COMP 150: Developmental Robotics

http://www.cs.tufts.edu/comp/150DR

Fall 2017
Tuesday and Thursday 3:00 - 4:30 p.m.
Location: Science and Technology 136
Tufts University

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What is this class about?

This class serves as an introduction to the interdisciplinary field of Developmental Robotics, which crosses the boundaries between robotics, artificial intelligence, and developmental psychology. The goal of the field is to create autonomous robots that are intelligent and adaptable in the real world rather than in very limited domains, situations and environments. The class will focus on representations and algorithms that enable a robot to continuously learn about its physical or social environment through its own interaction with it.

Topics include overview of robotics; robotics cognitive architectures; deep learning for visual and non-visual sensory data; unsupervised, self-supervised, and reinforcement learning in robotics; learning object affordances; and, theories of cognitive development and their applications to robotics. There will be several small homework assignments and one large class project, with the goal of producing work worthy of publication. You will use physics-based robot simulators as well as real robots as part of the final project. By the end of this class you will have an understanding of the current state of the art of the field and will be able to conduct original research within it.

Any required textbooks?

There is no textbook for this course. Instead, relevant research papers will be initially assigned, and later chosen by the students following their interests and project topics.
How is this class organized and run?*

This class will be taught as a seminar. You are expected to actively participate in class discussions and complete the assigned readings in advance.

* The instructor reserves the right to change any and all aspects of this class for any reason or no reason at all (a.k.a., academic freedom).

Any prerequisites?

A strong interest in the question, “What is intelligence and how can it be implemented in a physical robot?”

Some proficiency in programming languages (C++, Java or Python).

For best results take two lectures weekly. Common side effects may include sleepless nights, broken robots, nervousness, and banging head on keyboard. Frequent visits to the TA and instructor have been shown to alleviate some of those symptoms. Talk to your instructor if this class is right for you.

What is the final grade based on?

Grades will be based on:

- class participation and attendance (10%);
- written responses to the readings (20%)
- a final project. (70%)

The final project will have the following components:

- Project Proposal Presentation and Writeup (30%)
- Progress Report (10%)
- Final Project Report (40%)
- Final Project Presentation (20%)

Details about all assignments and project components will be available on the course website: http://www.cs.tufts.edu/comp/150DR

Is it ok to collaborate with others?

You are encouraged to form study groups and discuss the reading materials assigned for this class. You are allowed to discuss the reading response assignments with your colleagues. However, each student will be expected to write his own response.

Collaboration is expected for the final projects – as soon as you can, you will form teams of 2-3 members. If you absolutely insist on working alone, I won’t stop you but you’ll be facing a larger work load.
For the final project, you’re allowed to (and expected to) use various open-source libraries, published code, algorithms, datasets, etc. In fact, doing anything in robotics from scratch is next to impossible :) As long as you cite everything you use that was developed by someone else, you’ll be fine.

IMPORTANT: Cheating, plagiarism, and other academic misconducts will not be tolerated and will be handled according to Tufts’ policy on academic dishonesty. According to that policy, if I find any evidence of dishonesty, I am required to report it.

Is attendance required?

You are expected to attend each class and actively participate in the class discussions – not doing so will result in a lower participation grade. If you miss a class, it is your responsibility to find out what we talked about, including any announcements.

If you have a “valid” reason to miss a class (e.g., you’re traveling to a conference, or have a health or family emergency, etc.), let me know as soon as you can and we’ll work something out.

A note for students with disabilities

Tufts University provides upon request appropriate academic accommodations for qualified students with disabilities. Information about registering with Disability Services, as well as the resources provided for students with disabilities, can be found at Tufts’ Academic Resource Center webpage:

http://students.tufts.edu/academic-advice-and-support/academic-resource-center

To determine if you qualify and make a request:

http://oeo.tufts.edu/reporting-resources/reasonable-accommodation-request-student/

If they certify your needs, I will work with you to make appropriate arrangements. Note that there are no midterms or final exams in this class.