

Name of the course: 3D Sensing and Sensor Fusion	Total credits: 2+2+1=5
IPM-18AUTSSFEG	
Type: Obligatory	
A tantárgy elméleti vagy gyakorlati jellegének mértéke, „képzési karaktere”: 40/60 (kredit%)	
Total hours of per semester: lecture: 26 practice: 26 consultation: 13 Other: project	
Type of testing: exam Other: project	
Semester: 3rd	
Description	
Operation principles of 3D sensors. Active and passive 3D sensing for autonomous vehicles. Cameras, video cameras, depth cameras, LiDAR sensors, radars, sonars. Comparison of sensors, application areas, advantages and limitations. Sensor fusion on data and feature level and in state space. Camera LiDAR and camera-depth camera fusion. Sensor fusion and semantic segmentation.	
Literature	
Compulsory J. Janai et al, Computer Vision for Autonomous Vehicles: Problems, Datasets and State-of-the-Art, arXiv preprint arXiv:1704.05519, 2017. - Eichhardt, D. Chetverikov, Z. Jankó, Image-guided ToF depth upsampling: a survey Machine Vision and Applications, vol. 28, pp. 267-282, 2017. - Grzegorzek, M., Theobalt, C., Koch, R., Kolb, A. (eds.) Time-of-Flight and Depth Imaging. Sensors, Algorithms, and Applications, Lecture Notes in Computer Science, vol. 8200, Springer, 2013. ISBN: 978-3-642-44963-5 (Print), 978-3-642-44964-2 (Online).	
Recommended H. Fourati, Ed. Multisensor Data Fusion: From Algorithms and Architectural Design to Applications, CRC Press, 2015, ISBN: 9781482263749. M. Liggins II, D. Hall, J. Llinas, Handbook of Multisensor Data Fusion: Theory and Practice, CRC Press, 2008. ISBN: 9781420053081.	
Competencies	
Knowledge - Comprehensive and up-to-date knowledge of software technology, including the design, implementation, operation and maintenance of software. - Comprehensive and up-to-date knowledge of sensors, tools and methods for machine perception, including 3D vision, image and video analysis, and sensor fusion. - Comprehensive and up-to-date knowledge of tools and methods for image and video processing. - Detailed, expert-level knowledge of the technical terms and expressions of computer science	

in English.

Competencies

- Expertise in the application of the concepts and methods of software technology in modeling of complex software and architecture design. Ability to develop applications with real-time requirements.
- Ability to formalize complex technical problems, to analyze theoretical and practical background, and to provide adequate solutions.
- Expertise in design, development, operation and management tasks in the domain of complex software systems and database management systems.
- Skills for cooperation and team work, and ability to take leading role.
- Skills for written and oral communication in English, using the technical terms and expressions of computer science. Ability to argue, to prepare reports, to read, understand and exploit scientific and technical material (e.g. books and papers).
- Expertise in utilizing sources of technical information, their critical interpretation and evaluation, and the extraction of information relevant to the solution of a specific problem.
- Ability to perform supervised scientific research, and skills required for post-graduate studies.

Attitude

- Follows professional, technological developments related to his/her qualification.
- Committed to critical feedback and self-assessment.
- Committed to lifelong learning and receptivity to new IT competencies.
- Adopts and coordinates the ethical principles of work, organizational culture and research.
- Shares professional knowledge, mediates professional results.
- Adopts environmentally conscious behavior and social responsibility, helping them with IT tools.
- Committed to quality standards and its IT tools.
- Open to initiate collaboration with IT and other specialists. szakembereivel.

Autonomy and responsibility

- Takes responsibility for his professional decisions taken during his professional activities.
- Takes responsibility for observing and enforcing deadlines.
- Takes responsibility for own and fellow workers' work.
- In the case of operational critical IT systems, he/she can be assigned responsibility for development and operation, according to his/her professional competencies.