



## Subject card

Subject name and code	Sensors in Robots, PG_00038127						
Field of study	Automation, Robotics and Control Systems						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2023/2024		
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	6	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Department of Metrology and Information Systems -> Faculty of Electrical and Control Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Dariusz Świsulski					
	Teachers	dr hab. inż. Dariusz Świsulski					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	0.0	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	7.0		48.0		100
Subject objectives	The aim of the course is to introduce students to the subject of robot sensors.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_W10] has basic knowledge related to mechatronics and robotics systems	The student describes the structure and principle of operation of sensors used in robotics.			[SW1] Assessment of factual knowledge		
	[K6_U08] can design and build systems and devices in the field related to mechatronics and robotics systems	The student is able to plan and carry out experiments and measurements in the field of robot sensors.			[SU4] Assessment of ability to use methods and tools		
Subject contents	LECTURE Introduction to sensory systems. Classification of sensors. Static and dynamic properties of sensors. Measurement of position and movement (measuring potentiometers, selsyns, inductosyns, inductance sensors, incremental position encoders, linear encoders, absolute position encoders, magnetostrictive linear position transducers). Velocity sensors (DC and AC rate generator, digital methods). Touch sensors (touch switches, strength and strain transducers, resistive strain gauge transducers, magnetoelectric transducers, "artificial skin"). Proximity sensors (ultrasonic sensors, photoelectric sensors, inductive sensors, magnetic sensors, capacitive sensors). Vision systems (checking for presence, detecting location, check labeling, verify position, barcode readers). Sensors of Mindstorms NXT robot. LABORATORY Inductive sensors. Capacitive sensors. Optoelectronic sensors. Ultrasonic sensors. Magnetic sensors and touch switches. Angular position sensors. Vision sensors.						
Prerequisites and co-requisites	Basic metrology knowledge.						
Assessment methods and criteria	Subject passing criteria	Passing threshold			Percentage of the final grade		
	Assessment of laboratory exercises and home written reports	60.0%			30.0%		
	Lecture - midterm colloquium and oral exam	60.0%			70.0%		
Recommended reading	Basic literature	Świsulski D., Rafiński L.: Sensoryka robotów. Laboratorium. Wydawnictwo Politechniki Gdańskiej, Gdańsk 2007 Honczarenko J.: Roboty przemysłowe. Budowa i zastosowanie. WNT Warszawa 2004					

	Supplementary literature	Zakrzewski J.: Czujniki i przetworniki pomiarowe. Wydawnictwo Politechniki Śląskiej. Gliwice 2004  Mukhopadhyay S.C., Huang R.Y.M.: Sensors. Springer 2008
	eResources addresses	Adresy na platformie eNauczenie: SENSORYKA ROBOTÓW [2023/24] - Moodle ID: 36025 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36025">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36025</a>
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> <li>1. Static and dynamic properties of sensors.</li> <li>2. Structure and working principle of distance sensors.</li> <li>3. Structure and working principle of photoelectric sensors.</li> <li>4. Structure and working principle of encoders.</li> <li>5. Structure and working principle of proximity sensors.</li> </ol>	
Work placement	Not applicable	