EEL 5661 Robotic Applications

Credits: 3 credits

Textbook, Title, Author, and Year: Introduction to Robotics: Analysis, Systems, Applications, S. B Niku, Prentice Hall, latest edition

Reference Materials:

- Introduction to Robotics: Mechanics and Control (3rd Edition), John J. Craig, Prentice Hall
- Robotics: Control, Sensing, Vision and Intelligence, K.S. Fu, R.C. Gonzalez, and C.S.G. Lee, McGraw-Hill, 1987
- Robot Modeling and Control, M. W. Spong, S. Hutchinson and M. Vidyasagar, Wiley, 2006

Specific Course Information

Catalog Description: Robot classification and specification, Robot selection, Kinematic and dynamic modeling, Path and trajectory planning, Robot localization and calibration, Teaching robot to work, Robot programming and control, Actuation and sensing, Robot vision, and Robot applications

Prerequisites: Engineering Graduate Standing

Specific Goals for the Course: This course introduces graduate students to an up-to-date account of the basic principles underlying the design, analysis, synthesis, and applications of robotic systems

Brief list of topics to be covered:

1. Introduction: History of robots, robot systems, basic terms and robot standards
2. Robot kinematics: Spatial transformations, robot forward and inverse kinematics, robot velocity kinematics, manipulator Jacobian, and localization of robots
3. Robot trajectory planning Joint space planning, world space planning, and teaching robot to work
4. Robot dynamics and control: Overview of robot dynamic model and control methods, and case studies
5. Automation sensors: Ranger sensors, proximity sensors, touch sensors, torque sensors, and angular sensors
6. Robot vision: Robot vision basics, integration of vision to robot systems, and case studies
7. Application case studies: Industrial robots and service robots