ME 522
PRINCIPLES OF ROBOTICS

Instructor

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Main Topics

Kinematics:
Review of Spatial Kinematics.
Kinematic Modeling Using the Denavit-Hartenberg Approach.
Position, Velocity, and Acceleration Analyses in the Forward and Inverse Senses.

Dynamics:
Quasi-Static Analysis Using the Virtual Work Method.
Direct and Inverse Dynamics Using the Newton-Euler and Lagrange's Equations.

Motion Planning:
Task Space Planning, Joint Space Planning.
Via Positions, Splines, and Time Steps.

Control Methods:
Independent Joint Controllers.
Coordinated Joint Controllers Using the Computed Torque Method.
Free and Compliant Motion Control.
Combined Motion and Force Control.

Grading

Two Midterm Examinations (60 %)
Final Examination (40 %)

Typical Reference Books

Introduction to Robotics
A. J. Critchlow / Mac Milan.

Robot Manipulators: Mathematics, Programming, and Control.
R. P. Paul / The MIT Press.

Introduction to Robotics: Mechanics and Control
J. J. Craig / Addison-Wesley.

A Robot Engineering Textbook
M. Shahinpoor / Harper and Row.
Robotics: Basic Analysis and Design
W. A. Wolovich / HRW, The Dryden Press.

Fundamentals of Robotics
R. J. Schilling / Prentice-Hall.

Robot Analysis and Control
Asada and Slotine / Wiley-Interscience.

Robot Dynamics and Control
M. W. Spong, M. Vidyasagar / John Wiley.

Fundamentals for Control of Robotic Manipulators
A. J. Koivo / John Wiley.

Robotics: Control, Sensing, Vision, and Intelligence.

Fundamentals of Robotic Mechanical Systems
(Theory, Methods, and Algorithms)
Jorge Angeles / Springer

Robot Analysis
(The Mechanics of Serial and Parallel Manipulators)
Lung-Wen Tsai / John Wiley

Related Journal Publications of the Instructor


