



RTU Course "Industrial robot control systems"

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General data

Code	DDI701
Course title	Industrial robot control systems
Course status in the programme	Compulsory/Courses of Limited Choice
Course level	Undergraduate Studies
Course type	Academic
Field of study	Computer Science
Responsible instructor	Zigurds Markovičs
Volume of the course: parts and credits points	1 part, 2.0 Credit Points, 3.0 ECTS credits
Language of instruction	LV
Annotation	In case of subject, basic knowledge about robotics sphere are given. At the beginning of course student receives information about different robot control mechanisms (technical realization, manipulator kinematics, direct and inverted kinematic task) and principles (discrete, adaptive and intellectual control). In further, technical implementation and adaptive control mechanism principles are discussed. At the end of the course students are informed about existing adaptive robotic system.
Goals and objectives of the course in terms of competences and skills	The main aim is to introduce student with different robot control systems. Competence of student is described as self ability to detect and describe existing robot control system, give a control algorithm and structure scheme, and possibility to collect all knowledge to construct own robotic system.
Structure and tasks of independent studies	Additional literature acquisition and individual solution of kinematical task.
Recommended literature	Matricu teorijas pielietojumi robottehnikā. RPI, Rīga, 1988. Robottehniskās sistēmas un tehnoloģiskie kompleksi. Laboratorijas darbu apraksti. RPI, Rīga, 1987. Adaptive Control of Robot Manipulators, An-Chyan Huang and Ming-Chih Chien. ISBN: 978-981-4307-41-3, 226. lpp, 2010.
Course prerequisites	

Course outline

Theme	Hours
1. History of robotics, structure schemes, industrial robot structure and elements, robot generations and comparison;	1
2. Industrial robot (IR) discrete cyclic control;	1
3. IR discrete positional control;	1
4. IR contour control;	1
5. Kinematics of manipulator;	1
6. Manipulator coordinate system;	1
7. Detection of original position;	1
8. Manipulator movement, direct task;	1
9. Inverted kinematical task (simplified);	1
10. Inverted kinematical task (full version);	1
11. Classification of external sensors, position sensors, pressure and power transducer;	1
12. Direction, anti glide and location transducers;	1
13. Adaptive IR principles, adaptation for separate position;	1
14. External adaptation for whole manipulator;	1
15. Adaptive assembling robot technical complex for non oriented object seizing;	1
16. Welding robot adaptive control	1

Learning outcomes and assessment

Learning outcomes	Assessment methods
Student has a basic knowledge about robot control principles and define control system types and usage	Appropriate theoretical knowledge in exam. Positive evaluation in additional literature review.
Can choose industrial robot control algorithm and structure elements;	Appropriate theoretical knowledge in exam. Positive evaluation in additional literature review.
Have ability to create robot control platform	Appropriate theoretical knowledge in exam. Positive evaluation in additional literature review.

<p>Student has knowledge in different robot control systems and can define control system types and usage . Have ability to create overall industrial robot system by including work instruments, work objects, frame of reference and movement structure.</p>	<p>Appropriate theoretical knowledge in exam. Positive evaluation in additional literature review.</p>
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Study subject structure

Part	CP	Hours per Week			Tests		
		Lectures	Practical	Lab.	Test	Exam	Work
1.	2.0	2.0	0.0	0.0		*	