

CECS 262

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Lab 7: Parallel I/O Programming & Modular Programming

Purpose:

The purpose of this lab is to help students learn how to program 8051 I/O Port and to learn how to implement programs modularly.

Tasks:

Modify the previous lab code to implement the following main function, i.e. prototype and code the BounceLED, CountUpLED, and CountDownLED functions in support of this main function. The parameters that are passed to the functions are to be determined (TBD) by the student.

```
void main()
{
    while (1) {
        // Bouncing Mode
        if (PIN0 == 1) BounceLED(TBD);
        // Count Up Mode
        else if (PIN1 == 1) CountUpLED(TBD);
        // Count Down Mode
        else if (PIN2 == 1) CountDownLED(TBD);
    }
}
```

Then add the following functionality:

1. When the on-board dip switch pin 3 is on and pin 0, 1 and 2 are off, the on-board LEDs display the following pattern. 00000000, ●0000000, ●●000000, ●●●00000, ●●●●0000, ●●●●●000, ●●●●●●00, ●●●●●●●0, ●●●●●●●●, ●●●●●●●●, ●●●●●●●●, then repeat.
2. When the on-board dip switch pin 4 is on and pin 0, 1, 2 and 3 are off, the on-board LEDs display the following two-way shooting pattern. 000●0000, 00●00●00, 0●0000●0, ●000000●, then repeat.
3. Implement the following priority mode selection: Lower index pins have higher priority. For example, if both P0.0 and P0.3 is on, display Mode 1 instead of Mode 4.
4. When all 5 pins, pins 0,1,2,3,4, are off, flash all LEDs: turn on all LEDs for a fixed delay, then turn off all LEDs for the same delay, and then repeat.

```
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
11  sbit MODE1 = P0^0;
12  sbit MODE2 = P0^1;
13  sbit MODE3 = P0^2;
14  sbit MODE4 = P0^3;
15  sbit MODE5 = P0^4;
16  void main()
17  {
18      SW = 0xFF;
19      while (1) {
20          if (MODE1) {
21              bouncing();
22          }
23          else if (MODE2) {
24              countup();
25          }
26          else if (MODE3) {
27              countdown();
28          }
29          else if (MODE4){
30              shooting();
31          }
32          else if (MODE5) {
33              db();
34          }
35          else {
36              LED = 0xFF;
37              delay();
38              LED = 0;
39              delay();
40          }
41      }
42  }
43  void bouncing(void)
44  {
45      LED = 1;
46
47      while(MODE1 == 1){
48          char i = 0;
49          for (i = 0; i < 7; i++){
50              delay();
51              delay();
52              delay();
53              delay();
54              LED <= 1;
55          }
56          for (i = 0; i < 7; i++){
57              delay();
58              delay();
59              delay();
60              delay();
61              LED >= 1;
62          }
63      }
64  }
65  void countup(void)
66  {
67      LED = 0;
68      while ((MODE2 == 1) && (MODE1 == 0))
69      {
70          delay();
71          delay();
72          delay();
```

```
73     delay();
74     LED++;
75 }
76 }
77 void countdown(void)
78 {
79     LED = 255;
80     while ((MODE3 == 1) && (MODE2 == 0) && (MODE1 == 0))
81     {
82         delay();
83         delay();
84         delay();
85         delay();
86         LED--;
87     }
88 }
89 void delay(void)
90 {
91     unsigned char delay_len = 20;
92     unsigned int j;
93     unsigned char i;
94     for (i = 0; i < delay_len; i++){
95         for (j = 0; j < 30000; j++){
96         }
97     }
98 }
99 void shooting(void)
100 {
101     char i;
102     char array [] = {+128, +192, +224, +240, +248, +252, +254, +255};
103     LED = 0;
104     for (i = 0; i <= 7; i++){
105         delay();
106         delay();
107         delay();
108         delay();
109         LED = array[i];
110     }
111     for (i = 6; i >= -1; i--){
112         delay();
113         delay();
114         delay();
115         delay();
116         LED = array[i];
117     }
118 }
119 void db(void)
120 {
121     char i;
122     char array[] = {+24, +36, +66, +129};
123     for (i = 0; i < 3; i++){
124         delay();
125         delay();
126         delay();
127         delay();
128         LED = array[i];
129     }
130     for (i = 3; i > 0; i--){
131         delay();
132         delay();
133         delay();
134         delay();
135         LED = array[i];
136     }
137 }
138
139
```

Build Output

```
compiling lab07_Khan.c...  
lab07_Khan.c - 0 Error(s), 0 Warning(s).
```

Build Output

```
compiling lab07_Khan.c...  
linking...  
Program Size: data=17.0 xdata=0 code=607  
".\Objects\lab07_Khan" - 0 Error(s), 0 Warning(s).  
Build Time Elapsed: 00:00:01
```

```
<  
:0x0A06 BD30F5 CJNE R5,#0x30,C:09FE
```

```
97: }
```

```
:0x0A09 0E INC R6
```

```
:0x
```

Parallel Port 0

Port 0

P0: 0xF0 7 Bits 0

Pins: 0xF0

Parallel Port 1

Port 1

P1: 0x42 7 Bits 0

Pins: 0x42

```
90 {
```

```
91 unsigned char delay_len = 20;
```

```
92 unsigned int j;
```

```
93 unsigned char i;
```

```
0x0A02 0C INC R4
```

```
0x
```

Parallel Port 0

Port 0

P0: 0xF8 7 Bits 0

Pins: 0xF8

Parallel Port 1

Port 1

P1: 0x80 7 Bits 0

Pins: 0x80

```
90 {
```