COURSE DESCRIPTION CARD - SYLLABUS

Course name
Computer vision [S2Inf1-PB>WKOM]

Course

Field of study
Computing

Year/Semester
1/1

Area of study (specialization)
Edge Computing

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
30

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

5,00

Coordinators

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Lecturers

Prerequisites

A student starting this course should have a basic knowledge of computer graphics. Should be able to use selected image processing programs. Should have the ability to obtain information from the indicated sources (including English-speaking - at the basic level of language knowledge). They should also understand the need to expand their competences / be ready to cooperate within the team. In addition, in the field of social competences, the student must present attitudes such as honesty, responsibility, perseverance, cognitive curiosity, creativity, personal culture, respect for other people.

Course objective

1. Provide students with knowledge about innovative forms of data processing that lead to their proper interpretation 2. Developing students" skills in practical use of advanced image processing methods for the purposes of edge processing. 3. Shaping students" skills to use scarce hardware resources of edge devices.

Course-related learning outcomes

Knowledge:
1. has advanced detailed knowledge of selected issues in the field of computer science (advanced image

processing) (k2st_w3)
2. knows advanced methods, techniques and tools used in solving complex engineering tasks and conducting research in a selected area of computer science (k2st_w6)

Skills:
1.can - when formulating and solving engineering tasks - integrate knowledge from various areas of computer science (and, if necessary, also knowledge from other scientific disciplines) and apply a systemic approach, also taking into account non-technical aspects (k2st_u5)
2.can - in accordance with a given specification, taking into account non-technical aspects - design a complex device, it system or process and implement this project - at least in part - using appropriate methods, techniques and tools, including adapting existing or developing new tools for this purpose (k2st_u11)

Social competences:
understands the importance of popularizing the latest achievements in the field of computer science (k2st_k3)

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Formative assessment:
a) in the field of lectures:
- based on the prepared presentation as part of the lecture,,
b) in the field of laboratories:
- based on the assessment of the implementation of individual tasks,
Summative assessment:
a) in the field of lectures, verification of the assumed learning outcomes is carried out by:
- assessment of the knowledge and skills demonstrated on the exam conducted in the selected remote learning service, the exam test consists of several dozen closed test questions.To pass the test, it is necessary to obtain at least half of the possible number of points,
- discussion of the test results,
b) in the field of laboratories, verification of the assumed learning outcomes is carried out by:
- assessment of knowledge and skills based on the performed laboratory tasks,
Obtaining additional points for activity during classes, especially for:
- proposing your own examples of practical applications of the acquired methods,
- the effectiveness of applying the acquired knowledge while solving a given problem,
- remarks related to the improvement of teaching materials,
- assistance in understanding the presented didactic material to other students.

Programme content

The lecture program covers the following topics:
Physical basics of vision. Methods of representing images - vector, raster. Ways of color representation. Ways of acquiring images. Types and properties of image acquisition equipment.
Image processing algorithms - simple methods of single-point processing, convolution methods, image arithmetic, use of the Fourier transform for image processing in the frequency domain.
Stereoscopic images. Canonical camera layout. The concept of disparity. Depth estimation methods from disparity. Traffic analysis. Optical flow. Methods of estimation and prediction of traffic.
Selected image segmentation algorithms. Image segmentation by edge detection, area growth and division, catchment area, thresholding.
Aspects of computational and memory complexity of image processing algorithms. Algorithm classification.
Laboratory classes are conducted in the form of fifteen 2-hour exercises, held in the laboratory. During classes, students use ready-made or implement their own image processing algorithms presented at the lecture. Exercises are carried out by students individually or in pairs. Reports on the relation of tasks (according to the template provided) are submitted through the selected distance learning system.

Course topics

none

Teaching methods

1. Lecture: multimedia presentation, demonstration of the use of available tools.
2. Laboratory exercises: practical use of available tools, including the selected programming environment.

Bibliography

Basic
1. R. Krishna, Computer Vision, Stanford Univeristy (available online)
2. W.Mokrzycki, Wprowadzenie do przetwarzania informacji wizualnej. Tom 1, Exit, 2021
Additional
1. Przetwarzanie obrazów grafiki 2D (eBook), collective study, PWN, 2015

Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,00
Classes requiring direct contact with the teacher	60	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	65	2,50