CS 6452: Prototyping Interactive Systems Fall 2015
Arduino Meets Processing: Capturing and Visualizing Data from an IMU

This assignment will help you explore interfacing with complex sensors as well as recording and displaying their input.

Objective
Your objective is to build a simple circuit to capture the motion of the 9 DoF IMU and **write a sketch to send the X, Y and Z values of the accelerometer over the serial port.** Then, using Processing **write another sketch to connect to the serial port to capture the incoming values and visualize it.**

Your visualization needs to display **all the three sensor streams i.e. X, Y and Z values in an interesting manner**. E.g. in the simplest scenario you could use the X and Y values to display a circle on the screen and change it's position with respect to the incoming X and Y values and use the Z values to change it's color. If you want to get more creative you could even use an RGB LED and change the color of the LED instead of just the circle thus physicalizing the visualization.

Run the program and make a short video of you demonstrating moving the sensor around and it changing the visualization.

Steps and Resources:

Step 1(Setting up Hardware)- We will be using the **Adafruit 9 Degree of Freedom Inertial Measurement Unit (i.e. 9 DoF IMU).** This sensor is equipped with an accelerometer, gyroscope and magnetometer--each capable of sensing on the X, Y and Z-axis. Follow the instructions on Adafruit's IMU Learning Page for information on how to hook up the sensor, as well as how to install the libraries for communicating with the software.
https://learn.adafruit.com/adafruit-9-dof-imu-breakout/introduction

After installing the software and restarting the Arduino IDE, there will be code examples under File--Examples--Adafruit_9DOF to help you.

Step 2(Communicate between Arduino and Processing)-
Here, is a tutorial on connecting Arduino to Processing.
https://learn.sparkfun.com/tutorials/connecting-arduino-to-processing

In your first programming assignment using processing you visualized X, Y and Z values from a file that stored the X, Y and Z in a comma-separated format. Here, the trick is to stream data in a similar format as the Processing code expects the X Y and Z values to be comma-separated and each reading to be on a different line. i.e.
X1,Y1,Z1,
X2,Y2,Z2

Step 3(Use your imagination)-
You can then start getting creative with your visualization.

Here is the link to a sample visulization from last year's class:
http://gtprototyping2015.pbworks.com/w/file/101130652/AcclReadVizBox.zip

Here is another video that visualizes accelerometer data:
https://www.youtube.com/watch?v=vblcfZ291vw

Grading Criteria (10 pts)

- **Software**
  - Arduino Sketch: 2 pts.
  - Processing Sketch for capture and Visualizing : 3 pts.
  - Creativity: 2 pts.
- **Video**
  - Video Demo: 3 pts.

Due Date: Upload your Arduino Sketch, Processing Sketch and your video demo (or link to the video) to T-Square before Oct 4th.