ENPM 809T – Autonomous Robotics: Spring 2020

Master of Engineering Program in Robotics

Due Date Friday, March 13th, 2020

Submission Information

- This assignment focuses on completing assembly of the course robotic ground vehicle
- Submit response to Question #3 via the "Interim Project Presentation" assignment on Gradescope by 11:59 pm. Students may work on the presentation as a team, but **each student must submit a copy** of the presentation
- Submit response to part 5 of Question #4 via Gradescope by 11:59 pm

Question #1 (0 points)

A general theme of my teaching philosophy is that I am here for you, the student, and continually strive to add value to your academic experience. In this spirit, please log onto ELMS and complete the "Mid-Session Feedback Survey" located under ELMS > Quizzes. *All feedback is **anonymous*** (I have no indication who submits what information) and is gathered with the intent of improving the quality of ENPM 809T such that you get the maximum benefit out of the course. **Please complete by 11:59 pm Friday March 13th**.

Question #2 (nothing to submit)

General reminder to use your phone to record images and 30-60 second video clips throughout the course. These images/videos can then be stitched together towards the end of the Spring as part of your submission for the Grand Challenge. It is always better to have to cut out extra material than to say "I wish I had an image/video of that…!" at the conclusion of the project. And, as always…***have fun with the filming process***!

Question #3 (5 points out of 60 points allocated for project)

As discussed in lecture, the intent of the Interim Project Presentation is to take stock of the course project and plan for completion. The presentation must be submitted as a .pdf file on Gradescope, with no in-class presentation required. The presentation should be no more than 5 slides in length and include, at a minimum:

a. Description of the project and the Grand Challenge
b. Status of robot design, integration, and testing
c. Any pertinent preliminary data

d. Plan for completing the Grand Challenge
e. Any specific needs/assistance requests for Dr. Mitchell

Once complete, upload a .pdf of the presentation to Gradescope under the "Interim Project Presentation" assignment.

Question #4 (20 points)

The primary focus of this assignment is to complete the assembly of your ground vehicle. With this in mind, head to ELMS > Modules > 05 and **download the notes** for this week's lecture.

A time-lapse video of the full assembly process is available on the course YouTube page:

https://www.youtube.com/watch?v=0jfDlyhRDzg (Pirate)

https://youtu.be/UH9t-hU0xpg (Baron)

Reminder that it is imperative to ***take your time*** and methodically assemble the ground vehicle. Rushing through the integration process now will almost certainly lead to an exponential increase in debugging time down the road.

To complete this portion of the assignment:

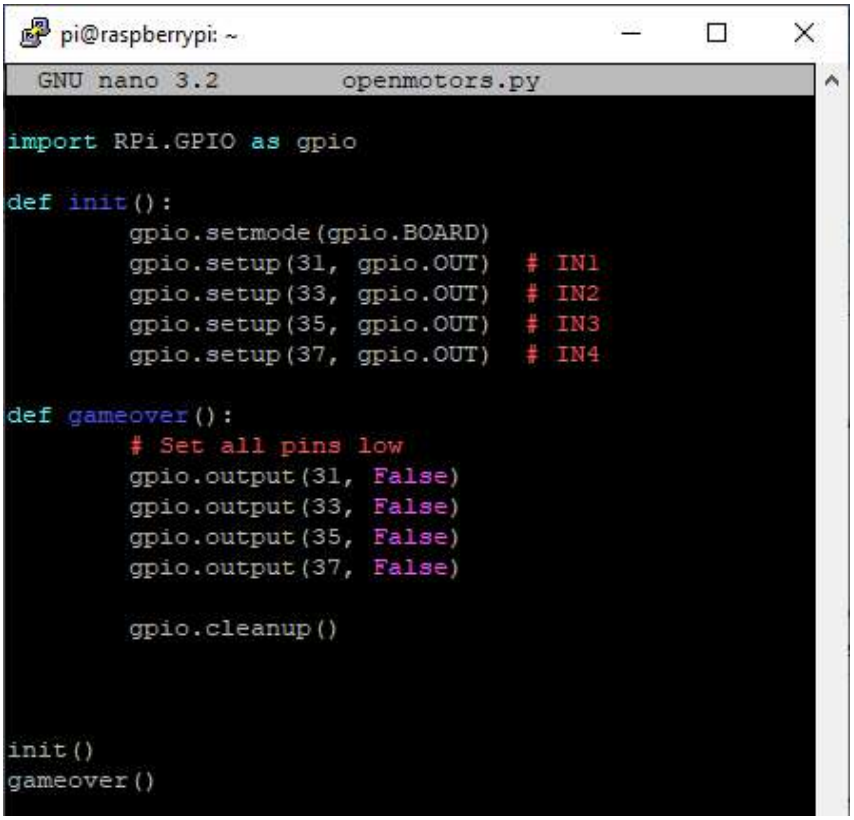
1. Complete the mechanical and electrical assembly of the ground vehicle as detailed in the lecture notes.

2. Copy/paste your response to the first In-Class Exercise ("Using the circuit below…") into the .pdf uploaded to Gradescope. Be sure to include a few sentences justifying your answers.

3. Create and test the *motorcontrol01.py* and *motorcontrol02.py* scripts as detailed in the lecture notes. This should include completion of the second In-Class Exercise ("Update the…"), although there is nothing to submit for this second In-Class Exercise.

4. To help prevent your robot from driving away during a power cycle, create the following *openmotors.py script* and ***run the script each time you boot up your Pi***. Details on how to run a script on bootup are available here: https://www.dexterindustries.com/howto/run-a-program-on-your-raspberry-pi-at-startup/

   The *openmotors.py* script sets all GPIO pins tied to the H-bridge as false (i.e. GND), helping to prevent your robot from driving inadvertently during boot up:



5. Using your cell phone camera or equivalent, record a minimum 30 second video clip of yourself teleoperating the ground vehicle with the *motorcontrol02.py* script. This should include clear demonstration of the forward( ), reverse( ), pivotleft( ), and pivotright( ) functions. **Upload the video to your YouTube account** then include a link to the video in the .pdf uploaded to Gradescope.