Haptics and Medical Robotics (HAMR) Laboratory

Joining the HAMR Lab: Guidelines & Expectations for Undergraduate & MSE Research

Overview

We perform interdisciplinary research related to human-machine interaction with a specific emphasis on haptic (touch-based) technologies and medical applications. Research projects range from designing and building mechatronic hardware, to performing human subject experiments, to writing computer code to analyze haptic and human movement data, to developing computation models or software tools to inform and conduct experimental studies.

We are always excited for undergraduate and Masters students to get involved in research in our lab, and seek to make each research opportunity as fulfilling as possible! Below summarizes the expectations and guidelines for applying to work in the HAMR lab.

Who We Seek

We are interested in highly-motivated, dependable, resourceful, curious individuals who are comfortable working individually, as well as part of a team. Due to the open-ended nature of research, it is very different than typical academic coursework (i.e. there are no daily readings or assignments). Rather, you are expected to work in a self-driven fashion on your particular project incorporating feedback from Prof. Brown and the PhD students in the lab to sustain progress. You are not expected to have field-specific knowledge when you enter the lab, but you are expected to be resourceful and learn what you need to know for your particular project.

What You Would Do

Research projects and tasks vary greatly. See the HAMR Lab website for some ideas of current/past projects, recent conference presentations, and journal publications. Upon joining the lab, every effort will be made to identify a project that fits your interests, aligns with your current skill set, and allows you to develop new skills and deepen your knowledge base. You will most likely work closely with or be mentored by a PhD student in the lab, assisting them with their research project(s). In some cases, you may be given the opportunity to pursue an independent project.

Time Commitment (Fall/Spring)

You are expected to spend at least as much time on research as you would on a 3-credit course, ~12 hours per week (i.e., 4 hours per credit). It usually takes 1-2 semesters to get oriented to a lab and learn the basic skills and knowledge relevant to the particular project you will be working on. Therefore, you should **be prepared to commit to a minimum of 2 semesters of research** (ideally sequential semesters, e.g., Fall-Spring).

Consistency

You must put consistent time into the project *every week*. It is a good idea to set aside fixed hours to work in the lab. Classroom commitments are a priority, so please carefully consider whether your schedule allows this time commitment to research. Prof. Brown will help you think through whether you can balance your planned classroom hours with research.

Weekly Check Ins

You will be expected to have weekly check ins with the PhD student with whom you are working in person or via email. Please use this time to describe your accomplishments and struggles for the week, as well as your goals for the next week. You will also be expected to attend the lab's weekly meeting and provide a brief update on your progress. Lab meeting time and location may change each semester, but all attempts will be made to accommodate class schedules.

Course Credit, Fellowships, and Paid Opportunities

You can receive academic credit for research (EN.530.501 and EN.530.11 for undergraduates; EN.530.600 and EN.530.602 for Master of Science in Engineering). Full-time summer research is also encouraged. Undergraduates can apply for a summer research fellowship (Provost Undergraduate Research Award (PURA) or Computational Sensing and Medical Robotics (CSMR) REU program). There may also be a limited number of paid positions available.

Grading & End-of-Semester Deliverables

Deliverables will vary based on the project and may include experimental results, a physical prototype, analysis software, and/or simulation results. You will submit an end-of-semester report (in the format of a conference abstract/paper; a template will be provided) and will give a PowerPoint presentation in lab meeting that summarizes your work. Generally, you will be graded on your participation, consistent progress, and your final results/report.

Checkpoints during the Semester

Your first goal, to be completed within the first two weeks of the semester, is to lay out a semester plan for your project. You should make a Gantt chart (a template will be provided) to identify milestones and specific goals/deliverables. You will be expected to give 3 presentations during the semester covering:

1. Project proposal (2-3 weeks into the semester) during lab meeting with:
   a) A brief literature/background review
   b) Project summary and specific goal(s) for end of semester (i.e., deliverables)
   c) Initial brainstorming for design/experiment/analysis/approach, and a preliminary Gantt chart.

2. Go/No-Go presentation (5 weeks into the semester). You will present to Prof. Brown and the PhD student with whom you are working:
   a) Selected design/algorithm/approach/experimental protocol
   b) Preliminary results or analysis
   c) Other relevant information (e.g., budget if applicable)
   d) Final Gantt chart for the rest of the semester with specified deliverables
   Note: If there is inadequate evidence at this Go/No-Go presentation of consistent effort and progress on the project, we will discuss redirecting your efforts or dropping the course.

3. Project summary (end of semester). You will explain what you completed and/or discovered, and if applicable, your continued research plans for the subsequent semester.

How to Apply

After considering the information above, please send an email to Prof. Brown (jdelainebrown@jhu.edu) in the following format:

1. Subject Line

Using the exact subject line italicized below will help me quickly organize and find these emails:

- *HAMR lab research opportunities for [semester of interest and year (i.e. Fall 2017)*

2. Body of Email

A brief paragraph introducing yourself:

- your name
- year in school (e.g., sophomore)
- expected graduation date
- intended major
- GPA (min 3.0, >3.5 preferred)
- specific research interests
- which semester you would like to begin research
- course load during the proposed research semester (# of credit hours if known, and an explanation of how research will fit into your schedule if this number is above 15 credit hours)
- any relevant skills or information you would like me to know
- contact information

3. Attachment

A single PDF attachment (which can contain multiple pages) with the following information:

- resume or CV
- unofficial transcript
- 2-3 references and their contact information

When to Apply

You are welcome to apply at any time, but Prof. Brown will likely review applications ~2 months prior to each semester.

After Applying (What to Expect)

Depending on availability of projects, lab space, and number of applicants, Professor Brown will follow up to discuss potential research opportunities, types of projects that excite you, your previous research experience, and technical skills you already have and those you are interested in developing.

Thanks again for your interest!