SYLLABUS

Robotics 7.5 credits R7010E

Robotik

Course syllabus admitted: Autumn 2021 Sp 1 - Present

DECISION DATE
2021-02-17

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LULEÅ TEKNISKA UNIVERSITET

Robotics 7.5 credits R7010E

Robotik

Second cycle, R7010E

Education level	Grade scale	Subject	Subject group (SCB)
Second cycle	G U 3 4 5	Reglerteknik	Automation Technology

Main field of study

Engineering Physics and Electrical Engineering

Entry requirements

Knowledge in the subject of Automatic control, specifically regarding modeling, frequency response, state-space, state feedback, control design. Knowledge in programming with Matlab, LabView and basic electonics is a plus. These prerequisites corrsepond to the courses R7003E - Automatic Control, R7014E - Advanced control design and E7012E - Mechatronics.
Knowledge in English, equivalent to English 6.

Selection

The selection is based on 30-285 credits

Examiner

George Nikolakopoulos

Course Aim

The students after the course will be able to understand, design and program fundamental robotic functionalities in the general field of vision and control. After the course, the student should be able to:

- show knowledge of the modeling and controling approaches for mobile robots
- demonstrate the ability to design and implement path planning algorithms
- show knowledge on basic concept in manipulator kinematics and dynamics
- demonstrate the ability to use image processing techniques on feature extraction and visual servoing
- show deep knowledge with robotic platforms and their operation
- demonstrate the ability program multiple robotic platforms in the area of vision and control and to report on this work both orally and in writing.

Contents

The course contents are the following ones:

- Representing Position and Orientation
- Time and Motion for Robots
- Mobile Robots
- Navigation
- Localization
- Forward and inverse kinematics for robotic arms
- Image Processing
- Image Feature extraction
- Vision based control

Realization

Each course occasion´s language and form is stated and appear on the course page on Luleå University of Technology's website.
The teaching consists of lectures, homework and extended experimental labs and sub projects. Lab work and project assignments is performed in groups of no more than two - four students, while a demonstration and a high quality written report is needed.

Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided.

The examination will be based on the delivery and quality of the corresponding projects and labs. Labs are examined based on reports and demonstrations. The final project is examined based on a report including the methodologies used, the code development, the electrical and mechanical designs and the obtained results and a final demonstration.The final grade will be the mean value of all the received grades of the previous activities.

Literature. Valid from Autumn 2015 Sp 1

Robotics, Vision and Control, Peter Corke, Springer, 2013

Course offered by

Department of Computer Science, Electrical and Space Engineering

Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0003	Project	G U 3 4 5	4.5	Mandatory	A19	
0004	Laboratory work	G U 3 4 5	3	Mandatory	A19	

Study guidance

Study guidance for the course is to be found in our learning platform Canvas before the course starts. Students applying for single subject courses get more information in the Welcome letter. You will find the learning platform via My LTU.

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Last revised

by Jonny Johansson, HUL SRT 2021-02-17

Syllabus established

by Jonny Johansson, HUL SRT 2015-02-16