Homework #3: Hybrid Embedded Systems

– Due October 15, 2010

Problem 1: Write a module in Verilog to evaluate arithmetic, logical Operators, compare and shift operators for two four bit numbers. Simulate the output to verify operation. (20 points)

Problem 2: Create a state machine in Verilog to implement a combination lock. The sequence that needs to be implemented for the lock to open is \textbf{1101010} (the bit on the right is the LSB).

Use the DE2 board to test the circuit with the switches and a pushbutton to capture the new switch entry. The current input to the lock should be displayed on the LCD and the lock can be reset with an additional pusbutton (30 points)

Problem 3: Develop a program using the Nios II softcore to implement a calculator.

Input values should be entered from the PS2 keyboard and displayed on the LCD display. Operations that are supported are addition (+), subtraction (-), multiplication (*), and division (/), clear entry (Q), clear (C).

The maximum number of digits to display is 6 with four digit fractional components. Overflow and error should be indicated as well as the sign of the result. (50 points)

Zip your Quartus and NIOS project files for each problem so that they can be launched for evaluation and also provide instructions for launching.

Grading will be performed based on the ability to load your code into the DE2 board and demonstrate operation. Document what your code is meant to accomplish in case it does not execute to receive partial credit.)