Final Project

Students will develop a human-robot interaction focused research project. This will be the primary goal throughout the class. Students may choose to either: (1) implement and repeat an existing study, (2) implement and extend an existing study, or (3) propose a novel study to implement. Students will be working in groups of 3-4 for these projects. The Turtlebot robot platform will be introduced in class and made available for your use in these projects. You may use an alternate robot platform with permission of the instructor. The project will be broken down into 4 milestones. The project will conclude with an oral presentation to the class during finals week and a 6-8 page written report in a IEEE Conference style format. The deliverables and due dates for each project milestone will be discussed herein.

Milestone 1: Project Proposal [DUE: 10/28, Monday, 5pm]

An abstract of the proposed project idea you would like to work on this semester should be described succinctly in this abstract. The questions you want to answer in this abstract include:

1) Why do you want to work on this project idea? What is the motivation for this work? Why is it important?
2) What is the goal of your project? What question do you want to answer or what novel problem will you address?
3) How will you answer this question? What materials or technologies will you use or explore? What will be the interaction scenario and research methods?
4) What outcome do you expect?

Deliverables

Your abstract should be sent to me at (louie@oakland.edu) in Word or PDF formats. All team member names should be indicated on the abstract.

Milestone 2: Study Design [DUE: 11/11, Monday, 5pm]

You will narrow down the scope of your project to a feasible single human-robot interaction user study. This means that you should have already put in some time developing the technical aspects of your project but this will refine the specific details that need to be implemented before the big study. At this point you should be able to answer the following questions:

1) **Materials** - What robot platform and technologies will you be using? What capabilities of the platform will be used this study?
2) **Research Methods** - What sort of study are you conducting and why? An observation or a comparative study? How will the conditions differ? What are the independent variables being manipulated? Is it a within- or between- participant study?
3) **Methodology** - How do you expect the step-by-step interaction to unfold from the perspective of the robot and human(s)? What is the setting of the study and where will it be conducted? Will the participants receive training or familiarization tasks before the study? How will the participants be instructed for the study and what tasks will they perform? What materials are required for tasks (e.g. obstacles, objects, tables)? Will you use actors? What exactly will the actors do? Which aspects of the robot's capabilities will be autonomous, and which will be Wizard-of-Oz? Will you administer interviews or questionnaires before, after, or during tasks?

4) **Metrics and Measures** - What will you measure? How will you measure them? What will you ask in your questionnaire? What are your dependent variables?
5) **Hypotheses** - What are your hypotheses? What do you expect to get out of the study?
6) **Data Analysis** – How do you plan on analysing your data? What descriptive or inferential statistics that you will use? Provide sample graphs to visualize this data.

Deliverables
A write-up that addresses all the questions above to me at (louie@oakland.edu) in Word or PDF formats. Use of figures will be important for describing your work to me.

Milestone 3: Implementation and Pilot User Study [11/20 or 11/25]

At Milestone 3 everything should be functioning and ready for the studies you have planned in Milestone 2. You will be piloting your user study with me and you should have the following accomplished:

1) Implementation complete and tested to ensure there aren't any bugs
2) Setup a time for me either on 11/20 or 11/25 to have me as your user study guinea pig.
3) Have a user study script ready which discusses the steps you will go through with a participant.
4) Pilot your system with me and update your implementation and script based on my feedback or any issues you observe during the pilot.

Deliverables
- Demonstrate your study to me and pilot the study using me as your first participant
- Share with me via GitHub any code you've developed
- E-mail me your finalized user study script (Due 11/29 at the latest)

Milestone 4: User study analysis, Presentation, Write-up, Video [DUE: 12/09, Monday, 7PM]

User Study Analysis - Analyze the data you have collected. Provide descriptive and comparative statistics which summarize your user study. Use graphs to succinctly convey what you have learned from the results. Qualitatively discuss what these results mean. Was your hypothesis at the beginning of the project supported or not? Are there any limitations of your study and what would be the potential next steps if you had time to continue the project? This should all be discussed in your write-up AND presentation

Presentation – Put together a ~15minute presentation for your project which you will present during the exam time.

Write-up – Write-up your project in a IEEE Conference Paper format (link: https://www.ieee.org/conferences/publishing/templates.html). Make sure to use the US Letter Word Template. This should be a maximum of 6 pages in length.

Video – Make a fun video of the system you designed and the user study you ran. This could be with the actual participants or a mock-up of your system. Use it as a part of your presentation to demonstrate the methods

Deliverables

- 15-minute presentation on your entire project
- IEEE Conference Paper of your project (6 Pages Max)
- Video
- GitHub code