GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Dedicated Machine Vision, PG_00068085		
Field of study	Automatic Control, Cybernetics and Robotics		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2027/2028
Education level	first-cycle studies	Subject group	Optional subject group 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	3	Language of instruction	Polish
Semester of study	6	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Decision Systems and Robotics -> Faculty of Electronics Telecommunications and Informatics -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Tomasz Talaśka	
	Teachers	dr hab. inż. Tomasz Talaśka	

Lesson types and methods of instruction

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	2.0	18.0	50

Subject objectives

The aim of the course is to familiarize students with the principles of operation and practical application of vision systems in industrial automation and to present methods of integrating vision systems with production lines and robots, enabling their use for quality inspection, positioning, color analysis, texture analysis and precise measurements in real time.
In addition, the aim is to familiarize students with Cognex and Keyence tools and software, learning how to configure, program and select appropriate vision system components. Particular emphasis is placed on practical aspects of creating and implementing image analysis algorithms and integrating them with industrial automation devices such as PLC, HMI or robots.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U12] can analyze the operation of components, circuits and systems related to the field of study, as well as measure their parameters and examine technical specifications, and plan and conduct experiments related to the field of study, including computer simulations and measurements, and interpret obtained results and draw conclusions	Is able to analyze the operation of industrial vision systems and their components in the context of their use in industrial automation and robotics. Is able to select and configure vision system components for specific applications.	[SU1] Assessment of task fulfilment
[K6_W03] knows and understands, to an advanced extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum	Has knowledge of the structure and operation of industrial vision systems. Understands the principles of integrating vision systems with production lines and automation systems such as PLCs, HMI panels, and industrial robots.	[SW1] Assessment of factual knowledge

<table>
<tr><td>Subject contents</td><td>Vision systems in industrial automation; Integration of vision systems with production lines; Applications in industrial robotics: positioning and orientation of elements; Real-time process monitoring and analysis; Detection of defects, surface defects, deformations and contamination; Dimensional inspection: precise measurements of elements in motion; Color and texture analysis to assess product quality; Overview of Cognex vision systems: VisionPro, In-Sight tools; Cognex analytical tools: pattern localization (PatMax), code reading (DataMan); Programming and configuration of Cognex systems: user interfaces and APIs; Keyence vision systems portfolio: KV Studio software, CV-X cameras; Keyence algorithms: edge analysis, object detection, 3D measurements. Component selection: selection of cameras, lenses, lighting and controllers; Creation of dedicated image analysis algorithms; Integration of vision systems with other automation devices (PLC, HMI, robots).</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></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>Lab Grade</td><td>50.0%</td><td>50.0%</td></tr>
<tr><td>Lecture Test</td><td>50.0%</td><td>50.0%</td></tr>
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<tr><td>Recommended reading</td><td>
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<tr><td>Basic literature</td><td>1. Dominik Sankowski, Wolodymyr Mosorov, Krzysztof Strzecha, Przetwarzanie i analiza obrazów w systemach przemysłowych. Wybrane zastosowania, PWN</td></tr>
<tr><td>Supplementary literature</td><td>CV-X Series Vision System User Manual / KV Studio Guide
https://www.keyence.com</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></td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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