

Software architectures for robotics

Credits: 5 Semester 2 Compulsory: No

Format	Lectures 16 h	Examples 30 h	Private study 68 h
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Lecturers: Fulvio MASTROGIOVANNI (UG) and Hendry CHAME (Irccyn)

Course objectives: A robot is a multi-purpose, multi-form and multi-function machine. It exhibits completely new and unique characteristics with respect to what it is for, how it is structured and what it is able to do. In order to cope with this diversity in form and function, software architectures for robots must be grounded on top of a model enforcing flexibility and efficiency well beyond those developed in other domain applications.

Students will be able to identify stable requirements in different and various scenarios, common design issues and similar approaches to recurrent software development problems while designing new Robotics applications.

Another objective of the module is to make the students familiar with robotics middleware very commonly used in robotics applications, like ROS (Robot Operating System).

Contents:

The following topics will be considered:

- Trends in software development for robots.
- Software environments for robot programming.
- Component-based software frameworks.
- Communication and information flow.
- Management of heterogeneous hardware and software.
- Examples of available programming frameworks and architectures.
- ROS: Robot Operating System.
- Effibox.

Practical Work:

In the lab, the students will develop applications using ROS.

Abilities: After completing the course students will be able to:

- Choose an appropriate architecture and design framework for a given robotic system.
- Identify infrastructural and practical solutions for the problem at hand.
- Develop applications for fairly complex robotic systems using existing middleware.

Assessment: 50% continuous assessment, 50% from end semester examination

Recommended texts:

- D. Brugali (Ed.). Software Engineering for Experimental Robotics. In Springer Tracts in Advanced Robotics, vol. 30. Springer Berlin / Heidelberg, 2007.
- I. Sommerville. Software Engineering. In the International Computer Science Series. Addison Wesley, 2000.