**Embedded Systems Fall 2012—Project 2**

**Due October 8, 2012**

The main objective for this lab is to make a FAST system.

Your goal is to implement a simple FIR filter, which will just compute a moving average.

A basic filter is described here:

<http://en.wikipedia.org/wiki/Finite_impulse_response/>

For your system, your “input” should be random 8-bit 2’s complement numbers Xi, one per clock cycle. Assume fixed-point format, with 6 fractional bits.

At each cycle i , you should compute

Zi = (1/3) \* Xi + (1/3) \* Xi-1 + (1/3) \* Xi-2

Use a 6-bit approximation to 1/3.

Output the result (in binary) to appropriate LEDs (one output per clock cycle).

Also keep track of the total number of inputs received.

Your circuit should begin computing when a “start” button is pushed. When a “stop” button is pushed, the circuit should stop calculations and should output the total number of inputs processed using the hex digits (you may need to display this as an appropriate exponent).

Your report for this project should follow the same format as the previous report. Be sure to include the (hypothetical) maximum speed at which your circuit can run and also identify the critical path.