CECS 262 Intro to Embedded

Project 1: 8051 I/O Ports, Timer and Interrupt

Purpose:

The purpose of this project is to help students learn how to program 8051 I/O ports, hardware timers and external interrupts.

Description:

Write your system software in C51 to perform the following 4 different LED display modes:

1. Mode 1: [bouncing mode] One light starts from the left outmost LED, move toward right one position at a time until it reaches the right most LED; then it start to move to left one position at a time until it reaches the left most LED, then repeat the sequence. One complete sequence of displays is shown below. (A filled circle represent a lighted LED) •ooooooo, o•ooooooo, oo•ooooo, ooo•oooo, oooo•ooo, ooooo•oo, oooooo•o,ooooooo•, oooooo•o, ooooo•oo, oooo•ooo, ooo•oooo, oo•ooooo, o•ooooo.

2. Mode 2: [counting mode] 4 bit Count up or down depending on an external interrupt switch P3.2, on reset the default should be count up mode. Use dip switch input P0.4 – P0.7 to determine initial count up or down value.

3. Mode 3: [double bouncing mode] •oooooo•,o•oooo•o, oo•oo•oo, ooo••ooo, oo•oo•oo, o•oooo•o, then repeat.

4. Mode 4: [stack mode] oooooooo, •ooooooo, ••ooooo, •••oooo, ••••ooo, •••••oo, ••••••o, •••••••, •••••••o, ••••••oo, •••••ooo, ••••oooo, •••ooooo, ••oooooo, •ooooooo, then repeat.

Mode Control: Use on-board dip switches Position 0 and 1 to select the mode:

P0.1	P0.0	Mode
0	0	Mode 1
0	1	Mode 2
1	0	Mode 3
1	1	Mode 4

Speed Control: Use on-board dip switches Position 2 and 3 to select delay speed:

P0.3	P0.2	Delay Speed
0	0	0.1 Second
0	1	0.5 Second
1	0	1 Second
1	1	2 Second

*Delay must be implemented using hardware timer. This means the delay time should be precise.

Changing Modes: the mode can be changed only when an external interrupt is detected. This external interrupt is generated by the external push button P3.3. To change the mode, we set the new mode on-board dip switch, then press the external push button once.

Changing Speed: Speed can be changed either after each delay period or when we change the mode. Change speed after each delay period: at the end of each delay period, check if there is a speed change.

System Response Time: your embedded system should be able to switch to the new mode as soon as an interrupt is detected; the system should not wait until finishing displaying all patterns for the current mode.

- Group of 2
- Due Oct 31, 2017 end of lab
- If you have a partner, both people must be present to demo
- Submit a report and software to beachboard dropbox