UNIVERSITÀ DI PAVIA

Anno Accademico 2019/2020

ROBOTICS

Enrollment year	2019/2020
Academic year	2019/2020
Regulations	DM270
Academic discipline	ING-INF/05 (DATA PROCESSING SYSTEMS)
Department	DEPARTMENT OF PHYSICS
Course	
Curriculum	Fisica delle tecnologie quantistiche
Year of study	1°
Period	1st semester (30/09/2019 - 17/01/2020)
ECTS	6
Lesson hours	50 lesson hours
Language	English
Activity type	WRITTEN AND ORAL TEST
Teacher	FACCHINETTI TULLIO (titolare) - 5 ECTS LI HOWARD - 1 ECTS
Prerequisites	Basic concepts of computer science and dynamical systems are required.
Learning outcomes	The course provides the know-how to design and engineering a robotic system. The study is concentrated on the systemic dimension of the design, i.e., on some of the main building blocks of a robot, their interconnection and control. This organization allows to provide the big picture of a robot system, while providing insights on some aspects that are considered of particular interest.
Course contents	The program includes the study of the characteristics of the most widely used sensors in robotic applications, including: linear and angular position sensors, pressure sensors, accelerometers, force sensors, thermal sensors, image sensors (cameras), and "time sensors". We will study some techniques for the use of sensors and their main application

	fields will be shown. Techniques and issues in real-time acquisition of sensory data will be explored. Moreover, the subject of Finite State Machines will be introduced as a useful tool for implementing robotic control and coordination algorithms. Finally, we will describe some basic techniques of robot navigation, which make use of different sensors among those presented.
Teaching methods	Lectures (hours/year in lecture theatre): 45 Practical class (hours/year in lecture theatre): 0 Practicals / Workshops (hours/year in lecture theatre): 0
Reccomended or required readings	The study material consists mostly of slides available on the course website. For further details of the various topics covered, you can consult the following texts: [1] John Brignell, Neil White. Intelligent Sensor System. Institute of Physics Publishing, Bristol and Philadelphia. [2] Paulo Verissimo, Luis Rodriguez. Distributed Systems for System Architects. Kluwer Academis Publishers. [3] Giorgio C. Buttazzo. Hard Real-time Computing System. Springer. [4] Howie Choset, Kevin M. Lynch, Seth Hutchinson, George Kantor, Wolfram Burgard, Lydia E. Kavraki, Sebastian Thrun. Principles of Robot Motion: Theory, Algorithms, and Implementations. The MIT Press.
Assessment methods	The exam is based on a single written test regarding the topics covered in the course. There are no tests during the course or oral tests. On the other hand, a practical test is required that involves the implementation of the control and coordination strategy of a simple mobile robot in a simulated environment. Specific information and details regarding the practice test will be given during the course. More information can be found at the page dedicated to the course on the homepage of Prof. Facchinetti.
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Sustainable development goals - Agenda 2030	$lbl_legenda_sviluppo_sostenibile