CPE 325: Embedded Systems Laboratory
Laboratory Assignment #9

Assignment   [100 pts]

1. (ADC: 100 pts) Write a C program to interface the 3-dimensional accelerometer ADXL335. Your program should achieve the following tasks:
   a. Sample the x-, y- and z-axis 10-times per second. [20 pts]
   b. Calculate the accelerations in terms of 'g' (Gravity of Earth) and send the sample to workstation, i.e. the samples (gx, gy and gz) should be sent such that it is displayed in UAH serial app.
      Note: Please revisit the previous laboratory assignment that discusses how to use UAH serial app. [20 pts]
   c. Calculate a value, *netG*, which is a vector sum of g values in each axis. [20 pts]
   d. If the value of *netG* is greater than or equal to 2g of earth, blink two LEDs alternately at 1Hz using Watchdog Timer ISR. This blinking should only stop when any one of switches is pressed. [20 pts]
   e. Similar to the calculations presented in tutorial at Section 1.2 for temperature sensor, using the transfer characteristics and voltage sensitivity of the accelerometer, and the knowledge about the reference voltages, show how you compute *gx, gy* and *gz* from the ADC values. [20 pts]

   Hint: You will need to access the datasheet for the ADXL335 accelerometer to configure the accelerometer to board.
   Hint: You can use demo code 2 as a starting point for your assignment.
   Hint: netG = $(gx^2+gy^2+gz^2)^{1/2}$

Questions To Be Addressed

Please make sure that you have addressed following questions in your demonstration:
1. Display the UAH Serial App output by changing the position of your accelerometer.
2. Display the condition where the value of netG is greater than or equal to 2g.
3. Can you position your accelerometer to display:
   a. Only X-component = 1 and other component as 0.
   b. Only Y-Component = 1 and other component as 0.
   c. Only Z-component = 1 and other component as 0.

Topics For Theory

1. Analog To Digital Converter
2. Temperature Sensor Interfacing (You should work out the formula for interfacing)
3. Accelerometer Interfacing (You should work out the formula for interfacing)

Deliverables

1. Report with Source codes or as instructed
2. A report where you work out the formula for Accelerometer interfacing