Syllabus

Descrizione corso

Titolo insegnamento	Mobile robotics
Codice insegnamento	47568
Titolo aggiuntivo	
Settore Scientifico-Disciplinare	ING-INF/04
Lingua	Inglese
Corso di Studio	Corso di laurea magistrale in Ingegneria Industriale Meccanica
Altri Corsi di Studio (mutuati)	
Docenti	prof. Karl Dietrich von Ellenrieder, Karl.vonEllenrieder@unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/37038
Assistente	
Semestre	Secondo semestre
Anno/i di corso	1
CFU	5
Ore didattica frontale	28
Ore di laboratorio	18
Ore di studio individuale	79
Ore di ricevimento previste	
Sintesi contenuti	A mobile robot is an unmanned system that operates in unstructured and dynamic environments, with or without the oversight of a human. Applications of mobile robots include environmental monitoring; manufacturing logistics and production; search & rescue; construction; forestry management, agricultural monitoring and production; mining; marine measurement and monitoring; and aerospace operations. This course covers the fundamental principles of mobile robotics at an introductory level. The topics covered include: functional architecture of unmanned systems (electrical, mechanical and software); vehicle dynamics

	and modelling; common navigation sensors, state & disturbance estimation; low-level control; and trajectory generation. Laboratory exercises that use Matlab, Simulink and possibly ROS/Gazebo to control unmanned vehicles will be given.
Argomenti dell'insegnamento	The basic principles of mobile robotics are presented.
Parole chiave	Robotics, automatic control.
Prerequisiti	None.
Insegnamenti propedeutici	
Modalità di insegnamento	Classroom lectures and laboratory exercises.
Obbligo di frequenza	Attendance at lectures and exercise sessions is strongly recommended.
Obiettivi formativi specifici e risultati di apprendimento attesi	Knowledge and understanding: 1. Applying basic principles to a broad range of dynamic system models (such as those typically learned in the 1st cycle). 2. Defining sensing and controller requirements for unmanned vehicles that operate in different conditions. 3. Understanding factors that affect system performance and stability. 4. Use of state space techniques for designing controllers and observers. Applying knowledge and understanding: 5. Analyzing, developing and presenting control & navigation systems for applications that span multiple disciplines through laboratory exercises, which complement the lectures. Making judgements: 6. On the choice of analytical and numerical tools to use in the lab exercises. This may require you to integrate knowledge, handle complexity, and formulate judgements with incomplete data. Communication skills: 7. Laboratory reports will require you justify your solutions/conclusions concisely (in clear and simple language). Learning Skills: 8. Students will be required to develop a proficiency in Matlab,

	Simulink and possibly ROS/Gazebo with a few in-class examples, but mostly on their own. This is intended to help students develop the ability to study in a manner that is largely self-directed or autonomous.
Obiettivi formativi specifici e risultati di apprendimento attesi (ulteriori info.)	
Modalità di esame	- Formative assessment: Exercises: 18 hours total; ILOs assessed: 1 - 8; - Summative assessment: 40% exercises; ILOs assessed: 1-8; 60% final exam: 4 hours; ILOs assessed: 1-6.
Criteri di valutazione	Laboratory Exercises: Completeness and correctness of answers; level of understanding Written Final Exam: Completeness and correctness of answers. Students are required to receive an overall grade of greater than 60/100 points to pass the course.
Bibliografia obbligatoria	Lecture notes and exercises will be available on Teams.
Bibliografia facoltativa	Additional books and articles may be recommended by the instructor during the course.
Altre informazioni	
Obiettivi di Sviluppo Sostenibile (SDGs)	Istruzione di qualità