Lab 7 Master−Slave Serial Communication

- 1 Master device, 3 slave devices
- Addresses for 3 slaves: 00H, 01H, 02H
- Address FFH is the control address, to ask all slaves to set SM2=1
- Control instruction, 00H for receiving, 01H for sending
- Status word for salves

D7	D6	D5	D4	D3	D2	D1	D0
ERR	0	0	0	0	0	TRDY	RRDY

where

ERR (D7) = 1, represents illegal instruction received

TRDY (D1) = 1, represents being ready for sending

RRDY (D0) = 1, represents being ready for receiving

Master: query mode, working mode 3, receive enabled, TB8 = 0, SM2 = 0,

Slaves: interrupt mode,

```
Master:
#include <reg51.h>
#include <math.h>
sbit switch1=P0^0;
sbit switch2=P0^1;
sbit switch3=P0^2;

void delay_ms(unsigned int i)
{
unsigned char j;
for(;i>0;i--)
    for(j=0;j<125;j++)
    ;
}

void main()
{
    EA=1;           //总中断打开
    //PS=0;         //串口优先级设为低
    //PX0=1;        //外部中断0优先级高
    //IT0=1;        //下降沿触发
    TMOD=0x20;      //定时器1 工作方式2 自动装载 用于串口设置波特率
    TL1=0xfd;
    TH1=0xfd;       //波特率设为9600
    PCON=0x00;      //不加倍  0x80 为加倍
    SCON=0xd0;      //SM2 设为0， TB8 设为0
    TR1=1;          //定时器1 打开
    //EX0=1;        //外部中断0 打开
    ES=1;
    SBUF=0xff;
    while(TI==0);
    TI=0;
    while(1)
    {
```

```c
            delay_ms(100);
            if(switch1==0)
            {
                TB8=1;
                SBUF=0x01;
                while(TI==0);
                TI=0;
                TB8=0;
                SBUF=0x00;
                while(TI==0);
                TI=0;
                //led=1;
                //delay_ms(100);
            }
            if(switch2==0)
            {
                TB8=1;
                SBUF=0x02;
                while(TI==0);
                TI=0;
                TB8=0;
                SBUF=0x00;
                while(TI==0);
                TI=0;
                //led=1;
                //delay_ms(100);
            }
            if(switch3==0)
            {
                TB8=1;
                SBUF=0x03;
                while(TI==0);
                TI=0;
                TB8=0;
                SBUF=0x00;
                while(TI==0);
                TI=0;
                //led=1;
                //delay_ms(100);
            }
        }
}


Slave 1:
#include <reg51.h>
#include <math.h>
sbit led=P2^0;
bit rrdy=0;
bit  trdy=0;
bit err=0;
void delay_ms(unsigned int i)
{
unsigned char j;
for(;i>0;i--)
    for(j=0;j<125;j++)
    ;
}

void main()
{
    EA=1;            //总中断打开
```

```c
    //PS=0;        //串口优先级设为低
    //PX0=1;       //外部中断 0 优先级高
    //IT0=1;       //下降沿触发
    TMOD=0x20;     //定时器 1 工作方式 2 自动装载 用于串口设置波特率
    TL1=0xfd;
    TH1=0xfd;      //波特率设为 9600
    PCON=0x00;     //不加倍  0x80 为加倍
    SCON=0xd0;     //SM2 设为 0， TB8 设为 0
    TR1=1;         //定时器 1 打开
    //EX0=1;       //外部中断 0 打开
    P1=0xff;
    ES=1;
    //delay_ms(100);
    while(RI==0);//接收控制指令 0xff
    if(SBUF==0xff) err=0;
    else err=1;
    RI=0;
    SM2=1;
    while(1);
}

void int1() interrupt 4
{
    if(RI)
    {
        if(RB8)
        {
            RB8=0;
            if(SBUF==0x01)
            {
                SM2=0;
                led=0;
            }
        }
        else
        {
            rrdy=1;
            P1=SBUF;
            SM2=1;
            led=1;
        }
        RI=0;
    }
    delay_ms(50);
    P1=0xff;

    //delay_ms(50);
}
```

```c
#include <reg51.h>
#include <math.h>
sbit led=P2^0;
bit rrdy=0;
bit trdy=0;
bit err=0;
void delay_ms(unsigned int i)
{
unsigned char j;
for(;i>0;i--)
    for(j=0;j<125;j++)
```

```
        ;
    }

void main()
{
    EA=1;           //总中断打开 Enable all
    //PS=0;         //串口优先级设为低 low priority for serial communication
    //PX0=1;        //外部中断 0 优先级高 High priority for external interrupt 0
    //IT0=1;        //下降沿触发 High-to-low transition trigger mode
    TMOD=0x20;      //定时器 1 工作方式 2 自动装载 用于串口设置波特率 Timer 1, mode 2, auto
reloading
    TL1=0xfd;
    TH1=0xfd;       //波特率设为 9600 baudrate 9600bps
    PCON=0x00;      //不加倍  0x80 为加倍, SMOD=0
    SCON=0xf0;      //SM2 设为 1, TB8 设为 0, SM2 = 1, TB8 = 0
    TR1=1;          //定时器 1 打开 Start Timer 1
    //EX0=1;        //外部中断 0 打开
    P1=0xff;
    ES=1;
    while(RI==0);//接收控制指令 0xff, waiting to receive control instruction 0xff
    if(SBUF==0xff) err=0;
    else err=1;
    RI=0;
    SM2=1;
    while(1);
}

void int1() interrupt 4
{
    if(RI)
    {
        if(RB8)
        {
            RB8=0;
            if(SBUF==0x02)
            {
                SM2=0;
                led=0;
            }
        }
        else
        {
            rrdy=1;
            P1=SBUF;
            SM2=1;
            led=1;
        }
        RI=0;
    }
    delay_ms(50);
    P1=0xff;
    //delay_ms(50);
}


Slave 3:
#include <reg51.h>
#include <math.h>
sbit led=P2^0;
bit rrdy=0;
bit trdy=0;
bit err=0;
```

```c
void delay_ms(unsigned int i)
{
unsigned char j;
for(;i>0;i--)
    for(j=0;j<125;j++)
    ;
}

void main()
{
    EA=1;           //总中断打开
    //PS=0;         //串口优先级设为低
    //PX0=1;        //外部中断0优先级高
    //IT0=1;        //下降沿触发
    TMOD=0x20;      //定时器1 工作方式2 自动装载 用于串口设置波特率
    TL1=0xfd;
    TH1=0xfd;       //波特率设为9600
    PCON=0x00;      //不加倍  0x80 为加倍
    SCON=0xf0;      //SM2设为1， TB8设为0
    TR1=1;          //定时器1 打开
    //EX0=1;        //外部中断0打开
    P1=0xff;
    ES=1;
    while(RI==0);//接收控制指令 0xff
    if(SBUF==0xff) err=0;
    else err=1;
    RI=0;
    SM2=1;
    while(1);
}

void int1() interrupt 4
{
    if(RI)
    {
        if(RB8)
        {
            RB8=0;
            if(SBUF==0x03)
            {
                SM2=0;
                led=0;
            }
        }
        else
        {
            rrdy=1;
            P1=SBUF;
            SM2=1;
            led=1;
        }
        RI=0;
    }
    delay_ms(50);
    P1=0xff;
    //delay_ms(50);
}
```