

FreeIMU library for Arduino

Library files: "ARD_SKETCH.LOC/libraries/FreeIMU"

- **FreeIMU.cpp**: sensor fusion algorithms to obtain orientation.
- **CommunicationUtils.cpp**: wrapper function that decides the format of the data transmitted between the computer and the Arduino.
- **calibration.h**: calibration parameters for accelerometer and the magnetometer (scaling factors and the offsets).

Arduino example Sketch: "ARD_SKETCH.LOC/freeimu"

- **FreeIMU_quaternion.pde**: The orientation information of the platform is sent to the USB port in the form of quaternions.
- **FreeIMU_raw.pde**: The un-calibrated data from the accelerometer, gyro, and magnetometer are sent to the USB port.
- **FreeIMU_serial.ino**: According to the commands received from the computer to the Arduino through the USB port, the Arduino board will send corresponding data in correct format. These data will later be accessed by **Processing for visualization**, or by a python code developed for **calibration**.

FreeIMU library for Processing

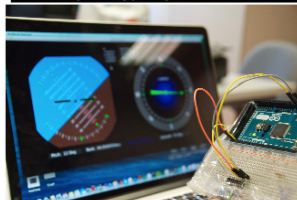
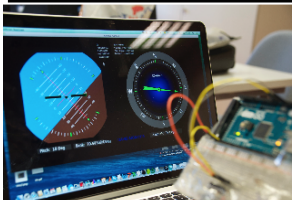
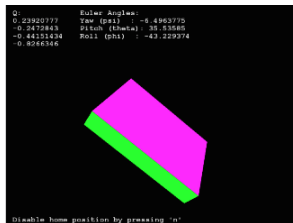
Processing is a flexible **open source** software sketchbook and a language to code within the context of the **visual arts**.

In this lab we use it to visualize the orientation of the platform. These scripts are placed in "PROC_SKETCH_LOC/FreeIMU":

- **FreeIMU_cube.pde**
- **Artificial_horizon.pde**

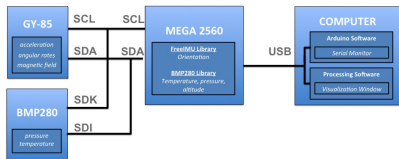
Task 1

- Read and understand FreeIMU library
- Understand communication between IMU, Arduino board and Processing



Task 2

- Display information from the barometer and the IMU in Processing. **Detailed steps are explained in the notes.**



```

FreeIMU_cube_Xin_2016_2017

Q:
0.8176714      Euler Angles:
0.019087175    Yaw (psi) : -69.98667
0.06446955     Pitch (theta): -7.304529
0.56879026     Roll (phi) : 2.4508045

Temperature: 30.03 C
Pressure: 93983.03 Pa
Altitude: 630.02905m

Point FreeIMU's X axis to your monitor then press 'h'
    
```

Task 3

- Modify the *FreeIMU_cube.pde* to add an arrow on the cube

