

Mobile robotic systems: from modelling and control to future challenges

45th International Summer School of Automatic Control
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<http://gipsacontrolsommerschool.org>



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Abstract: Today, robotic systems - and autonomous mobile robots in particular - are being developed at an accelerated pace for a wide range of applications and uses, on a global scale. The industrial and technical applications of robotic systems are constantly gaining in importance, and the many applications that can be performed by mobile robots, such as surveillance, inspection and transport tasks, as well as search and rescue missions, are posing new multidisciplinary scientific challenges and opening the way to new research questions. A mobile robotic system is a complex, dynamic system. For this reason, in addition to perception systems, decision-making and control algorithms are essential for the implementation of mobile robotic systems. To guarantee robustness and precision in the execution of complex tasks, the use of control techniques is essential.

The scientific objective of this summer school is to establish the fundamentals of mobile robotics, to provide the modeling and control tools needed to meet the challenges of these complex systems, and to identify new areas of research and applications in this rapidly evolving field by covering the following themes:

- Modeling of mobile robots: kinematics and dynamics with a focus on aerial robots.
- Motion control for mobile robots: classic control theory applied to robotic systems and advanced control methods
- Multi-robot systems: cooperation and coordination of multiple robots, swarm robotics, formation control and applications
- Recent innovative applications of mobile robots: manipulation and cooperative transportation, robots for environmental monitoring, energy production with aerial robots...

The objective is to assess the fundamentals of mobile robotics while offering insights into recent advancements in the field and innovative applications. The scientific program of the school brings together leading figures in control engineering and robotics, providing an exceptional opportunity to present their latest results and identify emerging areas of research.

Organization: The school will consist of a series of surveys, lectures, and research talks taught in English, completed by a computer lab and practical session, a poster session and a round table to discuss about the challenges of mobile robotics in the actual context of environmental crisis.

Audience: The school is mainly intended for PhD students, researchers, and industrial participants. Basic knowledge in control theory, optimization, and mathematics is useful.

About Grenoble: Capital of the French Alps, Grenoble can be easily reached by plane from two airports: Lyon Saint-Exupery (LYS) or Geneva Cointrin (GVA Switzerland). From LYS, a bus shuttle reaches Grenoble's Railway Station in 1 hour. From GVA, a bus shuttle (2 hours) or a train is available. By train, frequent services are also available from Paris (3-hour TGV) and from Lyon (1 hour and 20 minutes by train).

Registration: detailed information coming in spring 2024

Registration Fees: (including access to lectures, accommodation, lunches and Gala Dinner)

Students:	500 €
Academics (post-doctoral researchers included) and French participants with EPST affiliation:	650 €
Industry participants and French participants with EPIC affiliation:	1100 €
CNRS:	Free