

FALL 2023 – CS SPECIAL TOPICS

1. CS 594* – Michaelis – Social Robotics and Human-Robot Interaction

*CS 594 taught by Professor Michaelis in Fall 2023 will be converted to CS 531. So, the class will count as a regular CS 5xx course and not as a special topics CS 594 for graduation requirements.



Social Robotics and Human-Robot Interaction

CS 594 Special Topics – Fall 2023

Join us for a hands-on research and design focused course where you and a team will adopt and program a real social robot to engage people in interaction scenarios that you create.

- Instructor: Joseph Michaelis - jmich@uic.edu
- Meeting Time: Tues and Thurs 11:00-12:15
- CRN: 27441
- Textbook: Human-Robot Interaction (Bartneck et al. 2020) – *free and open source!*

Course Description:

The field of social robotics is growing rapidly as robots with socially interactive capacities are being implemented as collaborative robotics in industrial manufacturing, consumer assistants in retail settings, healthcare aids in hospitals and outpatient care facilities, and as in-home companions and assistants.

The growing demand for social robots in these fields has increased the demand for a workforce capable of designing human-robot interactions that incorporate the needs and workflows of stakeholders in each of these areas.

This course will introduce students to the research methods, iterative design processes, and theory on human-robot interaction as it applies to social robotics and guide them through developing their own social robotic interaction model, programming a real robot to enact that model and design a research study to explore the human-robot interactions the robot was designed for. The combination of design, technical skills and research methods in HRI that you will engage with are applicable to many computer science, engineering, learning sciences and design sciences fields that consider a human-centered approach to technology design.

Throughout, we will focus on designing, creating, and testing *social* robots, to concentrate the discussion on human perception of robots in social ways, interacting with humans in socially adept and responsive ways, and testing and measuring the social experience in relationship to other outcomes (e.g. learning or following directions). This emphasis will require additional readings beyond the book to supplement the course with findings and theory from social psychology, learning sciences, and social robotics.

Course Outline:

Typically, each class session will include some level of a reading discussion follow and an applied workshop, where students will spend time on guided project work or technical tutorials. The course will include two major themes: design and research. We will begin with the **research** theme to focus students on developing a knowledge of methods and research questions in the field to focus their robot design for a specific research question. Next the **design** theme will focus on generating design principles from theory and user input from a user centered design perspective, developing an interaction model (or flow-chart) based on those principles, and creating a wireframed or other low fidelity visualization of the interaction. Throughout the course, we will also support students in the **creating** theme will focus on implementing the interaction model as a functioning interactive prototype.

Course Topics:

- Research Questions and Methods in HRI
- Mode of Interaction + Measures
- Intro to HRI design
- Modes of Interaction
- Verbal and Non-verbal Interaction
- Applications and Ethics in Social Robots
- Robot Hardware, Sensors and Actuators
- Robotics Programming Models

Programming Requirements:

Programming requirement will be based on each student's prior experience and which robot is used. Most robots have robust Software Development Kits and APIs that serve as supports for programming. For this course, we will use physical robots available from my research lab (Misty, Temi, Cue, Cozmo iRobot).

Course Work:

The course will be structured as a project-based curriculum where students will have deliverables due at three points in the course as summative work for each theme. All pieces will be built together in a single document to create a project document that can serve as a fully articulated research study proposal.

Final projects will include:

1. 5-page HRI research study proposal.
2. Interaction model, annotated with design principles, and a low fidelity prototype.
3. Robot interaction prototype with programming and demonstration that enacts their design.