SYLLABUS

Name: ***Visual Data (MakAu-DS>SM2VD19)***
Name in Polish:
Name in English: ***Visual Data***

Information on course:

Course offered by department: Faculty of Automatic Control, Electronics and Computer Science
Course for department: Silesian University of Technology

Default type of course examination report:

ZAL

Language:

English

Course homepage:

https://platforma.polsl.pl/rau2/course/view.php?id=769

Short description:

The aim of the course is making the student familiar with methods, algorithms and tools for visual data analysis, These data may come from various imaging sources, such as visible light cameras, X-rays, USG or magnetic resonance.

The detailed objectives of the course are: to acquire knowledge of hardware and software tools used in graphics and imaging. To develop understanding of the possibilities offered by computer vision in
various practical applications. To obtain skills in the use of computer graphics, image processing and image analysis for the purposes of automatic perception.

Description:

ECTS: 3
Total workload: 90 hours (60 contact hours, 30 students' own work hours)
Forms of contact hours:
Lecture 30h
Laboratory 15h
Projects 15h

Lectures:
Topics cover an area of the visual information processing:
1. Digital image representations
2. Quantization methods
3. Filtering
4. Color models – color vision in human
5. Color models in computer systems
6. Morphology and segmentation
7. Multiresolution representation and image processing
8. Edges and features detection (basics of SIFT)
9. Visual features for application in AI
10. Models of human visual perception

Laboratory topics:
Topics cover selected areas of the image processing related to the computer graphics
1. Discretization of images
2. Color spaces
3. Morphology
4. Filtering
5. PCA analysis
6. SIFT feature detectors
7. Human visual system models

Bibliography:

1. R.C.Gonzalez, R.E.Woods: Digital Image Processing
2, A.V. Oppenheim, R.W. Schafer: Digital Signal Processing
3. R.Szeliski Computer Vision: Algorithms and Applications 2nd Edition. https://szeliski.org/Book/

Learning outcomes:

Wiedza: Zna i rozumie / Knowledge
1 Student acquires extended knowledge on image acquisition, digital representation, and processing (K2A_W02, K2A_W11)
2 Student acquires extended knowledge on human visual information processing (K2A_W02, K2A_W13)

Umiejętności: Potrafi / Skills
3 Student learns to understand and use the principal techniques comprising the chain of processing from raw raster image to description of planar forms and their change over time (K2A_U11)
4 Student acquires knowledge and advanced skills in image processing and understanding (K2A_U11)
5 Student acquires knowledge and skills in reading reference literature and technical documentation (K2A_K02)
6 Students acquires skills to design methods and algorithms addressing problems in Visual Data analysis and Computer Vision (K2A_U11)

Assessment methods and assessment criteria:

- Laboratory results evaluation (binary pass/fail) - all must be PASSED
- Project report (full scale)

The syllabus is valid from academic year 2025/2026 and its content cannot be changed during the semester

Course credits in various terms:

<without a specific program>			
Type of credits	Number	First term	Last term
European Credit Transfer System (ECTS)	3	2020/2021-Z	