# CPE/EE 421/521: Laboratory Assignment 3

**Purpose:** To study MSP430 and write C programs utilizing Digital I/O

**Assignment #1: Keypad interface on the MSP430 Education Board**

Write a C program that scans the keypad and determines which of the keys is pressed. The keypad driver must handle software keypad debounce. Keypad is connected to MSP430 microcontroller using its Port 2 as represented below.

Use pins P2.4, P2.5, P2.6, and P2.7 to select a row, and pins P2.0 - P2.3 to scan which of the keys in the selected row has been pressed and blink the LEDs as follows:

- If one of the numerical keys ('1'-'9') is pressed blink (turn on for 1 sec and then turn-off) the red LED \( N \) times, where \( N \) is the numerical key pressed.
- If the key '0' was pressed, blink the green LED once.
- If any other key was pressed, blink both LEDs once.

The LEDs are connected to I/O pins P1.0 and P1.1.

Use the template file for this assignment available at: [http://www.ece.uah.edu/~milenka/cpe421-06S/labs/keypad_template.c](http://www.ece.uah.edu/~milenka/cpe421-06S/labs/keypad_template.c)
Assignment #2: Toggle LED on the MSP430 EasyWeb2

Write a C program that toggles the status LED on the EasyWeb2 development board with frequency of 0.5 Hz (approx. 1s is on, and 1s is off). Use the software delay. Change parameters to increase toggle frequency to 2Hz and to decrease it to 0.25Hz.

Assignment #3: Interfacing buttons on the MSP430 EasyWeb2

Write a C program that scans the buttons of the EasyWeb2 board and responds as described below. The buttons B1, B2, B3, and B4 are connected to P4.4 – P4.7.

- If the yellow button (B1) is pressed (port P4.4), blinks the status LED (port P2.1).
- If the red button (B2) is pressed (port P4.5), toggle (if it is On, turn if Off, and vice versa) Relay1 (port P1.5).
- If the white button (B3) is pressed (port P4.6), toggle Relay2 (port P1.6).

Submission: Check lab submission policy at the course Web site: http://www.ece.uah.edu/~milenka/cpe421-06S/.