CECS 262

Lab 8: Timer Programming using Software Control in C

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Purpose:

The purpose of this lab is to help students learn how to program 8051 timer delay using software control.

Tasks:

Modify the previous lab code to implement the following additional function:
- bouncing is displayed with one-second delay controlled by on-board dip switch pin 5;
- count-up and count-down are displayed with two-second delay controlled by on-board dip switch pin 6;
- shooting and double bit are displayed with four-second delay controlled by on-board dip switch pin 7;

Build Output

```
compiling lab08_Khan.c...
lab08_Khan.c - 0 Error(s), 0 Warning(s).
```

Build Output

```
compiling lab08_Khan.c...
linking...
Program Size: data=17.0 xdata=0 code=674
".\Objects\lab08_Khan" - 0 Error(s), 0 Warning(s).
Build Time Elapsed:   00:00:01
```

```
0x5DF5      00          NOP
0x5DF6      00          NOP
0x
```

Parallel Port 0 ✕

Port 0

P0: 0xFF   7 Bits 0
              ☑☑☑☑☑☑☑☑

Pins: 0xFF   ☑☑☑☑☑☑☑☑

Parallel Port 1 ✕

Port 1

P1: 0xFF   7 Bits 0
              ☑☑☑☑☑☑☑☑

Pins: 0xFF   ☑☑☑☑☑☑☑☑

```
3    #define  SW  P0
4    void delay(void);
5    void bouncing(void);
6    void countup(void);
7    void countdown(void);
```

```c
void chg_mod(void) interrupt 0
{
  chg_flag = 1;
}

void timer1_isr(void) interrupt 3
{
  TR1 = 0;
  count++;
  TL1 = 0x00;
  TH1 = 0xA6;
  TR1 = 1;
}
```

```c
  1    #include <reg51.h>
  2    #define LED P1
  3    #define SW P0
  4    void delay(void);
  5    void bouncing(void);
  6    void countup(void);
  7    void countdown(void);
  8    void shooting(void);
  9    void db(void);
 10    void delay_two_sec(void);
 11    void delay_four_sec(void);
 12
 13    sbit MODE1 = P0^0;
 14    sbit MODE2 = P0^1;
 15    sbit MODE3 = P0^2;
 16    sbit MODE4 = P0^3;
 17    sbit MODE5 = P0^4;
 18    sbit MODE6 = P0^5;
 19    sbit MODE7 = P0^6;
 20    sbit MODE8 = P0^7;
 21    void main()
 22    {
 23      SW = 0xFF;
 24      while (1) {
 25        if (MODE1) {
 26          bouncing();
 27        }
 28        else if (MODE2) {
 29          countup();
 30        }
 31        else if (MODE3) {
 32          countdown();
 33        }
 34        else if (MODE4){
 35          shooting();
 36        }
 37        else if (MODE5) {
 38          db();
 39        }
 40        else {
 41          LED = 0xFF;
 42          delay();
 43          LED = 0;
 44          delay();
 45        }
 46      }
 47    }
 48
 49    void delay(void)
 50    {
 51      unsigned char delay_len = 50;
 52      unsigned int j;
 53      unsigned char i;
 54      for (i = 0; i < delay_len; i++){
 55        for (j = 0; j < 30000; j++){
 56        }
 57      }
 58    }
 59
 60    void delay_two_sec(void)
 61    {
 62      int count = 0;
 63      int sec;
 64      for(sec=0;sec<2;sec++){
 65        count=0;
 66        while(count!=500)
 67          {
 68            TMOD=0x01;
 69            TH0=0xF8;
 70            TL0=0xCC;
 71            TR0=1;
 72            while(!TF0);
```

```
 73              TR0=0;
 74              TF0=0;
 75              count++;
 76              }
 77          }
 78      }
 79
 80      void delay_four_sec(void)
 81      {
 82        int count = 0;
 83        int sec;
 84        for(sec=0;sec<4;sec++){
 85          count=0;
 86          while(count!=500)
 87              {
 88              TMOD=0x01;
 89              TH0=0xF8;
 90              TL0=0xCC;
 91              TR0=1;
 92              while(!TF0);
 93              TR0=0;
 94              TF0=0;
 95              count++;
 96              }
 97          }
 98      }
 99
100
101      void countup (void)
102      {
103        LED = 0;
104        while ( (MODE2==1)&&(MODE1==0) )
105        {
106          if (MODE7==1)
107          {
108            delay_two_sec();
109          }
110          else
111          {
112            delay();
113            delay();
114          }
115          LED++;
116        }
117      }
118
119      void countdown (void)
120      {
121        LED = 255;
122        while ( (MODE3==1)&&(MODE2==0)&&(MODE1==0) )
123        {
124          if (MODE7==1)
125          {
126            delay_two_sec();
127          }
128          else
129          {
130            delay();
131            delay();
132          }
133          LED--;
134        }
135      }
136
137      void shooting (void)
138      {
139        char i;
140        char array[] = {+128, +192, +224, +240, +248, +252, +254, +255};
141        LED = 0;
142        while ( (MODE4==1)&&(MODE3==0)&&(MODE2==0)&&(MODE1==0) )
143        {
144          for (i=0; i<=7; i++)
```

```c
145         {
146           if (MODE8==1)
147           {
148             delay_four_sec();
149           }
150           else
151           {
152             delay();
153             delay();
154           }
155           LED = array[i];
156         }
157
158         for (i=7; i>=0; i--)
159         {
160           if (MODE8==1)
161           {
162             delay_four_sec();
163           }
164           else
165           {
166             delay();
167             delay();
168           }
169           LED = array[i];
170         }
171       }
172   }
173
174   void doublebit (void)
175   {
176     char i;
177     char array[] = {+24, +36, +66, +129};
178     while ( (MODE5==1)&&(MODE4==0)&&(MODE3==0)&&(MODE2==0)&&(MODE1==0) )
179     {
180       for (i=0; i<=3; i++)
181       {
182         if (MODE8==1)
183         {
184           delay_four_sec();
185         }
186         else
187         {
188           delay();
189           delay();
190         }
191         LED = array[i];
192       }
193
194       for (i=3; i>=0; i--)
195       {
196         if (MODE8==1)
197         {
198           delay_four_sec();
199         }
200         else
201         {
202           delay();
203           delay();
204         }
205         LED = array[i];
206       }
207     }
208   }
209
210
```