

Course: EW451 Mobile Robot Design

Credits: 3 credit – 1 recitation hour – 4 laboratory hours

Course Description: An experimentation-based course in the design, analysis, construction, control and programming of autonomous mobile robots. Special topics include locomotion methodologies, design for terrain, behavior-based programming, localization and navigation, and formation/swarms. Eight to ten robots are constructed by each team throughout the semester using standard robotic construction kits. All topics are investigated through experimentation in the laboratory.

Pre-requisites: EW450

Course Coordinator: Prof Piper

Textbook: None

Course Objectives:

This course provides a survey of mobile robotic topics from a design perspective: it is largely project driven and emphasizes laboratory experiences. The goals are:

- Develop a sense of the breadth of mobile robot research and development, including current technologies, materials, trends and design challenges
- Gain experience in designing mobile robots for a specific task and performance level
- Gain experience with developing and documenting performance tests
- Develop an appreciation of the interplay between mechanical design, sensor selection and software architecture
- Reinforce programming and debugging skills
- Understand and program some common approaches to behavior design, navigation, and sensor integration

Topics:

Wheeled Drive Systems
Dead Reckoning
Design for Terrain
Behavior-Based Robotics
Localization and Navigation
Artificial Potential Fields
Formations, Flocks, and Swarms
Legged and Worm Locomotion

Last Updated: 17-December-2020