

MICRO-453

Robotics practicals

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Cursus	Sem.	Type
Robotics	MA2	Obl.

Language of teaching	English
Credits	4
Withdrawal	Unauthorized
Session	Summer
Semester	Spring
Exam	During the semester
Workload	120h
Weeks	14
Hours	4 weekly
TP	4 weekly

Number of positions

It is not allowed to withdraw from this subject after the registration deadline.

Summary

The goal of this lab series is to practice the various theoretical frameworks acquired in the courses on a variety of robots, ranging from industrial robots to autonomous mobile robots, to robotic devices, all the way to interactive robots.

Content

The practicals can include the following topics:

Artificial Muscles: After a general overview of artificial muscle technologies used in robotics, the students fabricate dielectric elastomer actuators (DEAs) by hand and test the mechanical and electrical properties of their devices, comparing their results with theoretical predictions.

Outdoor Flying Robots: This is a practical exercise on the design of a combined altitude and speed controller for a miniature autonomous airplane.

Mobile robot position estimation and navigation: The goal of this practical is to implement position estimation and navigation on a real mobile robot.

Teaching Robots to Accomplish a Manipulation Task: In this robotic practical, the student will be teaching a robot to build a tower by stacking several objects on top of each other.

Industrial Robot Control: The goal is to control a robot specifically designed for tasks such as assembly, manipulation or packaging where there is need of fast and precise actions.

Haptics: After a brief overview of the state of the art of haptic devices, the students need to generate useful sensations in respect to a give problem, study the type of sensations that can be produced, as well as how they can be programmed.

Assembly, programming and characterization of a modular fish robot: This practical is aimed at realizing a swimming fish robot using the same modules used for the Salamandra robotica II and AmphiBot III robots.

WARNING: These practicals have a limited number of places, due to the heavy equipment used. Students following the master in robotics will have priority in the attribution of places.

Keywords

industrial robotics, haptics, autonomous robots, manipulation, navigation

Learning Prerequisites**Required courses**

Basics of mobile robotics

Introduction to automatic control

Introduction to signal processing

Important concepts to start the course

Robotics
Programming
Automatic control
Signal processing

Learning Outcomes

By the end of the course, the student must be able to:

- Assess / Evaluate the performances of a robotic system
- Synthesize a control system
- Discuss the performances of a system
- Elaborate the model of a system

Transversal skills

- Plan and carry out activities in a way which makes optimal use of available time and other resources.
- Use a work methodology appropriate to the task.
- Collect data.
- Write a scientific or technical report.

Teaching methods

Students attend a set of practicals by groups of two or three, supervised by an assistant.

Expected student activities

Preparation of the practicals before attending it, writing of the report after the practical.

Assessment methods

Written report and oral feedback during the practical

Supervision

Office hours	No
Assistants	Yes
Forum	No

Resources

Moodle Link

- <http://moodle.epfl.ch/course/view.php?id=524>