CS 378: Autonomous Intelligent Robotics FRI II

http://justinhart.net/teaching/2017_fall_cs378/

Fall 2017
Tuesday & Thursday 3:30-5:00pm
RLM 7.116
University of Texas at Austin

Instructor: Justin Hart

Office:	GDC 3.402
Phone:	512-232-7446 (email preferred)
Email:	hart@cs.utexas.edu
Website:	http://justinhart.net
Office Hours:	Tuesday & Wednesday 2:30-3:30 or by appointment

Course Description

This course focuses on expanding on what was learned in the first semester of FRI by diving more deeply into a directed project chosen jointly by student project teams and the instructor. Students participate as researchers in a real laboratory. As such, the challenges presented differ greatly from those of a typical undergraduate university course. Successful projects will make significant contributions to the laboratory; either by completing novel research or laying the groundwork for longer-term projects, or by developing important infrastructure components which support the laboratory's research efforts.

There are two significant research efforts upon which students are encouraged to focus their contributions. The first, the Building-Wide Intelligence (BWI) Project, aims to develop a fleet of service robots with which people in the Gates-Dell Complex may interact. These robots are intended to carry out useful and fun tasks and to become an integral part of the building's environment. The second is the development of software and studies to support the UT Austin Villa @ Home RoboCup@Home team. RoboCup@Home is a competition in which domestic service robots are tested on a series of challenge tasks. Robots perform a variety of tasks; such as helping people carry groceries into their apartment from a car, or acting on verbal instructions. More details about BWI can be found at http://www.cs.utexas.edu/~larg/bwi_web/. More details about RoboCup@Home can be found at http://www.robocupathome.org/.

Readings

There is no textbook for this course. Instead, students will perform a literature survey; finding papers relevant to their research project. Grading of these surveys will follow the criteria that peer reviewers use when performing the scientific peer review process. These papers should explore prior work on the problem that the student team is investigating, demonstrate an understanding of the problem or phenomenon, and support the investigation that the students perform. Much like the literature survey in an archived scientific paper, a successful literature survey both demonstrates that the students understand the current state of the art and supports the hypothesis tested or approach taken in their research. Students may also be assigned readings as part of class exercises, and will be expected to read the paper and possibly compose a written response to be emailed to the instructor prior to in-class discussion.

Organization

This class will incorporate a mixture of classroom instruction and laboratory practice. Class sessions will be held in RLM 7.116. The laboratory can be found at GDC 3.414. The first class will be held in RLM 7.116. On days when class is not held in RLM 7.116, students are expected to come to the laboratory in GDC 3.414. An up-to-date schedule of class locations and dates can be found on the course website.

During laboratory days, student teams will have scheduled meeting slots with the instructor in which progress will be evaluated and general guidance will be provided. These meetings will take a format similar to the regular weekly meetings that a PhD student would have with their doctoral advisor.

Prerequisites

Participation in either FRI I or the Summer ARI program is a prerequisite for this course. Students are also expected to be able to work independently and in teams on projects utilizing ROS in either the C++ or Python programming languages. When choosing course projects, students should carefully consider the prerequisite or corequisite knowledge necessary for their success, as this will vary from project to project.

Choosing a Project

Early in the course, project ideas will be offered by the instructor. These project ideas are intended to seed discussion and may either become the project that a student team pursues or the inspiration for their project. Student teams may also come up with ideas all their own. Successful projects will balance ambition with pragmatism and make a real contribution to the lab. Projects will be mutually agreed upon by student teams and the instructor, and the instructor will provide guidance in the development of these ideas.

Grading

Grades will be based on:

Class participation and attendance (including reading responses)	20%
Final Project	80%

The final project will comprise the following components:

Project Proposal, Writeup, & Presentation	30%
Progress Report 1	10%
Progress Report 2	10%
Final Project Report	25%
Final Project Presentation	25%

Optionally, the final project can include a live demonstration, yielding the following breakdown:

Project Proposal, Writeup, & Presentation	30%
Progress Report 1	10%
Progress Report 2	10%
Final Project Demonstration	10%
Final Project Report	20%
Final Project Presentation	20%

Plus and minus grades will be used in final grading of the course.

Final project reports will be due on Monday, December 11 by 11:59pm.
Final project presentations will be during the final exam slot on Saturday, December 16 from 2:00-5:00pm.

Academic Integrity

As this is a research course, it is important to use the many tools at your disposal to achieve your research goals. Students will work in groups in this course, and are expected to collaborate with their teams and outside of their immediate teams in order to achieve the best results possible. When you leverage someone else's work, cite them. Citations are the currency of the scientific community. Use third-party software, but make sure to honor licenses and cite the authors. In this course, you will be graded on what you accomplish above and beyond what is already freely available. If this means implementing an algorithm, state which parts were your original work or implementation in your progress reports, and which parts were downloaded or were someone else's ideas. In this class, leveraging such resources is encouraged. It makes code easier to maintain and update, and encourages potential collaborations with other institutions. Invest your efforts in making novel discoveries or implementing functionality beyond what is freely available. Do, however, abide by Computer Science Department's Academic Honesty Policy, which can be found at http://www.cs.utexas.edu/users/ear/CodeOfConduct.html#honesty

Students with Disabilities

The University of Texas at Austin provides upon request appropriate academic accommodations for qualified students with disabilities. To determine if you qualify, please contact the Dean of Students at 471-6529; 471-4641 TTY. If they certify your needs, I will work with you to make appropriate arrangements. Further information can be found at http://www.utexas.edu/diversity/ddce/ssd/.