ENPM 809T – Autonomous Robotics: Spring 2020
Master of Engineering Program in Robotics

Due Date   Friday, May 1st, 2020

Submission Information
- This assignment explores closed-loop motor encoder and IMU control of a robot's trajectory for the purposes of localizing the robot within its environment
- Submit response to Question #1 via Gradescope by 11:59 pm
- Question #1 may be completed as a group, however **each student must upload the submission to Gradescope**

Question #1 (20 points)

The primary focus of this week's lecture was the tracking and interpretation of our robot's inertial measurement unity (BNO055) to provide an estimate of the robot's angular orientation in a global reference frame.

To complete this portion of the assignment:

1. Revisit the lecture notes and ensure the IMU feedback from the *imu01.py* script behaves as expected.

2. Complete the final In-Class Exercise from the lecture notes (see below). Record a minimum 3 minute video clip of yourself describing the setup and demonstrating your robot successfully traverses through a __rectangular__ course defined by user-defined distances. Note: *this video should be recorded with your cell phone, iPad, etc*.

In-Class Exercise

- Create new Python script *imu02.py*
- Script must:
  1. Take as input a sequence of commands from user
  2. Drive robot through sequence, using encoders **& IMU** for feedback
  3. Record position data through sequence
- Once complete, open & plot position data in Matplotlib
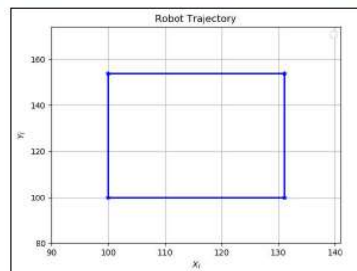
The video should show at a minimum **two runs** through the rectangular course:
a) One where the vehicle uses only motor encoder feedback to complete the course
b) One where the vehicle uses motor encoder and/or IMU feedback to complete the course

Compare and contrast the performance of your vehicle under both conditions in your video.

Upload the video to your YouTube account and include a link to the video in the .pdf uploaded to Gradescope. Also include in the .pdf a screenshot(s) of your Matplotlib plot(s) of the positional data for both runs, along with 2-3 sentences describing each plot.

Be sure to indicate **which platform** your team is using (Baron or Pirate) in your submission.