ENPM 809T – Autonomous Robotics: Spring 2021

Master of Engineering Program in Robotics

Due Date	Friday, April 16th, 2021
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 #0.1 (nothing to submit)

Reminder that the project video constitutes the largest portion of your project grade for ENPM809T this semester. Be sure to continue recording 30-60 second clips to document the build and testing of your vehicle this semester!

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.

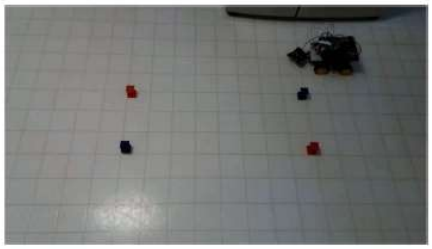
To complete this portion of the assignment:

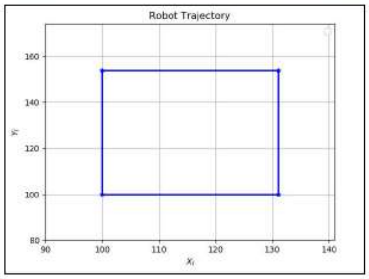
1. Revisit the lecture notes and ensure the IMU feedback from the ***imu01.py*** script behaves as expected.

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.