Robots and Society

Graduate Curriculum

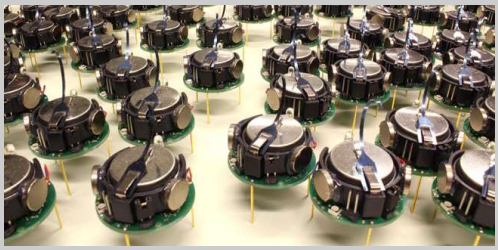
Fall '16

SYS/ECE 6501
Autonomous Mobile Robots
Tues &Thurs 5-6:15 PM

The objective of this course is to provide the basic concepts and algorithms required to develop mobile robots that act autonomously in complex environments. The main emphasis is put on mobile robot locomotion and kinematics, control, sensing, localization, mapping, path planning, and motion planning.

Spring '17

Cooperative Autonomous Systems



This course will explore advanced topics in autonomous and intelligent mobile robots, with emphasis on planning and cooperative control algorithms for swarms and multirobot systems. The focus will be on key research issues in this field including multi-robot architectures, cooperative control, formation control, and learning. Emphasis each of the focus areas will be on the development of algorithms and software that enables a distributed team of intelligent mobile robots to cooperate to achieve a global goals in the physical world using only distributed, local information. Techniques to build such systems will primarily be drawn from natural interconnected systems such as fish schools, bird flocks, deer herd, and cell colonies.

STS 5500 Robots and Society Seminar (Both semesters, Friday 2PM)

The main theme of this seminar will be how humans and robotic solutions could and should co-evolve. What are the possible ways in which robots can enhance or replace human functions? Will robots decrease employment opportunities, or just transform them? Science fiction writers have imagined futures in which robots and humans are co-evolving, and we will consider some of these futures through film and readings. Readings on ethics and anticipatory governance will also be included as well as guest speakers with relevant expertise.

ECE/SYS 6501
Robots and Humans
Tues & Thurs 2-3:15 PM

This course investigates topics in Human-Robot Interaction (HRI), with the goal of understanding how to design, develop, and evaluate robots capable of operating in real-world human environments. Topics to be covered include human-robot collaboration, physical embodiment, degree of autonomy, mixed-initiative interaction, social cognition, and adaptation and learning. Application areas include therapy, service and assistance, entertainment, education, and search and rescue.

Sensors and Perception

This course will provide theoretical and practical exploration of sensor systems, including specifying appropriate sensors based on data requirements, reliability, complexity, and other criteria. A wide variety of sensors will be explored, including machine vision, distance and proximity sensors (e.g. ultrasonic or laser range finders), and tactile and force sensors. Methods for fusing disparate sensors will be presented, including the Kalman filter and particle filters. Examples will be drawn from modern robotics problems as well as engineered analogues to biological systems.