NYU Tandon School of Engineering
Department of Electrical and Computer Engineering

EL5223: Sensor Based Robotics

Class Location: JAB775B
Class Time: Thursday 3 PM – 5:30 PM

Instructor: Dr. Prashanth Krishnamurthy, LC029, pk@crrl.poly.edu, prashanth.krishnamurthy@nyu.edu
Office Hours: Tuesday 11:30 PM - 1:30 PM, Thursday 12:00 PM - 1:00 PM; or by appointment
Course Website: http://crrl.poly.edu/EL5223

Course Outline

1: Introduction to robotics and industrial applications.

2,3: Direct kinematics problem. Denavit-Hartenberg representation, Euler and RPY angles.

4: Homogeneous Transformations.

5,6: Inverse kinematics and examples.

7,8: Manipulator Jacobian, differential relationships, force and moment analysis, inverse Jacobian, trajectory planning.

9: Midterm.

10,11: Robot Arm Dynamics: Euler-Lagrange formulation, Newton-Euler formulation, and Hamiltonian.

12: Basic concepts of mobile robot localization, navigation, and mapping.

13: Linear controllers for robot manipulators, i.e., PD and PID. Computed torque control for robotic manipulators.

14: Practical robotic system implementation aspects, limitations and constraints, and sensors and actuators.

15: Final.

References:

1. M. Spong, S. Hutchinson, and M. Vidyasagar, Robot Modeling and Control, Wiley, 2005.
2. Lecture notes on the course website.

Additional References:

1. Fu, Gonzalez, and Lee, "Robotics: Control, Sensing, Vision, and Intelligence", Mc-Graw Hill, 1987.

Grading:
Midterm: 30% , Final: 40% , Homework: 15% , Project: 15%