Lab 8

Objective: Gain experiences programming, emphasizing use of code developed thus far in the class. This lab will involve using the button and encoder to control the LED display that was used in Lab 7. Our goal will be to control the position of a blinking LED.

Programming Sequence: We will want to develop a system that will blink a single LED on the display and allow us to move it around on the display using the button and encoder. This first section will describe a couple changes to the code used previously to prepare for the final task. Note grading will be based on each complete each change described and then properly using this code to implement the full system.

Task 1: Adapt the button debounce code to return codes that indicates when the button was held down for less that 0.5 seconds (2) or longer (3). This change is easier that it might first appear. Simply go to the portion of code that transitions from LOW back to IDLE. Since a reading of millis() was taken at the button being pressed, we can calculate how long the button was down as

```
if( millis() - ButtonTimer < 500 ) // Less than 0.5 seconds
      return 2; // Short press
else
      return 3; // Long press
```

Task 2: Since we will want to use both the LCD and LED displays, a software version of the SPI is called for. This code is available under the "Files->CourseNotes->B_Programming->Support Code" link on the webpage. The code is in the form of a header file that can be included (#include "SW_SPI.h") in your code. You should download this file and figure out how it is used.

Task 3: Create two global variables, named something like Row and Column, that represent the location on the LED Display. Also you should create a state machine that has two states of Vertical and Horizontal. To aid in debugging, display these quantities on the LCD with the state showing as "VERTICAL" or "HORIZONTAL" on the first line, and the value of Row and Column appearing on the second row

Full systems: Update the LED display every 200 milliseconds to blink the LED at Row, Column. The encoder will either increase (clock-wise rotation) or decrease (counterclockwise rotation) the Row or Column value. If your state machine is in the VERTICAL state, the encoder will change the vertical position of the blinking LED. If your state machine is in the HORIZONTAL state, the encoder will change the horizontal position of the blinking LED. Note that the encoderposition variable from lab 6 incremented by +/- 4, thus a simple function will be needed to increase/decrease the Row or Column variable when the encoderposition variable updates. Your state machine should function in the following fashion – If the button is pressed and held for less than 0.5 seconds, set mode to VERTICAL. If a long press, change to HORIZONTAL.