Embedded Systems Design

EECE 4038C, Embedded System Design

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Laboratory Assignment – 7

Preparation:

Go through Lessons 6, 7 and 8 in Chapter 3 of the "44-Pin Demo Board User's Guide" and execute the corresponding programs on the demo board with PIC 16F887.

Assignment:

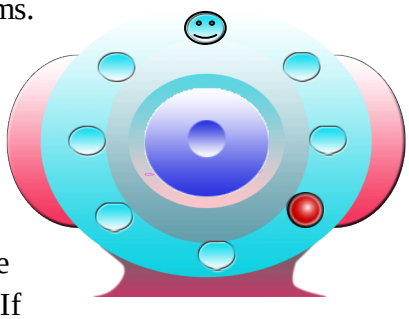
Using the knowledge you have gained from these lessons, develop assembly programs for the following tasks:

1. Does the Switch Bounce?

Lesson 6 demonstrated software debouncing of the push button switch on the demo board. The question is: Does that switch bounce at all? Develop a method to detect switch bouncing in software. Your method may depend on modifying the Lesson 6 program (debounce.asm) or writing a new program from scratch. Your program should detect the switch bouncing and demonstrate it using the LED panel. Experimentally determine and report the *minimum* amount of waiting time for the bouncing to die down for down press and release.

2. Catch the Clown!

Game gadgets are an important application area for embedded systems.



A game designer came up with the idea for a new game: "Catch the Clown!" which tests the reflexes of the player. In this game, a lighting LED is rotated clockwise across the circular 8-LED panel. The speed of rotation can be controlled by the position of a rotary knob. The objective of this game is to push the big blue button in the middle exactly when the smiley face "clown" LED on the top is lit. If the button is pushed exactly when the clown is lit then the rotation halts and the clown LED stays on as long as the button remains pushed down. Rotation should resume when the button is released. If the button is pushed when the clown is off, rotation simply continues and this button push is ignored. The user should release the button and push it down again for the next attempt.

That is, simply pushing the button down at the wrong time and keeping it down until the clown is lit would not catch him!

You are asked to develop and demonstrate a prototype of the embedded electronics for this game. Use the PIC16F887 demo board. Use the LED panel n the board to model the 8-LED panel in the game. Use rotate right (MSB to LSB) to model clockwise rotation and designate the LED in the MSB position as the clown LED. Use the potentiometer to model the knob which controls the speed of rotation (as in Lesson 5). Finally, use the push button on the board to model the push button in the game.

Vary the rotation speed using the pot and test your reflexes! Find the fastest rotation setting at which you can reliably catch the clown in every rotation cycle. This is how fast *your* reflexes can reliably react with this game. The game designer would like to know this rotation speed. Record this in your report and explain exactly how you measured it.