



Subject card

Subject name and code	Design of unmanned vehicles, PG_00070912						
Field of study	Informatics						
Date of commencement of studies	February 2025	Academic year of realisation of subject				2025/2026	
Education level	second-cycle studies	Subject group					
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				3.0	
Learning profile	general academic profile	Assessment form				assessment	
Conducting unit	Faculty of Electronics Telecommunications and Informatics -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Łukasz Kulas				
	Teachers		dr hab. inż. Łukasz Kulas				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	0.0	45.0	0.0	45
	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	45	3.0		27.0		75
Subject objectives	The project covering the entire semester gives the student the opportunity to build and run his own unmanned platform (the so-called drone). It can be an offshore or land system. The expected effect of the project is a working prototype that performs the planned missions in the operational environment (TRL 7).						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[K7_U03] can design, according to required specifications, and make a complex device, facility, system or carry out a process, specific to the field of study, using suitable methods, techniques, tools and materials, following engineering standards and norms, applying technologies specific to the field of study and experience gained in the professional engineering environment		can use his knowledge of programming methods and techniques, and select and apply appropriate programming methods and tools in creating a computer software or programming devices or controllers using microprocessors or programmable components or systems used to control unmanned systems			[SU4] Assessment of ability to use methods and tools	
	[K7_U09] can carry out a critical analysis of the functioning of existing technical solutions and assess these solutions, as well as apply experience related to the maintenance of advanced technical systems, devices and facilities typical for the field of studies, gained in the professional engineering environment		can design a typical unmanned system according to the specification, based on popular platforms (e.g. RaspberryPi) using chosen elements or sensors			[SU1] Assessment of task fulfilment	

Subject contents	Course content – project Course Content - Project 1. Assembly of a driving platform with basic functionality (connecting motors, controllers, and encoders). 2. Implementation of a model that converts simple linear and angular velocity commands of the robot into individual wheel speeds. 3. Determining position relative to the starting point (Odometry or fusion of odometry and IMU data (potentially using an extended Kalman filter)). 4. Installation of sensors enabling obstacle detection. 5. Potentially using SLAM to determine the "global" position in a known environment and fusion with other information about the robot's position - odometry, IMU, GPS, etc. (this step can be integrated with determining relative position). 6. Implementation of robot path planning (based on a map or a simple version, e.g., the direction of a given point). 7. Implementation of an algorithm that allows for the execution of a given path, taking into account the avoidance of obstacles encountered along the way, based on position feedback. The result is understandable commands.								
Prerequisites and co-requisites									
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="453 512 790 539">Subject passing criteria</th> <th data-bbox="799 512 1139 539">Passing threshold</th> <th data-bbox="1149 512 1493 539">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="453 546 790 571">completed mobile platform</td> <td data-bbox="799 546 1139 571">50.0%</td> <td data-bbox="1149 546 1493 571">100.0%</td> </tr> </tbody> </table>	Subject passing criteria	Passing threshold	Percentage of the final grade	completed mobile platform	50.0%	100.0%		
Subject passing criteria	Passing threshold	Percentage of the final grade							
completed mobile platform	50.0%	100.0%							
Recommended reading	Basic literature	technical documentation of platform components provided by manufacturers							
	Supplementary literature	technical and legal standards, norms, recommendations							
	eResources addresses								
Example issues/ example questions/ tasks being completed	The process of designing, implementing, running and testing semi-autonomous platforms								
Practical activities within the subject	Not applicable								

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