Course: Robotics

credits: 4

Course code	ELVH20AROB
Name	Robotics
Study year	2022-2023
ECTS credits	4
Language	English
Coordinator	F. Martins

Modes of delivery	Assignment Lecture Practical / Training
Assessments	Robotics - Assignment

Learning outcomes

1. Apply working principles and characteristics to choose the right type of sensor to measure presence / absence of objects, distance to objects and position of objects.
1. Name the basic principles and functionalities of the main sensors used in robotics applied for measuring variables such as position, orientation, distance, pressure, temperature, presence of obstacles, speed, acceleration.
1. Identify the main industrial robots used for manufacturing applications, advantages and disadvantages concerning to its kinematics, degrees of freedom and constrains.
1. Understand the basics of mobile robots kinematics, especially for a differential robot, and apply it to measure position and speed in a given application.
1. Name the main differences between deliberative and behavior-based architectures of robot control, and decide which one to apply in a given application.
1. Apply concepts of Control Systems to implement a PID Controller to control the orientation of a mobile robot to move it to a goal position.
1. Understand the concepts and implement a trajectory tracking controller to control a mobile robot to follow a specific trajectory in a flat plane.

Content

This is an introductory course on robotics, mainly focused on control of mobile robots. It deals with typical sensors for robots, focusing on the ones that can be used in the context of robot navigation and obstacle avoidance. The mathematical model of mobile robots is studied and used to develop moving controllers for the robots. Concepts of Control Systems are revisited to study the application of PID controllers. Different techniques to control mobile robots are discussed, like behavior-based robotics and finite state-machines. Finally, the course also introduces fundamental concepts of robot manipulators.

Included in programme(s)

Electrical Engineering Major Sensor Technology

School(s)

Institute of Engineering

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