

# EE333 Microcontroller Engineering

## Oregon Tech Portland, Fall 2013

Lab Assignment #7 - *Adjustable Thermostat*  
Due December 12

### Objectives:

Implement de-bounced pushbuttons and a state machine.

### Equipment Required:

Your working lab assignment #4.

### Background Information:

We want to make use of two push buttons to raise and lower the thermostat set-point temperature in our thermometer program. Since we don't know what the current setting is, we want to display it when the button is pushed. Then if the button is held down for at least one second, we want to increment/decrement the setting by one degree every half second the button remains depressed.

By having the delays before any action takes place, and contact bounce will be ignored because it will cause pulses too short to do anything.

You need to implement this in a state machine placed at the end of the RTI interrupt service routine. Every 1.024 milliseconds the code will execute depending on its current state. The following states will suffice:

STATE\_IDLE — The state when no button is pressed. If a button press is detected, clear a counter (lets call it *button\_count*) and set the state to STATE\_DEPRESSED.

STATE\_DEPRESSED — If no buttons are pressed, set the state to STATE\_IDLE, otherwise do the remaining operations for this state. Increment *button\_count*. If *button\_count*=977 then clear the count, increment or decrement the set-point (depending on which button is depressed), and set the state to STATE\_REPEAT.

STATE\_REPEAT — If no buttons are pressed, set the state to STATE\_IDLE, otherwise do the remaining operations. Increment *button\_count*. If *button\_count*=488 then clear the count and increment or decrement the set-point (depending on which button is depressed).

### Assignment:

Add the ability to set the thermostat set-point using the pushbuttons as described above.

### To turn in:

- Documented program listing.
- Description of how you tested the program.
- Discussion of any problems you had

This should all be placed in a single file (PDF format preferred, Word or Open Office formats also acceptable).