GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Robotics and haptics systems, PG_00064803						
Field of study	Mechatronics						
Date of commencement of studies	February 2027		Academic year of realisation of subject	2027/2028			
Education level	second-cycle studies		Subject group	Obligatory subject group in the field of study Subject group related to scientific research in the field of study			
Mode of study	Full-time studies		Mode of delivery	at the university			
Year of study	2		Language of instruction	Polish			
Semester of study	3		ECTS credits	2.0			
Learning profile	general academic profile		Assessment form	exam			
Conducting unit	Institute of Mechanics and Machine Design -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Michał Mazur				
	Teachers						

Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	30
	E-learning hours included: 0.0						

Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
	Number of study hours	30	4.0	16.0	50

Subject objectives	The aim of the subject is to familiarize students with the construction, application and principle of operationof haptic systems used in robotics.

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<tr><td>Learning outcomes</td><td>
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<tr><th>Course outcome</th><th>Subject outcome</th><th>Method of verification</th></tr>
<tr><td>[K7_W04] demonstrates knowledge encompassing selected issues in the field of detailed knowledge, particularly in the scope of methods, techniques, tools, and algorithms specific to Mechatronics</td><td>Demonstrates knowledge of issues related to the application of haptic systems in robotics.</td><td>[SW3] Assessment of knowledge contained in written work and projects
[SW2] Assessment of knowledge contained in presentation
[SW1] Assessment of factual knowledge</td></tr>
<tr><td>[K7_K12] is ready for fullfiling social commitement and initation of actions for public interest including entrepreneurial thinking and acting</td><td>He is ready to present haptics and robotics solutions for the public interest.</td><td>[SK5] Assessment of ability to solve problems that arise in practice
[SK4] Assessment of communication skills, including language correctness
[SK3] Assessment of ability to organize work
[SK2] Assessment of progress of work
[SK1] Assessment of group work skills</td></tr>
<tr><td>[K7_U12] dvelops her/his own potential and independently plans own, lifelong learning, while also being able to guide others in this regard</td><td>Develops his/her potential and independently plans his/her own learning in the field of robotics.</td><td>[SU3] Assessment of ability to use knowledge gained from the subject
[SU2] Assessment of ability to analyse information
[SU1] Assessment of task fulfilment</td></tr>
<tr><td>[K7_U14] integrates information obtained from literature and other properly selected sources, including those in a foreign language, creatively interpreting and critically evaluating them, and drawing conclusions</td><td>Uses information obtained from literature and other appropriately selected sources, also in a foreign language, when carrying out tasks in the field of haptics and robotics.</td><td>[SU5] Assessment of ability to present the results of task
[SU4] Assessment of ability to use methods and tools</td></tr>
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<tr><td>Subject contents</td><td>Course content – lecture
1. Basic knowledge about haptics and robotics2. Designing hapting systems3. Software4. Review of existing solutions</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Knowledge in the field of mechatronic design, automation and robotics, programming and vibration analysis.</td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Written exam</td><td>50.0%</td><td>60.0%</td></tr>
<tr><td>Report</td><td>50.0%</td><td>40.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>Janschek, Klaus. Mechatronic systems design: methods, models,concepts. Springer Science & Business Media, 2011.Hatzfeld, Christian, and Thorsten A. Kern. Engineering haptic devices.Springer London Limited, 2016.</td></tr>
<tr><td>Supplementary literature</td><td>Kaltenbacher, Manfred. Numerical simulation of mechatronic sensorsand actuators. Vol. 2. Berlin: Springer, 2007.Eric Vezzoli, Chris Ullrich, Gijs den Butter, Rafal Pijewski. XR Haptics,Implementation & Design Guidelines. 2022</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>1. What is a haptic?2. What are the differences between the sense of touch and the sense of sight? 3.Discuss the differences between kinesthetic and tactile sensors.4. What is the difference between hapticdevices whose construction is based on impedance and those based on admittance?5. List the applicationsof haptic systems.6. What frequency ranges can be used in haptic systems?7. Types of drives used in hapticsystems.8. How is sliding control implemented?9. What is image segmentation.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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