

Lab 3 : Accelerometer

ECE/CS

Due by Monday Feb 14,2011 11:59 PM

The goal of this lab is to read the data from the accelerometer(ADXL322) which is present as a peripheral on MSP-EXP430F5438 experimenter board and to display it on the LCD.

1 Problem Statement

The accelerometer (ADXL322) gives acceleration in X and Y directions when tilted. More information like, the bounds of measurable acceleration and acceleration computation can be found in the ADXL322 data-sheet. The ADXL322 outputs data in analog form. So you will have to use an ADC inside the MCU to sample the input data for further processing in the micro-controller. The power pin of the accelerometer is hard-wired to P6.0. So use port P6 to interface the ADC. Use a channel each for X and Y directions. You can read upon the clocks that are to be used in Chapter 4 of the MSP430 Family User Guide.

As was the case with the LCD driver, wait for the ADC to settle after initializing. The accelerometer might already be tilted even when the board is flat. In other words due to manufacturing imperfections, there is a very high probability that the axes are already tilted. This case is also discussed in the ADXL322 data-sheet. Therefore, it is essential to calibrate the sampled data initially before taking any reading.

Read Chapter 20 of the MSP430F5438 data-sheet. Decide on the configuration registers that are required to be programmed. Initialize the ADC and sample the data from the accelerometer. You may have to use an interrupt to transfer the data from the ADC memory registers to a variable which will be used for further computations. You can enable interrupt nesting in the function by using the *GIE* bit in the Status Register. Read the section on Interrupts in Chapter 1 and on Status Register in Chapter 5 of the MCU data-sheet.

Write a function for the entire process of initializing and sampling the data. There can be a separate function for calibration of the data. This will be helpful for the upcoming labs as well. Use the functions to gather and send the accelerometer data to the LCD screen on the board. Use the LCD driver that you wrote for Lab 1 to achieve this.

2 Submission

Please zip everything before submission and only upload the package. Do not upload every single file separately. The content of the package should be properly organized. Particularly, you should put everything under a directory named *username_lab1*, where *username* is your Blackboard system login id. Under the directory, include

1. **adc.c**: Your implementation of the Accelerometer ADC interface;
2. **main.c**: Where you use the driver to calibrate, gather data and print out data.

Please submit well commented code.