA :1010_000_0_WRITE
    I2CReceiveACK();
    I2CSendByte(ucRAddress);
    I2CReceiveACK();
    //启动 改为读操作
    I2CStart();
    I2CSendByte(0xa1); //DEVICE DATA:1010_000_0_READ
    I2CReceiveACK();
    //开始读取数据,先低后高,存入 int 型
    ucLowData = I2CReceiveByte();
    I2CAcknowledge();
    ucHighData = I2CReceiveByte();
    //结束时没有 ACK
```



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```
I2CStop();
uiDataReg = ucHighData;
uiDataReg <<= 8;
uiDataReg += ucLowData;
I2CDelay(1000);
return (uiDataReg);
}

/*****
*FUNCTION NAME: I2CReceiveWords()
*CREATE DATE:2006.09.12
*CREATED BY:DreamHW
*FUNCTION:送多个字程序
*MODIFY DATE:
*INPUT:ucRDAddress
*OUTPUT:uiReceiveDataBuffer[]
*RETURN:nop
*****/
void I2CReceiveWords(unsigned char ucRDAddress)
{
    unsigned char ucLowData;
    unsigned char ucHighData;
    unsigned int i;
    //启动 方式输入, 输入地址
    I2CStart();
    I2CSendByte(0xa0);
    I2CReceiveACK();
    I2CSendByte(ucRDAddress);
    I2CReceiveACK();
    //启动 改为读操作
    I2CStart();
    I2CSendByte(0xa1); //DEVICE DATA:1010_000_0_READ
    I2CReceiveACK();
    //读取数据 将数据放入 uiReceiveDataBuffer[]
    for(i = 0; i < 7; i++)
    {
        ucLowData = I2CReceiveByte();
        I2CAcknowledge();
        ucHighData = I2CReceiveByte();
        I2CAcknowledge();
        uiReceiveDataBuffer[i] = (ucHighData << 8) + ucLowData;
    }
    ucLowData = I2CReceiveByte();
    I2CAcknowledge();
```



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```
ucHighData = I2CReceiveByte();
//结束时没有 ACK
I2CStop();
uiReceiveDataBuffer[7] = (ucHighData << 8) + ucLowData;
I2CDelay(1000);
}

/*****
*FUNCTION NAME: I2CPageWrite();
*CREATE DATE:2006.09.12
*CREATED BY:DreamHW
*FUNCTION: 页写程序
*MODIFY DATE:
*INPUT:ucRDAddress;uiSendData[]
*OUTPUT:nop
*RETURN:nop
*****/
void I2CPageWrite(unsigned char ucRDAddress,unsigned int uiSendData[])
{
    unsigned int *p;
    unsigned char ucHighData;
    unsigned char ucLowData;
    unsigned char i;
    p = uiSendData;//送数组首地址到指针
    //I2C 开始通信, 写起始地址
    I2CStart();
    I2CSendByte(0xa0);
    I2CReceiveACK();
    I2CSendByte(ucRDAddress);
    I2CReceiveACK();
    //数据传输
    for(i = 0;i < 8;i++)
    {
        ucLowData = *p;
        ucHighData = (*p >> 8);
        p++;
        I2CSendByte(ucLowData);
        I2CReceiveACK();
        I2CSendByte(ucHighData);
        I2CReceiveACK();
    }
    I2CStop();
    I2CDelay(1000);
}
```