Dartmouth CS 81: Robotics

Professor Devin Balkcom
Winter, 2012

News

- Please read the first six sections of Baraff 96 before class on Monday; we will be discussing the paper in class.
- Assignment 8 out. Dynamics. Due Wednesday, March 7 at 11:59 pm.
- Assignment 7 Nonholonomic motion planning out. Due Friday, March 2 at 11:59 pm.

About the course

The purpose of this course is to give you a framework for modelling, simulating, planning, and controlling the motion of mobile robots, manipulators, and other physical systems. We will use the robots in the lab as motivating examples, but we will focus most strongly on mathematical foundations and principles.

The reason for this strong emphasis on mathematical modelling is that I believe that this material provides a strong foundation for building and programming robots in a principled way. The techniques and ideas we will discuss also play a pivotal role in computer vision, graphics, computational biology, and engineering.

Professor

Devin Balkcom
Office: 211 Sudikoff
devin@cs.dartmouth.edu

Office hours are:

- M 10 am - 12 pm
- W 3 pm - 4 pm
- F 3 pm - 4 pm

You are welcome to drop by any time during office hours, but it may be wise to send an e-mail first reserving some time during office hours. If I appear to be in a meeting, knock anyway; most of my meetings are informal, and I can at least tell you when I will be free.

Prerequisites

I expect you to have:

- Some background in calculus, equivalent to Math 3 or (preferably) 8.
- Experience in some programming language, equivalent to CS 1.

Assignments will be written in the Python programming language; even if you have not written Python code before, you should be able to pick it up quickly.

Lectures

- **Location**: Sudikoff 115
- **Times**: 9L: MWF 8:45-9:50 am

Grading

- Assignments: 80%
- Quizzes, participation, in-class discussion: 20%

There is no fixed scale for assigning letter grades. Expect the median grade for the class to be a B or B+. Assignments will be graded on a scale of 1-20, scaled so that a score of 10 roughly corresponds to a median grade. Not all assignments will be weighted equally.

Assignment requirements

- We will use svn for all assignment submissions.
- Written work should be submitted as latex .tex documents **and** pdf.
- Code should be submitted as Python source code.

Late policy

- Any assignment handed in more than three days after the deadline will receive no credit.
- The first assignment handed in after the deadline but three or fewer days after the deadline will be graded with no penalty.
- The second assignment handed in after the deadline but three or fewer days after the deadline will be graded with a 50% penalty. Late assignments beyond the second will receive no credit.

Which programming language?

We'll use Python 2.7 in this course.

In general, what language should you write robotics software in? I haven't found a best choice. Many existing libraries are written in C++, including OpenCV for vision, dynamics engines like Bullet, and rendering engines like OGRE. MATLAB is very popular for controls. Python with Numpy and Scipy are convenient for array manipulation.

Honor Principle

You may discuss homework with other students at a high level, but should never look at or copy another student's written work. You should never under any circumstances turn in homework that is a duplication or partial duplication of another student's solution. You must also credit other students you have talked with, or any other sources. You may NOT discuss exam problems with other students, until all exams have been graded and returned.

Religious observances

Some students may wish to take part in religious observances that occur during this academic term. If you have a religious observance that conflicts with your participation in the course, please meet with me before the end of the second week of the term to discuss appropriate accommodations.

Disabilities

I encourage students with disabilities, including "invisible" disabilities such as chronic diseases and learning disabilities, to discuss with me after class or during my office hours appropriate accommodations that might be helpful to you.

Students with disabilities enrolled in this course and who may need disability-related classroom accommodations are encouraged to make an appointment to see me before the end of the second week of the term. All discussions will remain confidential, although the Student Accessibility Services office may be consulted to discuss appropriate implementation of any accommodation requested.