Syllabus

Kursbeschreibung

Titel der Lehrveranstaltung	Mobile robotics
Code der Lehrveranstaltung	47568
Zusätzlicher Titel der Lehrveranstaltung	
Wissenschaftlich-disziplinärer Bereich	ING-INF/04
Sprache	Englisch
Studiengang	Master in Industrie- und Maschineningenieurwesen
Andere Studiengänge (gem. Lehrveranstaltung)	
Dozenten/Dozentinnen	Prof. Karl Dietrich von Ellenrieder, Karl.vonEllenrieder@unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/37038
Wissensch. Mitarbeiter/Mitarbeiterin	
Semester	Zweites Semester
Studienjahr/e	1
KP	5
Vorlesungsstunden	28
Laboratoriumsstunden	18
Stunden für individuelles Studium	79
Vorgesehene Sprechzeiten	
Inhaltsangabe	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.
Themen der Lehrveranstaltung	The basic principles of mobile robotics are presented.
Stichwörter	Robotics, automatic control.
Empfohlene Voraussetzungen	None.
Propädeutische Lehrveranstaltungen	
Unterrichtsform	Classroom lectures and laboratory exercises.
Anwesenheitspflicht	Attendance at lectures and exercise sessions is strongly recommended.
Spezifische Bildungsziele und erwartete Lernergebnisse	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.
Spezifisches Bildungsziel und erwartete Lernergebnisse (zusätzliche Informationen)	
Art der Prüfung	- 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.
Bewertungskriterien	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.
Pflichtliteratur	Lecture notes and exercises will be available on Teams.
Weiterführende Literatur	Additional books and articles may be recommended by the instructor during the course.
Weitere Informationen	
Ziele für nachhaltige Entwicklung (SDGs)	Hochwertige Bildung