CS 898AW SP25 Course Projects

Introduction

The course project is designed to give students the opportunity to deeply explore a topic in Robotic Learning or Cognitive Robotics, allowing them to gain hands-on experience in research, algorithm development, or system integration. **Ph.D. students will form a team up to 2, and the graduate student will form a team up to 4 students.** (Please let the instruction and TA know if you want to work individually.)

Students are expected to investigate a problem, review related work, implement or simulate robotic learning or cognitive reasoning systems, and evaluate their approach through experiments or analysis. The project culminates in both written reports and oral presentations.

Topics

The project should contribute toward advancing the understanding or capabilities of intelligent robotic systems. Possible topics include (but are not limited to):

- Reinforcement Learning for Dexterous Grasping
- Neuro-Symbolic Learning in Cognitive Robots
- Human-Robot Collaboration
- Multi-Agent Collaboration and Planning
- Gesture Understanding for Robotic Learning
- Semantic Scene Understanding for Robots
- Language-Guided Robotic Planning

Project Proposal Report (April 18th EoD)

Before starting the main project work, students must submit a **two-page proposal** using a standard two-column format (e.g., IEEE or conference templates). The proposal must address:

- The research question or system goal
- Motivation and importance of the problem
- In-depth Literature Survey (Related Work)
- Preliminary methods or system architecture
- How performance or outcomes will be evaluated

- Timeline and key milestones

In-depth Literature Survey

This literature survey expands upon the proposal by diving deeper into related work. It must:

- Be 2-3 pages (excluding references) in two-column format
- Include at least 15 references (ICRA, IROS, TRO, RAL, TPAMI, etc)
- Group related papers into thematic clusters
- Discuss how previous work has evolved over time
- Clearly identify how the student's project contributes beyond existing literature

Project Proposal Presentation (At the week of April 14th)

Each student will deliver a 10-minute presentation introducing their proposed project, highlighting the research question, background, objectives, and initial plans.

Project Final Report (May 15th 2025)

Students will submit a **6-page research-style report (IEEE Conference)** at the end of the semester, formatted using an appropriate conference template. It should include:

- Clear problem definition and motivation
- Related work and your unique contribution
- Detailed methodology and system design
- Evaluation and results
- Discussion of findings, limitations, and future directions

Reports should emphasize **novelty**, **rigorous evaluation**, and **clarity of presentation**

Project Final Presentation (May 8th 2025)

A **15-minute final presentation** summarizing the complete project. This should reflect both the technical achievement and the research depth of the work.