

EN530.603 Applied Optimal Control Project

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1 Overview

The goal of the course project is to apply the trajectory optimization and estimation algorithms learned during class to a practical problem. Various implementations of robotic systems will be provided to you for applying the optimization problems. This is an individual project and each student should submit their own work. The project timeline is given below:

Due Date	Task
11/18	Discuss project idea with Prof. Kobilarov (e.g. during office hours on 11/17)
11/19	Give a 2-minute 2-slide project idea overview in class
12/16	Give a 5-minute 5-slide project presentation in class (during final exam time)
12/18	Submit a project report (maximum 3 pages)

2 Suggested Projects

1. Optimal Control:

- (a) Robotic manipulator
- (b) Car model
- (c) Quadcopter model
- (d) Mobile manipulator (a manipulator mounted on a mobile robot)
- (e) Unmanned underwater vehicle (UUV)

2. Estimation:

- (a) Object shape estimation using noisy range measurements
 - i. simple shapes: add dynamics, i.e. shape is moving
 - ii. complex shapes: static estimation is OK, but think about optimally selecting next measurement location
- (b) Pose estimation of a wheeled ground vehicle using odometry and GPS data
- (c) Rigid body attitude estimation using Inertial measurement unit (IMU) measurements

3 Exceptions

If you are absolutely not interested in implementation-related projects (e.g. Matlab, C++, etc...) then it might be possible to work on a theoretical problem, as long as it is related to the material and has significant depth. Please discuss with me such possibilities.