RĪGAS TEHNISKĀ
UNIVERSITĀTE

RTU Course "Basics of autonomous and mobile robotic systems"

33000 Faculty of Computer Science, Information Technology and Energy

General data

Code	DSP711
Course title	Basics of autonomous and mobile robotic systems
Course status in the programme	Compulsory/Courses of Limited Choice
Responsible instructor	Agris Ņikitenko
Volume of the course: parts and credits points	1 part, 3.0 credits
Language of instruction	LV
Annotation	The study course provides basic knowledge about autonomous robotic systems. The study course consists of lectures and three practical homework that enable to apply the most essential methods for mobile robot control.
Goals and objectives of the course in terms of competences and skills	The aim of the study course is to provide theoretical knowledge about autonomous and mobile equipped systems, as well as to develop student's ability to practically use the basic robotics required for the control of mobile robotic platforms. The tasks of the study course are: - To provide knowledge about autonomous systems and autonomy in general; - To provide knowledge and skills in mathematical modelling of robotic systems; - To provide knowledge and skills in modelling and use of robot sensor systems - To provide knowledge and skills on the use of robotic motion planning methods.
Structure and tasks of independent studies	The study course includes three homework on: - Kinematic models of mobile robotic systems; - Selflocalization; - Motion planning and navigation.
Recommended literature	Obligātā/Obligatory: 1) R.Siegwart, R. Naurbaghsh Introduction to autonomous mobile robots, MIT Press, 2004. 2) S.Russell, P.Norvig Artificial intelligence: a modern approach 4th edition, Pearson Education Inc., 2021.
Course prerequisites	Mathematics, Physics.

Course contents

Content	Full- and part-time intramural studies		Part time extramural studies	
	Contact Hours	Indep. work	Contact Hours	Indep. work
Introduction, terms of autonomous and mobile robotic systems.	4	0	0	0
Classification of autonomous and mobile robotic systems.	4	0	0	0
Kinematic models of mobile robotic platform and their constraints.	12	2	0	0
Maneuverability of mobile robots and their workspace.	8	2	0	0
Perception and its processing in autonomous systems.	12	4	0	0
Selflocalization and mapping.	12	4	0	0
Motion planning and navigation.	12	4	0	0
Total:	64	16	0	0

Learning outcomes and assessment

Learning outcomes	Assessment methods
Is able to distinguish autonomous and mobile systems.	Practical work.
Is able to describe the basic kinematic models of mobile platforms and their constraints. Can apply them for practical use.	Practical homework.
Is able to describe basic methods for perception processing in mobile robotic platforms.	Practical work.
Is able to describe and apply basic methods of selflocalization.	Practical homework.
Is able to describe and apply basic methods of motion planning.	Practical homework.

Evaluation criteria of study results

Criterion	%
Practical work on kinematics	30
Practical work on self-localization	30
Practical work on mapping	40
Total:	100

Study subject structure

Part	CP	Hours			Tests		
		Lectures	Practical	Lab.	Test	Exam	Work
1.	3.0	1.0	1.0	0.0	*		

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		Lectures	Practical	Lab.	Test	Exam	Work
1.	3.0	1.0	1.0	0.0	*		