POZNAN UNIVERSITY OF TECHNOLOGY

COURSE DESCRIPTION CARD - SYLLABUS

Course name
Vision systems in production processes [S1ZiIP2>SWwPP]

Course

Field of study	Year/Semester
Management and Production Engineering	3/5
Area of study (specialization)	Profile of study
–	general academic
Level of study	Course offered in
first-cycle	Polish
Form of study	Requirements
full-time	compulsory

Number of hours

Lecture	Laboratory classes	Other
15	30	0
Tutorials	Projects/seminars	
0	0	

Number of credit points

3,00

Coordinators	Lecturers

Prerequisites

The student should have basic knowledge in the field of automation, optics, robotics, elements of automation, drivers and programming. He should also have the ability to obtain information from the indicated sources and be ready to cooperate as part of the team.

Course objective

The student's acquisition of design and configuration skills. software and implementation of selected elements of machine vision systems. Developing students' skills of practical implementation of machine vision solutions into practice.

Course-related learning outcomes

Knowledge:
1. Knowledge of the principles of operation of machine vision systems.
2. Knowledge of how to develop and design the connectivity of the device with supervisory systems, eg PLC or PC.
3. Knowledge of how to set the optics on the camera.
4. Knowledge of what elements of the system to choose for a given task.
5. Knowledge of the basics of optics.

Skills:
1. Is able to design and program a vision system
2. Can select elements, including the controller, and design simple vision systems
3. Can select the elements of the vision system to work on the production line
4. Is able to program the exchange of camera data with the supervisory system
5. Can use the vision system in practice

Social competences:
1. Understands the need for lifelong learning; can inspire and organize the learning process of others
2. Can define priorities for the implementation of a specific task
3. Can interact and work in a group
4. Can think and act in an entrepreneurial manner
5. Is aware of the responsibility for his own work and readiness to submit to the principles of teamwork and responsibility for jointly performed tasks

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Laboratory: Credit based on the correct implementation of exercises and reports on each of them laboratory exercises according to the instructions of the laboratory teacher. Before the exercise short entry checks.
Credit for the lecture on the basis of a written test
Assignment of grades to percentage ranges of results: <90-100> very good; <80-90) good plus; <70-80) good; <60-70) satisfactory plus; <50-60) satisfactory; <0-50) unsatisfactory.

Programme content

1. History of vision systems
2. Examples of vision systems
3. Construction of vision systems
4. OpenCV library
5. OCR - text recognition in vision systems
6. Detection of shapes in vision systems
7 Calibration, calculations, filters in vision systems

Course topics

1. OpenCV - the basics of using the library
2. Detection of lines and shapes
3. Face detection
4. OCR and Aruco library
5. Filtration in vision systems
6. Pattern recognition
7. Measurements of sizes and calculation of dimensions

Teaching methods

Lecture: multimedia presentation and software application demonstration
Laboratory: Exercises performed by students in groups under the supervision of the teacher.

Bibliography

Basic:
1. Jähne B., Digital Image Processing, Springer, 2005, 6th revised and extended edition
2. Siciliano B., Khatib O., Springer Handbook of Robotics, Springer, 2008, 1st Edition

Additional:
1. Sankowski D., Morosov W., Strzecha K., Przetwarzanie i analiza obrazów w systemach przemysłowych, PWN, Warszawa, 2011

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00