

91.549, Mobile Robotics, Fall 2006

Syllabus

Contact Information

Prof. Holly Yanco
Office: Olsen 206
Lab: Olsen 304
E-mail: holly@cs.uml.edu (best way to reach me)
Phone: 978-934-3642

Class Meetings

Thursdays, 5:30-8:00, Olsen 401 (lecture) and 304 (lab)

Office Hours

Tuesdays 10:00 to 11:15
Thursdays 1:00 to 3:00
and by appointment.

Course Description

In this course, we will focus on artificial intelligence for mobile robots, looking at robotics from the software side (as opposed to the hardware side as in 91.548). Topics to be covered include robot architectures, vision, machine learning, mapping and localization, human-robot interaction, and multi-agent robotics.

The course will draw upon research papers (both recent and historical) for learning about these topics. Each week, you will read 3-5 research papers each week on a particular topic. These papers will form the basis for class discussion of the topic.

Course Website

<http://www.cs.uml.edu/~holly/91.549>

Software

We will be using Pyro for programming in this course, which is available on all of the computers in the robotics lab (Olsen 304). You will have 24 hour access to the lab using your id. If you're like to install Pyro on your own linux system at home or work, you can download Pyro for free. The installation and details about how to install Pyro can be found at <http://www.pyrorobotics.org/index.cgi/PyroInstallation>. You can also download a Knoppix CD that will run from the CD drive of an Intel architecture computer.

We'll also use the Phission vision system, which was developed by Phil Thoren, a MS student. More on Phission later in the term.

Hardware

We will use Pioneer robots, built by ActivMedia, in the course. These are research grade robots that include 16 sonar sensors (8 in the front and 8 in the back), a color camera, an array of bumpers in the back, and a gripper. You will need to be in the lab to use the robots – they can't go home with you.

Course Requirements

Written Discussions of the Readings

Each week, you should turn in a written discussion of each of the papers for that week (about one page per research paper). In this discussion, you should briefly summarize the paper (no more than two or three sentences), then discuss the pros and cons of the paper's approach. You should also list at least three issues that you would like to discuss about the paper; these issues could be in the form of questions, if you'd prefer. These summaries must be original work and should include proper citations if you take any material from other sources.

Assignments/Labs:

There will be assignments distributed every 2-3 weeks, with part consisting of a lab portion using Pyro to develop code for simulated and real robots.

Projects:

The second half of the term will be spent developing a project, which can either be paper- or robot-based. You'll choose the topic in consultation with me. Project meetings will be held at the end of class on October 26th. Project proposals will be due on November 2nd. On the last day of class (December 21st), you'll give a 15-20 minute presentation on your project work and will turn in your project report. More on the project will be discussed in class in early October.

Grading Policy

Written discussions	35%
Class discussion	10%
Assignments (Labs)	15%
Project	40%

Collaboration Policy

You should write your paper discussions, assignments, labs and project on your own. You can discuss these assignments with your classmates, but any work that you turn in must be your own.

Homework Policy

All work must be turned in at the start of class on the date it is due in order to receive credit.

Course Schedule

Date	Topic
9/7	Course Intro
9/14	Reactive Architectures
9/21	Planning and Hybrid Architectures
9/28	No class: Rescheduled to 12/21
10/5	Autonomy
10/12	Vision I
10/19	Vision II
10/26	Mapping and Localization
11/2	Reinforcement Learning
11/9	Genetic Algorithms and Neural Networks
11/16	Multi-Agent Robotics
11/23	No class: Thanksgiving
11/30	Human-Robot Interaction
12/7	Assistive Technology
12/14	Current Research in Robotics
12/21	Project Presentations