



POLISH NATIONAL AGENCY
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PROGRAMME

<p>name of the unit:</p> <p>DIVISION OF COMPUTER GRAPHICS AND VISION Institute of Information Technology, Lodz University of Technology</p>		<p>symbol:</p> <p>I-72 http://www.it.p.lodz.pl</p>
<p>head of the unit:</p> <p>Adam Wojciechowski, PhD, DSc, TUL Prof.</p>	<p>potential promoters:</p> <p>Adam Wojciechowski, PhD, DSc, TUL Prof. Piotr Napieralski, PhD, DSc, TUL Prof.</p>	<p>contact person:</p> <p>Adam Wojciechowski, PhD, DSc, TUL Prof. tel.: 42-631-27-96 adam.wojciechowski@p.lodz.pl</p>
<p>scope of activities:</p> <p>Major areas of research include contemporary challenges in computer graphics and computer vision:</p> <ul style="list-style-type: none"> • photorealistic rendering and digital image synthesis, • polygonal mesh processing and analysis, • point cloud analysis and processing, • scene processing and analysis based on image data from video cameras and depth sensors, • affective computing, face image analysis, eye movement tracking, • computer animation synthesis, also in terms of emotion engines, • machine learning in testing computer games and graphical interfaces, • biomechanics of motion, musculoskeletal models, artificial intelligence in animation synthesis and analysis. 		<p>graphic material</p>    
<p>present activities:</p> <p>Current research in the analysis and processing of laser scan point clouds is concerned with semantic segmentation and classification of indoor and outdoor objects. The research focuses on the efficient application of graph convolutional neural networks for large unstructured datasets. The research finds applications in automotive, geo location, construction and all kinds of inventories.</p> <p>Research in the area of facial image analysis focuses on detection and classification of micro-expressions in facial images and efficient tracking of eye movements in vision systems equipped with a regular video camera. A separate thread concerns the processing and classification of incomplete face images, such as those occluded by a mask.</p> <p>A separate thread of research is the application of artificial neural networks and machine learning methods, mainly unsupervised, to automate testing of computer games and their graphical interfaces.</p> <p>Research related to photorealistic image synthesis focuses on high-performance rendering of the phenomenon of sunlight scattering in the Earth's atmosphere and teaching neural network models with a limited number of images. The search is for neural network models with broad generalization properties to allow style transfer.</p> <p>Research in animation synthesis is concerned with creating, biomechanically correct musculoskeletal models and applying machine learning techniques to generate biomechanically correct motion sequences.</p>		
<p>Future activities:</p> <p>Each of the research threads is actively working to improve existing solutions and create new ones.</p>		



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Keywords: machine learning, point clouds, semantic segmentation, classification, affective computing, face analysis, eye tracking, animation, computer games, real-time rendering, graphical interfaces

List of internship proposal in this research team:

Walczak, J., Najgebauer, P., Scherer, R., & Wojciechowski, A. (2021, July). CVA-GNN: Convolutional Vicinity Aggregation Graph Neural Network for Point Cloud Classification. In *2021 International Joint Conference on Neural Networks (IJCNN)* (pp. 1-8). IEEE.

Gałąj, T., Pietrusiak, F., Galewski, M., Ledzion, R., & Wojciechowski, A. (2021). Hybrid Integration Method for Sunlight Atmospheric Scattering. *IEEE Access*, 9, 40681-40694.

Walczak, J., Poreda, T., & Wojciechowski, A. (2019). Effective planar cluster detection in point clouds using histogram-driven KD-like partition and shifted mahalanobis distance based regression. *Remote Sensing*, 11(21), 2465.

Project NCBR - LIDER XI, pt. „Semantic analysis of a 3D point clouds”, 01.12.2020 - 01.12.2023 r., Nr LIDER/25/0092/L11/19/NCBR/2020

List of attachments:

Each research area has an open list of post-doctoral fellowships and post-doc positions, as well as a wide range of graduate degrees that can be completed through projects or collaborations with industry.