Experimental Mobile Robotics
CS 3120

Instructor Libero Ficocelli
Prerequisites CS 2290 or permission of the Instructor

Course Content

This course is inspired and modeled (roughly) after the famous MIT course 6.270 (LEGO Robot Design Competition). The course will provide students an opportunity to integrate knowledge of software and hardware design in the context of building an autonomous LEGO robot(s).

Students will become extremely familiar with the difficulties of designing hardware and software, which must work in the **real world,** in contrast to the usual computer science simulated world. Students will learn the basics of robot design techniques, terminology and concepts in the construction of working robotic systems.

Each student participates in a team of 2 students (special case group size of 1 or 3, if we have odd numbers) who will work together to assemble hardware, instrument sensors, write control software, and test their designs. The robot(s) will be constructed from off-the-shelf components: LEGO parts, assorted sensors (light, bumper, infrared), motors, and controlled by the *Handy board*. The Handy board is special purpose robotics board designed by Fred Martin at MIT, it houses a Motorola 68HC11A microprocessor, 32K RAM, a 2 line LCD screen as well as input and output circuitry. Robot control software will be written using Interactive C, a special purpose interactive programming language. Each team will be given a kit of the robot components at the beginning of the course and will be responsible for returning it in working order at the end of the semester.

Although the course is primarily seminar/project based it will include class lectures and lab instruction periods, brainstorming sessions and oral presentations. In a variety of required lab assignments each robot will be tested against a number of predetermined tasks and behaviors (line/wall following, obstacle avoidance, etc).

The comprehensive final project may entail some form of solo or head-to-head competition (details to be defined during the semester). Each team may be required to give periodic oral presentations, keep a working log (1 per team) and submit a final written report summarizing the robot development from design to implementation. Details on the report content and layout to be specified at later date.

Laboratory: **E311**

Text: **Robotic Explorations: An Introduction to Engineering**
By **Fred Martin**
Prentice Hall

The Robotics Primer (pre-publication edition)
By **Maja Mataric**

Grading:
35 % -- Lab Assignments, Mini-projects
17 % -- Final Project
8 % -- Final report
15 % -- Log book also may include oral presentations
25 % -- Term Exam – near the end of term

Special Notes: Attendance will be monitored. **You must clear absences with me**.