



Aalto University
School of Electrical
Engineering

ELEC-E8126 Robotic Manipulation

Course information

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Contents

- Aspects of state-of-the-art robot manipulation
 - Planning trajectories
 - Planning grasps
 - Learning manipulation skills
 - Coordinated motions
 - Handling contact

Learning goals – What's the course about?

After completing the course, a student can

- explain main concepts related to robotic manipulation
- read scientific literature in robotics to choose approaches for a particular problem
- implement state-of-the-art algorithms

Prerequisites

- Programming (C++ will be used in assignments)
- Robotics basics (e.g. kinematics)
- Control engineering basics (e.g. feedback, PID)
- Math (calculus, vector and matrix algebra)

- Motivation to work hard!

Teaching

- Independent study
 - Readings
- Lectures
 - Discuss concepts, summarize, give new viewpoints
 - Mon 10:15-12 (periods 3-4), over Zoom
- Assignments / quizzes
 - Weekly electronic quizzes based on lectures and readings
- Assignments / exercises tasks
 - 6 exercises tasks, to be completed individually
 - Weekly sessions to introduce tasks and provide advice
 - 1 in-class/on-campus (Thu at 10am), 1 on-line (Wed at 8am)

Grading and evaluation

- To pass, 50% of maximum total grade must be achieved.
- Grading
 - Quizzes 25% (based on lectures and readings)
 - Exercise-assignments 75%
- Extra points from active participation (lectures/exercises).

Workload estimate

- Lectures 26 h
- Exercise sessions 22 h
- Independent study / Readings and quizzes 28 h
- Independent study / Solving exercises 56 h
- Total 130 h

Material

- MyCourses
 - Lecture slides
 - Links to readings and videos
- Primary book
 - Lynch & Park, “Modern Robotics: Mechanics, Planning, and Control”
- Secondary books
 - LaValle, “Planning algorithms”
 - Murray, Li & Sastry, “Mathematical Introduction to Robotic Manipulation”

Teachers

- Lecturer
 - Ville Kyrki (ville.kyrki@aalto.fi)
 - Guest lecturer: Gökhan Alcan

- TAs (assignments)
 - Tran Nguyen Le
 - Daulet Baimukashev

Contacting teachers

- Primary
 - At lectures/exercises
 - Course Slack channel
- Secondary
 - Email

Questions?