

## ECE276C Course Project

### Description

ECE276C involves a substantial project that is the majority of the class grade. The overall motivation for this project is to incentivize advancing *research* ideas in robotics that leverages self-learning by the robot or some internalized model. This is the 3<sup>rd</sup> (and final) course in the sequence from ECE276, so it would be fitting that we will try to move research forward.

Project topics have certain requirements that **must be met (no exceptions!)**:

1. Projects must fundamentally be linked to reinforcement learning.
2. The project should develop a new algorithm or modify an existing algorithm, combining with new ideas or new techniques in related fields, to demonstrate new capabilities (generalization, speed of learning, robustness, data efficiency, solving complexity). Straight-up applications of available algorithms to new problems is insufficient and will not be accepted.
3. Requirement (2) require sufficient literature review to confirm (this is part of your final report).

You are allowed to leverage as many packages as you need if you find them online.

### Deliverables

#### **Preliminaries (20% grade)**

Your group will select a paper that is most closely related to your project direction and present the concepts in the paper to the class. We have provided you a list of papers that you will select from:

[https://docs.google.com/spreadsheets/d/10\\_97r1RhL5ToxdcHPpl7mP-q7pMZqA8kRqkRg4HIRNw/edit?usp=sharing](https://docs.google.com/spreadsheets/d/10_97r1RhL5ToxdcHPpl7mP-q7pMZqA8kRqkRg4HIRNw/edit?usp=sharing)

It is up to you to gauge from the titles and abstracts which paper your group will wish to tackle. The presentation will be ~12 min long (2 min for questions). You will present the key concepts of the paper as a mini-lecture (i.e. you are now the professor!). The intention is that you will teach the class about a technique, not to report on a publication's content. Thus, as a general guideline for this unique mini lecture, you should expect to spend no more than 1-2 minutes on experiments/results from the paper. Instead, the focus should be on teaching the methods and discussing its origination, limitations, benefits, implications, applications, etc. Your presentation should therefore likely not exceed 10 slides.

Once you have picked a paper you may immediately sign up for that paper presentation. It is first come first serve. All papers may be presented by up to a limit of 3 students. Before or after the presentations you are free *not* to do the final project and report with those who you presented the preliminaries with.

*Grading Criteria: Clarity of Slides, Depth of Material, Team Contribution, Oral Delivery. Files due at end-of-day of your oral presentation on TritonEd.*

*Deliverables: Oral Presentation, Slide deck.*

#### **Project Presentation (40% project grade)**

Each group will present their project at the open house, in an open-house format. Each group should present a poster, following the general guidelines of Introduction, Background, Methods, Results, Discussions/Conclusions, and References. In addition, Video/laptop demos are encouraged. Posters can be printed from the Campus Bookstore for a reasonable price.

An approximately 2~3 min. trailer for your project is requested. Trailers that describe the key concepts of the project, any necessary math, and show visually engaging results will receive up to 5% bonus on the final grade of the course

*Deliverables: Poster and Video. Poster and Video files also due by end-of-day of Open-House on TritonEd.*

*Grading Criteria: Poster (and Video) Clarity and Quality; Depth of Analysis into Project.*

### **3. Paper Report (40% grade)**

Each group will submit a mock conference paper detailing their work. This paper should be 4 pages in length, and have the following sections: Introduction, Background, Methods, Results, Discussion/Conclusions, and References. When in doubt as to how the papers should look, please take a look at what is published in IEEE's International Conference of Robotics and Automation (ICRA) as a guidelines; though these papers are 6-8 pages long, they present the type of writing style that we will be expecting. Follow the IEEE conference format, which you can download templates online (in Word or Latex).

With your paper, please submit a ZIP file of all your work (code, videos, etc.).

*Deliverables: Report. Due end of day Jun 14.*

*Grading Criteria: Completeness of relevant literature. Completeness of methods. Some encouraging Validation. Thoughtful Discussions. Overall Clarity. Code base.*

### **Logistics**

**Group size:** Project group sizes may be between 1-3 persons. There is often *no* correlation with group size and quality of work, and thus the expectations regardless of group size is the same. Those who wish to work alone can do so.

*Beyond ECE276C: Depending on interest level of students and professors, the projects are set up in a way that any interesting work can be followed up with independent research and publications. Please keep this in mind if you are interested.*