COMP 150: Developmental Robotics

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Today

- Syllabus – overview and Q & A
- Projects Q & A
- Overview of Robotics
Announcements
North-East Robotics Colloquium

- Held at Northeastern University on Saturday October 21\textsuperscript{st}
- [https://nerc2017.ccis.northeastern.edu/](https://nerc2017.ccis.northeastern.edu/)
- Deadline for registration: October 15
- $50 dollars for graduate students, $10 for undergrads
- Extra credit if you attend – let me know if you will
Class Goals

At the end of this class you will have an understanding of the current state of the art in cognitive and developmental robotics and will be able to contribute to original research in this field.
This class will be taught as a seminar. The students will be expected to read the assigned papers for each lecture in advance and to actively participate in class discussions.

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

** You agree that I have the unconditional right to exercise this discretion in a way that is most favorable or convenient to me.
Prerequisites
Prerequisites

(All episodes)
Prerequisites

(Star Wars) (all episodes)

(The Matrix) (all episodes)
Prerequisites

- Star Wars
  (all episodes)

- The Matrix
  (all episodes)

- Star Trek: The Next Generation
  (most episodes)
Prerequisites

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

In most cases, at least one person on a project team should have some programming experience.

The most important prerequisite of all, however, is your interest in the course, motivation, and commitment to learning.
Prerequisites

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 instructor and the TA have been shown to alleviate some of those symptoms. Talk to your instructor if this class is right for you.
How Difficult is this Class?
Attendance

You are expected to attend every class and actively participate in the discussions. If you miss a class, it is your responsibility to find out what we talked about, including any announcements.
Homework Assignments

- Homework assignments will consist of short written essays on questions related to the readings
- Homeworks will be announced in class
- Your submission will consist of a post on a forum
- Next homework is going out on Tuesday
Projects

The final project must be a research or design project that is related to the topics covered in class. You may choose to work individually or in small groups (2-3 members each). Working in groups, however, is highly recommended.

You are encouraged to select a topic for your final project as soon as possible. A written project proposal will be due on 10/26. The final project report will be due on the Sunday of the last week of classes.

Each team will be required to present the results of their final project during the last week of the semester.
Project Components

• Preliminary Proposal “Presentation”

• Project Proposal

• Progress Report

• Final Report + Presentation
Questions about projects....

- Are we required to use specific programming languages?
- How do we team up and form study groups?
- What are the “types” of projects we could do?
- How do we decide the topic?
Questions about projects....

• Is there a robotics lab where we can work at?
• Are we expected to use real robots and if so, which robots?
• If using real or simulated robots, to what extent do we have to program all the implementation running on the robot, e.g., low level controllers?
• Are we allowed to use github to store our project materials?
• Are you going to grade us on the quality of code?
Questions about programming...

- Help! I am not a programmer!
Questions about my research...
Small-Group Activity

- Question: What is an object? To a human? To a robot?
- Talk to your neighbors in a small group and try to come up with some definitions
- We'll share the results in 5-10 min
Behavior-Based Object Exploration
Behavior-Based Object Exploration
Other questions?
A Brief History of Robotics
A Brief History of Robotics

First introduced in the play *R.U.R. (Rossum's Universal Robots)* which opened in Prague in January 1921.

The word ‘robot’ is derived from the Czech word for forced labor or serf.
Early Depiction of Robots in Movies
Definition

“re-programmable, multi-functional, manipulator designed to move material, parts, tools, or specialized devices through variable programmed motions for the performance of a variety of tasks”

– Robotics Industry Association (RIA)
A Brief Timeline
Mechanical Duck

[Jacques de Vaucanson (1709-1782) ]
Radio-Controlled Submarine

[Nikola Tesla, 1898 (patent #613809)]
Walter's Turtle

[Grey Walter, 1948-49]
Walter's Turtle

BRISTOL'S ROBOT TORTOISES HAVE MINDS OF THEIR OWN

[BBC Report ~1949]
The “Beast”

1960

[John Hopkins University Applied Physics Lab]
First Industrial Robot

First Industrial Robot (~60s)
The Stanford Cart

[Stanford University, 1970]
Shakey

[Stanford Research Institute, 1970]
Video
Genghis

[Rodney Brooks, MIT, 1989]
Sojourner

[NASA, 1997]
Honda's Humanoids

[Honda, 1986-2011]
Honda's Humanoids

http://www.honda.co.jp/ASIMO/
Sony's Robot Dog
Androids

[Honda, 1986-2011]
Geminoid Summit
The Uncanny Valley

- moving ---
- still ----

- human likeness
- familiarity

- corpse
- zombie
- prosthetic hand
- bunraku puppet
- healthy person

- humanoid robot
- stuffed animal
- industrial robot
The Uncanny Valley
Next time...

- What are the major practical and research questions in robotics?
- Mapping and Localization
- Movement and Control
- Perception and Cognition
- ...
- ...