CS354 Final Project

Introduction

For the final project in this course you will design and develop a complete robotics application. Your application may make use of any of the equipment available in the lab: the Turtlebots, the pincher arms, the quadrotors etc. In developing your project idea you should be ambitious, but realistic. The goal is to develop a compelling application using existing tools and technologies, not to advance the field of robotics with groundbreaking new results. To that end, I encourage you to take advantage of existing ROS packages wherever possible.

Project Stages

Proposal (Due 3/3 11:00AM)

The preliminary proposal should be a one-page document describing your project goals. I suggest that you include the following components in your proposal:

- Overall goals.
- A narrative describing the behavior that should be exhibited by your robot when your project is complete.
- A short description of the existing ROS packages and resources that you intend to use, as well as the project components that you intend to create from scratch.

Your proposal should be submitted through Canvas as a pdf document. The writing should be clear, concise and grammatically correct.

Checkpoint #1 - Initial Design (Due 3/19 11:00PM)

By the first checkpoint you should have completed the steps outlined below. All design and process documentation should be stored in a folder named `doc` in your ROS package. Checkpoint submissions should be completed by tagging the appropriate version of your repository as "checkpoint1", "checkpoint2" etc.

- Complete a brief design document describing your proposed software components. There only needs to be enough information in this document for group members (and me) to understand the development plan. At a minimum, this should list the nodes that need to be completed along with their responsibilities. It should also include an overall todo list of tasks that must be completed in order to reach the project goals. (A "product backlog" in scrum terminology.)
- Create a mercurial repository and a ROS package. The package should contain a complete stubbed-out implementation of your project. You should create a Python

file for each node in your design. These nodes need not be functional, but they most instantiate appropriate publishers and subscribers. Your submission should also include a launch file that I can use to launch your project.

- Produce a visualization of your initial ROS computation graph created using the `rqt_graph` tool. You can create this by launching your project and then executing:

  ```
  rosrun rqt_graph rqt_graph
  ```

- Create a todo list of tasks for the next checkpoint, with each item assigned to one or more group members. (A "sprint backlog" in scrum terminology.)

Checkpoint #2 - (Due 4/2 11:00PM)

By the second checkpoint there should be enough functionally in place to produce a demo the robot completing some sequence of actions. It is OK if some functionality is faked or stubbed out at this point. For example, if your final version of the project will rely on a computer vision system to locate objects, at this stage you might have a node that "pretends" to perform computer vision by querying the user for object locations.

Your submission for this checkpoint must include:

- A YouTube video demonstrating the completed functionality.
- A launch file that I can use to launch your project, along with a short README document providing any information that a user would need to run your code.
- An updated version of the sprint backlog indicating the status of the tasks at the time of submission.
- An updated version of the product backlog.
- A new sprint backlog for the next checkpoint.

Checkpoint #3 (Due 4/16 11:00PM)

The requirements for this deadline are the same as for Checkpoint #2. Ideally, most functionality should be in place.

Checkpoint #4 (Due 4/23 11:00PM)

Your project should be functionally complete for this checkpoint. In addition to the elements from the previous checkpoint, this submission must include:

- A draft of your final project video.
- A draft of your final poster.

The video and the poster should be as close to their final form as possible. You will have a chance to make revisions before the final presentations, but you will receive a grade based on the quality of these submissions.

Final Presentations (Due 4/30 11:00AM)

On the last day of class we will screen the final project videos. These presentations will be open to the public and the CS department will be invited.

Grading

Final project grades will be calculated as follows:

Proposal	10%
Checkpoint 1:	10%
Checkpoint 2:	10%
Checkpoint 3:	10%
Checkpoint 4:	10%
Peer Evaluation:	10%[1]
Final Presentation:	20%
Final Functionality:	20%

[1] I reserve the right to increase the weight of this factor if there is strong evidence that some group members have not make a good faith effort to contribute to the project.