COS 399 - Programming Autonomous Robots

Course Description

Introduction to the programming concepts involved with autonomous robotic systems. Using off the shelf "robot kits" students will design a simple robotic platform to meet specific goals. Then, using a common platform for the remainder of the course, students will develop their programming capabilities. Simple open-ended, feedback, and artificial intelligence systems will be explored throughout the. Several benchmarks and robot competitions will be used demonstrate the platform and programming learned in the course.

Stephen Houser	144 Luther Bonney Hall
(207)780-4588	houser@usm.maine.edu

Course Outcomes

Your grades will be at least partially dependent on your performance in attaining these course outcomes.

- Develop basic engineering skills and their relationship to software systems.
- Understand communications and interfaces used in programming of robots.
- Use robotics to solve simple and complex physical and virtual problems (c).
- Understand limitations of small robotic (and embedded) systems.
- Apply concepts of computer science to robot system programming (a).
- Develop teamwork through competitions among groups of students (d).
- Communicate effectively, through presentations, to a range of audiences (f).
- Communicate effectively in writing using grammatically correct, coherent, and persuasive reports (f).

The objectives refer to the USM Computer Science Department's program outcomes to achieve the Department's program objective. The outcomes this course is designed to achieve are:

(a) An ability to apply knowledge of computing and mathematics appropriate to the discipline

(c) An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs

(f) An ability to communicate effectively with a range of audiences

Textbook

The Robotics Primer by Maja J. Mataric, (c) 2007 MIT Press.

Course Schedule

Section	Date	Project	Reading
Introduction	Week 1 (1/19)	Lego NXT	Ch. 1 & 2
Construction	Week 2 (1/26)		Ch. 2 & 3
Actuation	Week 3 (2/2)	Line Follower I	Ch. 4 & 5
Sensors	Week 4 (2/9)		Ch. 7 & 8
	Week 5 (2/16)	*** Winter Break ***	
	Week 6 (2/23)	Line Follower II	Ch. 8 & 9
Control	Week 7 (3/2)		Ch. 10 & 11
	Week 8 (3/9)	Find the Goal I	Ch. 12 & 13
Behavior	Week 9 (3/16)		Ch. 14 & 15
	Week 11 (3/23)	*** Spring Break ***	
	Week 10 (3/30)	Find the Goal II	Ch. 16 & 17
	Week 12 (4/6)		Ch. 18 & 19
Groups	Week 13 (4/13)	Sumo I	Ch. 20
	Week 14 (4/20)		
Learning	Week 15 (4/27)	Team Sumo	Ch. 21
	Week 16 (5/4)	Presentations	
	Week 17 (5/11)	Presentations & Papers Due	

Grading

Grades will be based on the design and implementation of three (3) robots and associated robot competitions, a 15 minute presentation, and a 10 page final paper. Details of each will be stated in the assignments. Each assignment carries the same weight (20%) towards the final grade and is graded on a scale from 1 to 100.

Robots: Line Follower, Goal Finding, and Sumo & Team Sumo.

Presentation: Describe the approach you (or team) used to solve a challenge.

Report: Written description of approach you (or team) used.