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/*ULuo_2017031611_2019蓝桥杯_1数码管和矩阵键盘*/
/*目标实现：数码管显示秒计时并可通过Key22控制启停*/

#include"main.h"

sbit KL1=P3^0;sbit KL2=P3^1;sbit KL3=P3^2;sbit KL4=P3^3;
sbit KR1=P4^4;sbit KR2=P4^2;sbit KR3=P3^5;sbit KR4=P3^4;
//矩阵键盘IO定义

uint t0Cnt; //定时器t0计数
bit isTimer;  //毫秒计数使能
uint keyVal[2]={0,0}; //矩阵键盘值与长短按状态

uchar ledBuff[8]={0xff,0xff,0xff,0xff,0xff,0xff,0xff,0xff}; //数码管显示缓存
uchar ledChar[11]={0xC0,0xF9,0xA4,0xB0,0x99,0x92,0x82,0xF8,0x80,0x90,0xbf};
//共阳数码管段码表，10：-


//main主函数
void main()
{
  P2=0xa0;P0=0;P2=0; //关闭外设

  TMOD=0; //开定时器t0并设为模式0 16位自动重载
  TH0=0xfc;TL0=0x66; //1ms@11.0592MHz
  TR0=1;ET0=1;EA=1;  //使能t0和中断

  isTimer=1; //毫秒计数使能

  while(1);
}


//led数码管扫描
void ledscan()
{
  static uint i;

  P2=0xe0;P0=0xff;P2=0;  //消隐
  P2=0xc0;P0=1<<i;P2=0;  //位选
  P2=0xe0;P0=ledBuff[i];P2=0; //段码

  if(i<7)
    i++;
  else
    i=0;
}


//led数码管设置
void led_set(ulong numShow)
{
  uint i;
  uchar buf[8];

  for(i=7;i>0;i--)
  {
    buf[i]=numShow%10;
    numShow/=10;
  }

  for(i=0;i<8;i++)
  {
    if(buf[i]==0)
    {
      ledBuff[i]=0xff;
    }else
    {
      break;
    }
  }

  for(;i<8;i++)
  {
    ledBuff[i]=ledChar[buf[i]];
  }
}

//key按键扫描
void keyscan()
{
  static uchar keyState,keyNow; //按键状态机
  uchar kl,kr;   //临时行列键值

  //键盘行扫描
  KR1=KR2=KR3=KR4=0; KL1=KL2=KL3=KL4=1;
  if(KL1==0){kl=1;}
  else if(KL2==0){kl=2;}
  else if(KL3==0){kl=3;}
  else if(KL4==0){kl=4;}
  else{kl=5;}

  //键盘列扫描
  KL1=KL2=KL3=KL4=0; KR1=KR2=KR3=KR4=1;
  if(KR1==0){kr=1;}
  else if(KR2==0){kr=2;}
  else if(KR3==0){kr=3;}
  else if(KR4==0){kr=4;}
  else{kr=5;}

  keyNow=kl*10+kr;   //更新扫描键值

  //矩阵键盘状态机
  switch(keyState)
  {
    case 0: //闲置
    {
      if(keyNow!=55) {keyState=1;} //按下
    }break;
    case 1: //消抖
    {
      if(keyNow!=55)
      {
        keyVal[0]=keyNow;keyVal[1]=0;  //返回短按
        keyState=2;
      }
      else {keyState=0;} //认为误触
    }break;
    case 2: //消抖后
    {
      if(keyNow==55) {keyState=0;}
    }break;
    default:keyState=0;break;
  }
}


void t0Server() interrupt 1 //T0:1ms
{
  static uint keyTimeCnt;
  static ulong cntCnt;

  //每30ms矩阵键盘扫描
  if(++keyTimeCnt==30)
  {
    keyTimeCnt=0;
    keyscan();
  }

  //毫秒表
  if(isTimer==1)
  {
    if(cntCnt==99999999)
    {
      cntCnt=0;
    }else
    {
      led_set(cntCnt/1000);
      ledBuff[0]=ledChar[10]; ledBuff[1]=ledChar[0]
      cntCnt++;
    }
  }


  //矩阵键盘响应服务
  if(keyVal[0]==22 && keyVal[1]==0)
  {
    if(isTimer==0){isTimer=1;}
    else{isTimer=0;}
    keyVal[0]=keyVal[1]=0; //按键复位
  }
  ledscan();
}
```