EEDG/CE 6302

Microprocessors and Embedded Systems

Electrical and Computer Engineering

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The University of Texas at Dallas

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Project 2: Part 2: Accelerometer

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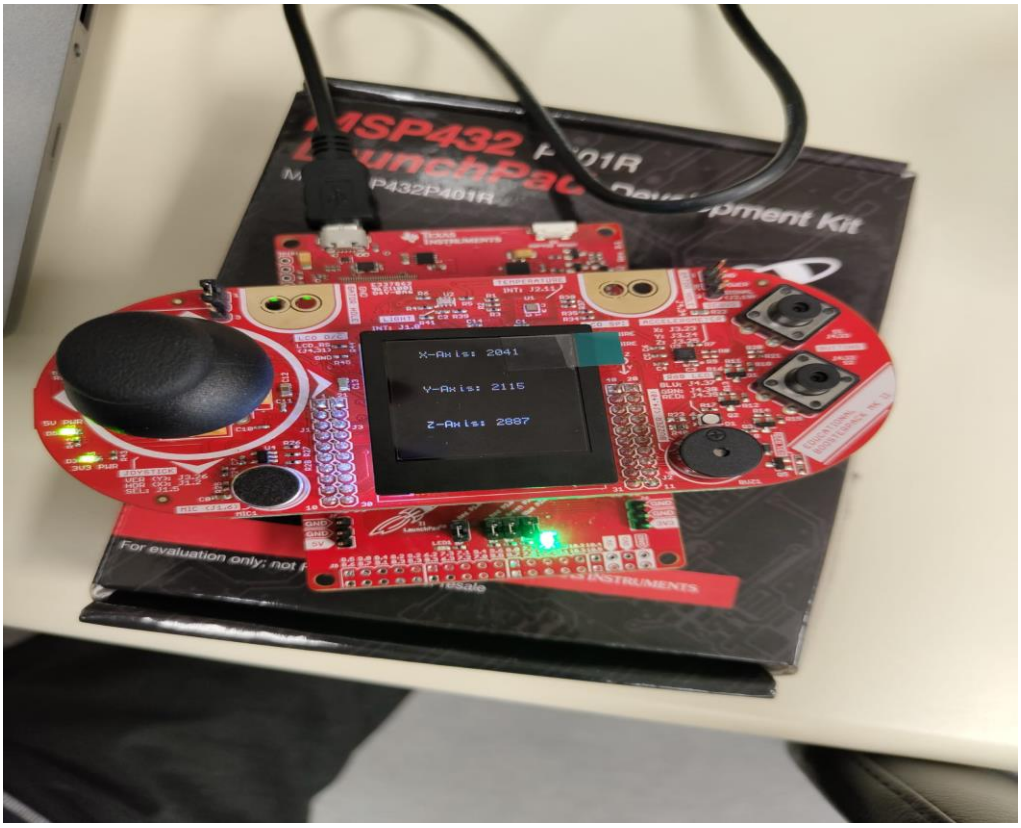
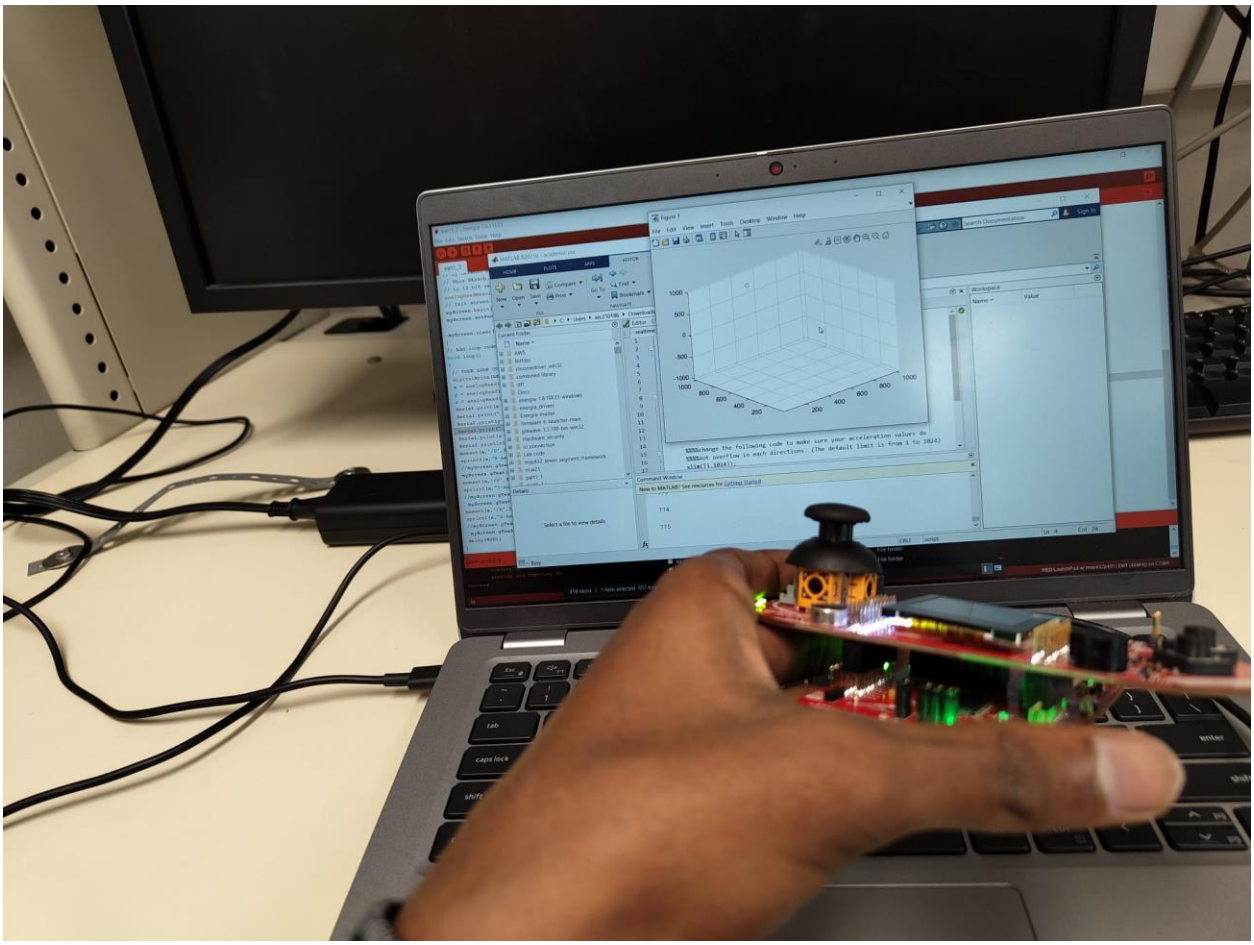
Introduction:

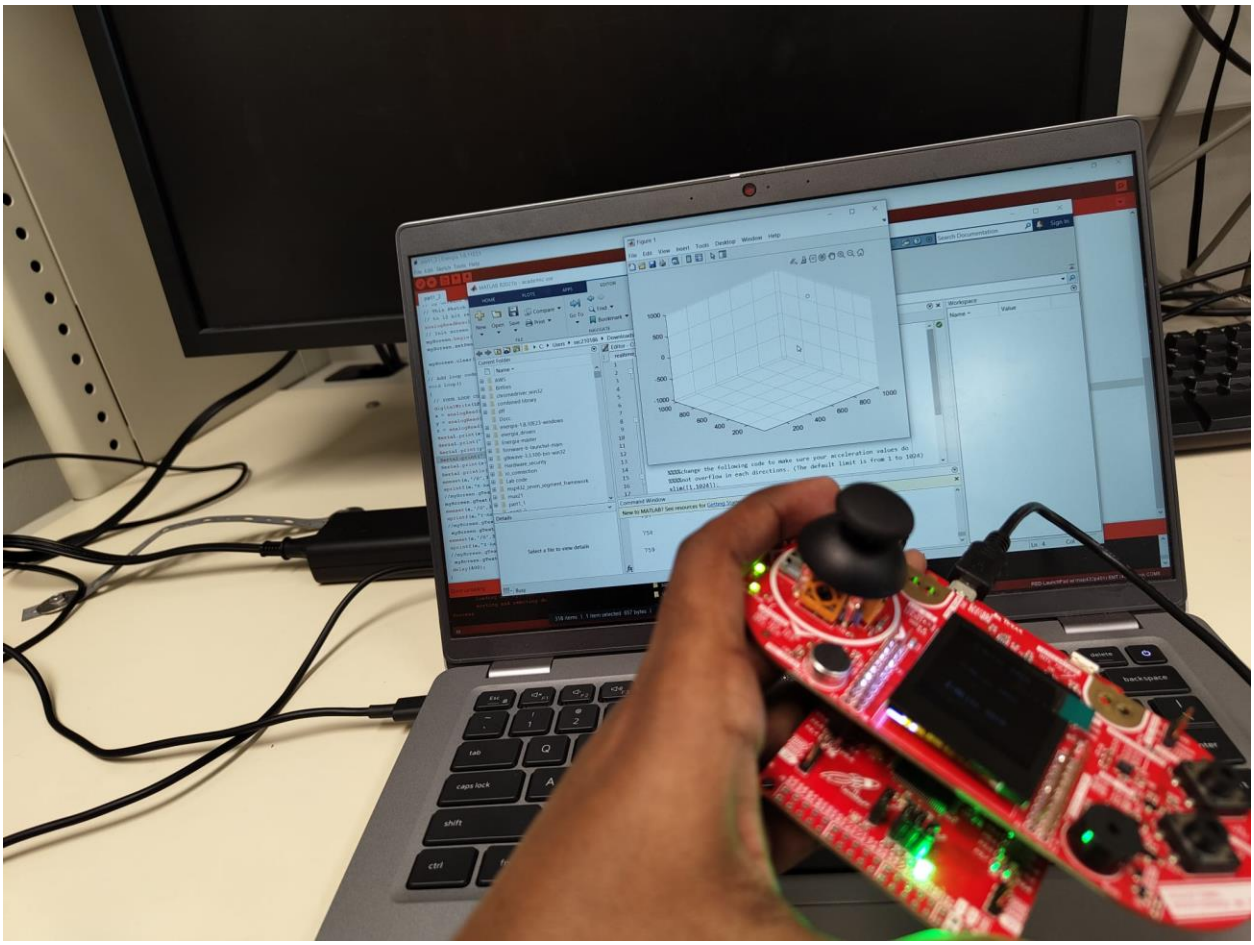
In this lab, we write the program to read and visualize acceleration values from the Educational BoosterPack MKII by the MSP-EXP432P4111 board. There is 3-Axis accelerometer (Kionix KXTC9- 2050) that measures g-forces on the MKII. Moving the board along the axes will change the generated signal. There is acceleration due to movement and gravity. Accelerometer could be used to measure the tilt angle of the board. In this experiment, we 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). After finishing LCD part, we could read the acceleration values from the board and visualize it on our laptop.

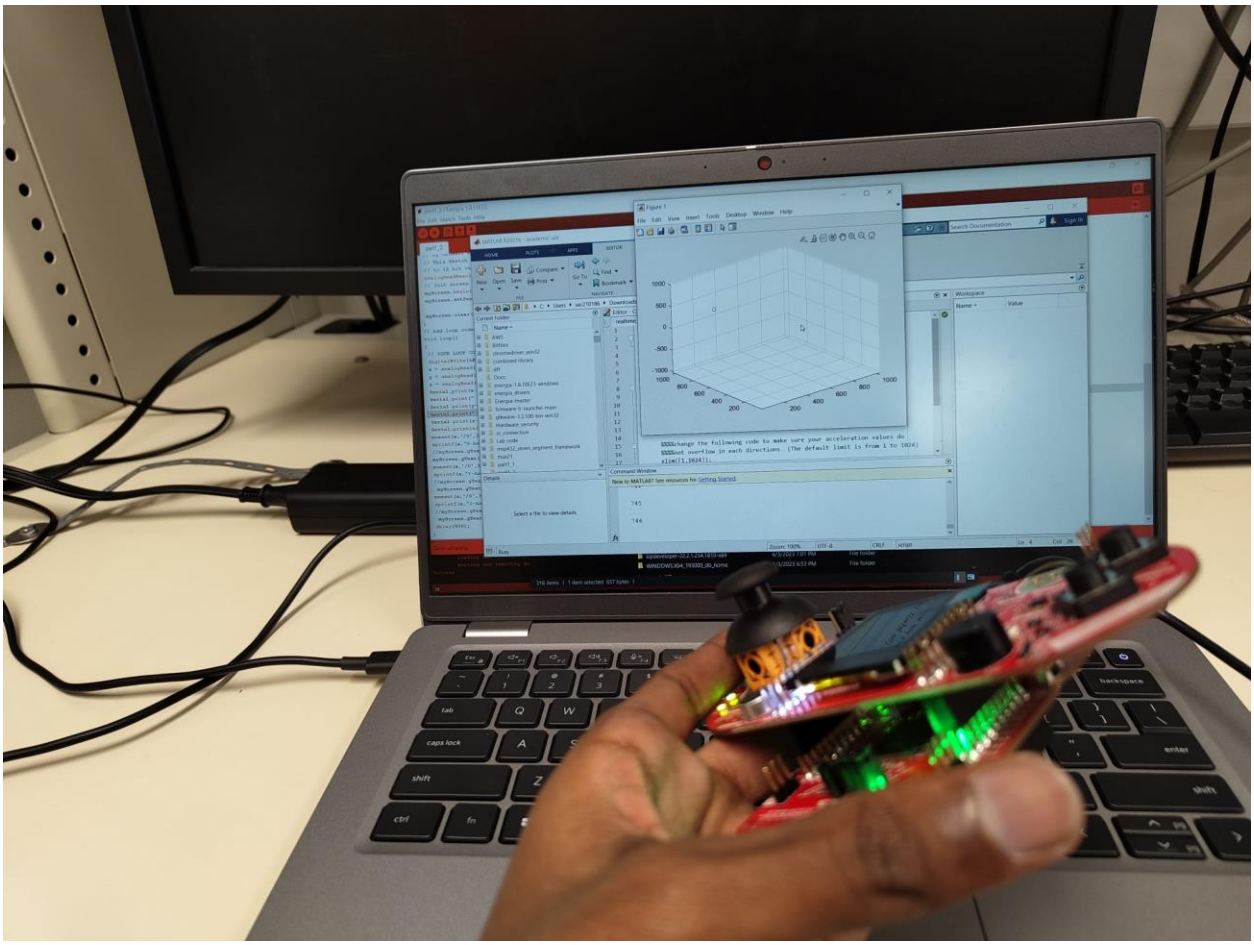
Output:





Plot in matlab showing the tilt of the board.





Code:

```
#define LED GREEN_LED

// Include application, user and local libraries

#include <SPI.h>

#include <LCD_screen.h>

#include <LCD_screen_font.h>

#include <LCD_utilities.h>

#include <Screen_HX8353E.h>
```

```
#include <Terminal12e.h>
#include <Terminal6e.h>
#include <Terminal8e.h>
#include <string.h>
#include <stdio.h>
// Define constants for the joystick pins
const int AX = 23;
const int AY = 24;
const int AZ = 25;
// Define screen
Screen_HX8353E myScreen;
/*
* ------------------------------------------------------------------------------------------
* DO NOT EDIT CODE ABOVE THIS LINE
* ------------------------------------------------------------------------------------------
*/
// YOUR DECLARATIONS AND DEFINITIONS HERE
int x,y,z;
int col=20, row=10;
char a[30];
// Add setup code
void setup()
{
 /*
 * DO NOT EDIT BELOW THIS LINE
 */
 Serial.begin(9600); // for LCD debug output
 // By default MSP432 has analogRead() set to 10 bits.
 // This Sketch assumes 12 bits. Uncomment to line below to set analogRead()
```

```
 // to 12 bit resolution for MSP432.
 analogReadResolution(12);
 // Init screen
 myScreen.begin();
 myScreen.setPenSolid(true);

 myScreen.clear(blackColour);
}
// Add loop code
void loop()
{
 // YOUR LOOP CODE HERE (runs continuously after setup function)
 digitalWrite(LED, HIGH);
 x = analogRead(AX);
 y = analogRead(AY);
 z = analogRead(AZ);
 Serial.print(x-1500);
 Serial.print(" ");
 Serial.print(y-1500);
 Serial.print(" ");
 Serial.print(z-2000);
 Serial.println();
 memset(a,'/0',30);
 sprintf(a,"X-Axis: %d",x);
 //myScreen.gText(col,row,a,myColours.white,myColours.black);
 myScreen.gText(col,row,a,whiteColour,blackColour);
 memset(a,'/0',30);
 sprintf(a,"Y-Axis: %d",y);
 //myScreen.gText(col,row+40,a,myColours.white,myColours.black);
```

```
 myScreen.gText(col,row+40,a,whiteColour,blackColour);
memset(a,'/0',30);
sprintf(a,"Z-Axis: %d",z);
//myScreen.gText(col,row+80,a,myColours.white,myColours.black);
 myScreen.gText(col,row+80,a,whiteColour,blackColour);
delay(400);
}
```