GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Designing mobile robots, PG_00064571						
Field of study	Hydrogen Technologies and Electromobility						
Date of commencement of studies	October 2023		Academic year of realisation of subject	2025/2026			
Education level	first-cycle studies		Subject group				
Mode of study	Full-time studies		Mode of delivery	at the university			
Year of study	3		Language of instruction	Polish			
Semester of study	5		ECTS credits	3.0			
Learning profile	general academic profile		Assessment form	assessment			
Conducting unit	Department of Control Engineering -> Faculty of Electrical and Control Engineering -> Wydziały Politechniki Gdańskiej						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Paweł Kowalski				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	10.0	0.0	0.0	20.0	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		0.0	0.0	30	
Subject objectives	The aim of the course is to provide knowledge and skills in the independent design, construction, and programming of mobile robots. This includes learning tools and techniques for 3D design in FreeCAD, optimizing 3D models for printing, designing the mechanics and control electronics of robots, and programming microcontrollers responsible for their operation. This enables the realization of complete mobile robot projects from concept to finished device.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U08] can design and build systems and devices related to automation systems, mechatronics and robotics in energy storage devices and in hydrogen installations	Designs and builds mobile robots.	[SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task [SU1] Assessment of task fulfilment
[K6_W13] knows the properties of materials used in the field of hydrogen energy and electromobility	Selects appropriate materials for creating mechanical and electronic components of robots.	[SW3] Assessment of knowledge contained in written work and projects
[K6_K01] is aware of the need for continuous education and self-improvement in the field of the profession of an electrician and knows the possibilities of further education	Finds information in the literature useful for designing and building a mobile robot.	[SK5] Assessment of ability to solve problems that arise in practice [SK3] Assessment of ability to organize work [SK2] Assessment of progress of work [SK1] Assessment of group work skills
[K6_U05] can use analytical and simulation methods, prepare and for the formulation and solution of tasks in the field of hydrogen technologies, automation and robotics, electrical engineering, use various techniques to carry out engineering tasks related to electrical devices, hydrogen installations, control and robotics systems	Prepares and formulates engineering solutions for the design and propulsion of mobile robots, utilizing technologies from the fields of automation, robotics, and electrical engineering.	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task
[K6_W07] knows the basics of computer programming, digital circuits, microprocessor technology, design of simple algorithms, principles of operation of computer networks	Designs the electronics of a mobile robot and programs the microcontroller that controls the mobile robot.	[SW3] Assessment of knowledge contained in written work and projects

Subject contents

Lecture:

- Introduction to FreeCAD.
- 3D design techniques for 3D printing.
- Designing the mechanics of a mobile robot.
- Preparing 3D models for 3D printing.
- Designing control electronics for robots.
- Introduction to microcontroller programming for controlling mobile robots.

Project:

- Designing a mobile robot.
- Building a mobile robot.

Prerequisites and co-requisites

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Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
lecture assignments	50.0%	40.0%
project	50.0%	60.0%

Recommended reading

Basic literature	freeCAD documentation, https://wiki.freecad.org/Main_Page
Supplementary literature	Ultimaker 3D Printing Academy, https://support.makerbot.com/s/topic/0TO5b000000Q4usGAC/ultimaker-3d-printing-academy
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed

Development of a mobile robot using 3D printing technology.

Work placement

Not applicable

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