HW 5: Soft Robotics and Path Planning

Due April 17, 2018

We don't mind if you work with other students on your homework. However, each student must write up and turn in their own assignment (i.e. no copy & paste). If you worked with other students, please **acknowledge who you worked with** at the top of your homework.

1. **Project Checkup**

   (a) **Materials:** What materials do you need for your project? Confirm that you've ordered/recieved all of them. Is there anything you need from the course staff

   (b) **Mentor Feedback:** Some groups have been assigned a mentor: a graduate student whose research is related to your project. Mentor assignments are located here. If we could not find a grad student whose research interests matched your project, we assigned you the GSIs. If you were not assigned a mentor, you can either email the GSIs/professor for more feedback, or simply ignore this question.

      i. Contact your graduate mentor and start a conversation with them. Send them a copy of your project proposal. Please update the proposal with our feedback and any other updates you feel necessary. They will send you:

         - Feedback on your proposal
         - Related papers/resources

         Feel free to ask them for additional advice or help, but remember that they are *volunteering*, and that any additional help is at their discretion. Please be respectful to the mentors. We want this class to maintain a good relationship with all the labs here.

      ii. Attach a copy of their feedback. Please email your mentor *early*. Grad students are busy and might take a few days to reply.

   (c) **Project Update Presentation:** Please sign up for a presentation slot here as soon as possible. Remember that we can see your edit history, so please don't attempt any shenanigans. Presentations will mostly be on Thursday April 18, but some will also be on Thursday April 25. Instructions are as follows:

      - Project Update Presentations should be five minutes long *at most*. We will cut you off. The content should be
        - Succinct Description of your research topic (2-3 mins). This should be comprehensible not only by the professor and teaching staff, but also your peers.
        - What you've done so far (1 min). You should have at least some preliminary results or setup to talk about.
        - Your experimental plan for the next 2-3 weeks (1 min).
      - Your presentation should include slides, which should be on Google Slides. The link must be on the presentation submission doc by the start of class or you will lose credit. Please ensure that everyone with a Berkeley email and the link can view your presentation.
      - No questions will be asked during or after the presentations, but feedback will be compiled and sent to you in a timely fashion.
      - All students will be required to provide feedback for at least four presentations from other groups. Ideally, you'll provide feedback to everyone.

2. **Short Problems**

   (a) When would you use a McKibben actuator as opposed to a PneuNet?

   (b) When would you use a sampling-based planner over an optimization-based planner? When would you use the optimization-based planner? Can you combine the two approaches?

3. **Research Comprehension: Soft Robotics**

   Read one of the following papers:

   - Soft Robotic Glove
   - Soft Manipulation and Grasping
   - Deep RL-based control of soft actuators

   Provide a summary with the following

   (a) A brief summary of the work (2-3 paragraphs).

   (b) What did you find most interesting about the paper?

   (c) How might you apply the ideas presented here?

   (d) If you were implementing this, what would you add or do differently?

   (e) Look at the paper's references. Which 2-3 seem to be the most important or foundational to understand the paper's methodology and why?

4. **Research Comprehension: Path Planning**

   Read one of the following papers:

   - CHOMP
   - FaSTrack
   - Artifical Potential Functions

   Provide a summary with the following

   (a) A brief summary of the work (2-3 paragraphs).

   (b) What did you find most interesting about the paper?

   (c) How might you apply the ideas presented here?

   (d) If you were implementing this, what would you add or do differently?

   (e) *For the CHOMP or FaSTrack papers:* Look at the paper's references. Which 2-3 seem to be the most important or foundational to understand the paper's methodology and why?

   For the Khatib paper: This is a very old paper, yet it's still very widely cited. What are the most important parts for a modern audience?