Electrical and Computer Engineering
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MSP432 Lab 2: Accelerometer

EEDG/CE 6302 Embedded Systems

Contents

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1 Lab Procedure

In this lab, we will write the program to read and visualize acceleration values from the Educational BoosterPack MKII by the MSP432P401R board.

1.1 Introduction.

There is 3-Axis accelerometer (Kionix KXTC9-2050) that measures g-forces on the MKII. Moving the board along the axes will change the generated signal. There is acceleration due to movement and gravity. Accelerometer could be used to measure the tilt angle of the board. In this experiment, we will tilt the MKII and display the acceleration values in xyz axes on the LCD.

We need to show the analog values (in x y and z directions) read from accelerometer (check the following figure). You may need function myScreen.gText(). Please check the fig1 to learn how to use it. No need to modify the background color(last argument) After finishing LCD part, we could read the acceleration values from the board and visualize it on our laptop. There is an example matlab code. Please run it to check your program. You may need to modify some lines in the matlab program. (please check the comments)

1.2 Modify your code.

- Create a blank sketch in Energia.
- Include the headers that we need for LCD display. If you do not have the corresponding library, please download from ***https://github.com/energia/Energia/tree/master/hardware/msp432/libraries/EduBPMKII_Screen***. And put the folder under the libraries folder.
- Please set proper delay after each reading acceleration values. The plotting on matlab program will cost some non-negligible time. If there is no delay between each reading, the matlab program could not plot real-time acceleration values. (unread values will be accumulated)
- Serial Monitor is not allowed when the COM port is used by matlab

Use

```
myScreen.gText(10, 10, "Text",
    myColours.black,
    myColours.white);
```

The required parameters are

- The first line specifies the top-left coordinates `x-y` for the text.

The optional parameters are

- The second and third lines are optional and specify the text and background colours.

Default values are black text on white background.

Figure 1: screentext function.

1.3 Matlab Code

Please make sure you are connected to the device and write the code in the following manner for Matlab plotting.

- Give your serial port and baud rate “9600.”
- Write a loop for 1000 and read the line from the device and split it into an array.
- Convert string to a double value.
- Plot x, y and z axis with a marker ‘o’
- Set limits for the axis to ensure that the acceleration values do not overflow.
- Create a grid and display the latest data point.

2. Lab Report

Before submitting your lab report, please ask TA to check your program is working correctly. Include the following in your lab report.

1. Describe how to read the acceleration values.

2. Figures to prove you have correct display on LCD and plotting on matlab.

3. Copy your code at the bottom of your report. Add clear comments in the program to make it readable.

4. Separately submit the code the edited .ino file that TA could run.

5. A video explaining the experiment is required.
6. DO NOT SUBMIT A ZIP FILE. SUBMIT EACH FILE SEPARATELY!

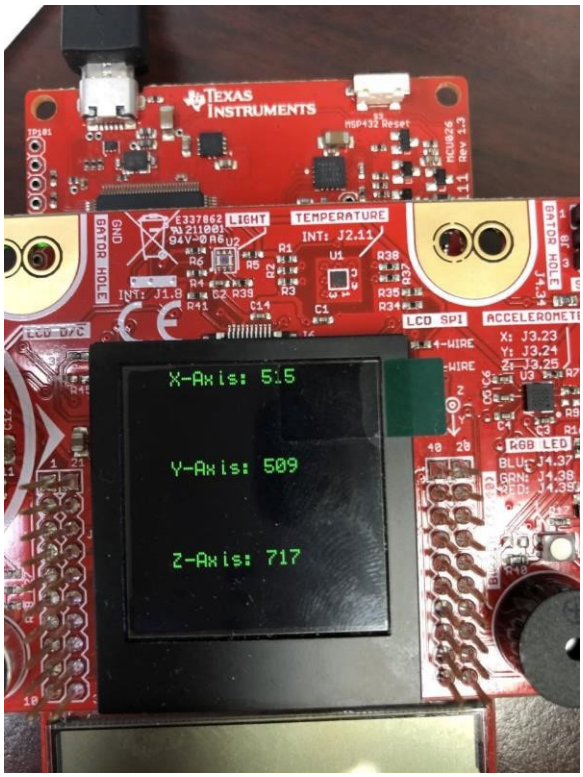

Figure 2: acceleration values on LCD.

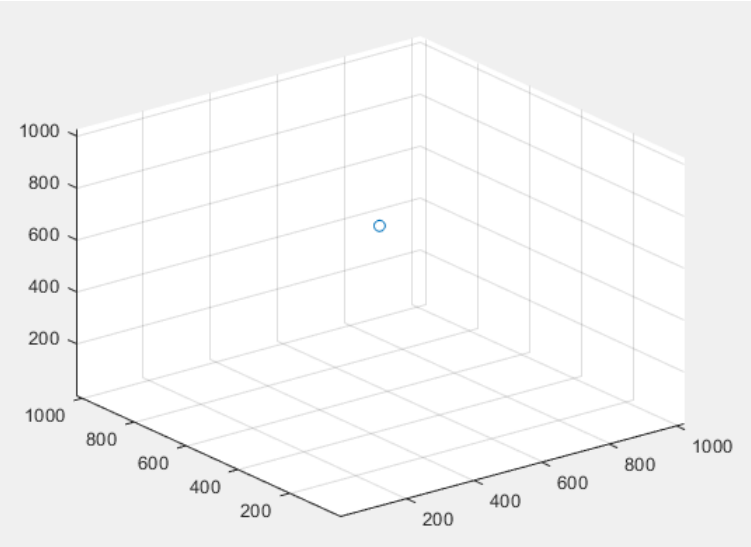

Figure 3: matlab 3d display.