Name: **Image Processing and Computer Graphics**		*NEPTUN-code:* *NIXSKGEMNE*	*Number of periods/week:* full-time: 2 lec + 0 sem + 2 lab
Credit: 4 *Requirement:* mid-term mark		*Prerequisite:* -	
Responsible: Zoltán VÁMOSSY, Ph.D.	*Position:* associate professor	*Faculty and Institute name:* John von Neumann Faculty of Informatics Institute of Applied Informatics	

Way of assessment:

- successful home project + min. 50% in the tests written during the semester

Competences

Course description:

Homogeneous coordinates and 3D transformations. Modeling objects. Camera models, orthographic and perspective projection. Objects in 3D projections. The imaging basics. Gray scale and color images features: resolution, histogram, etc. Typical image noises, distortions. Image enhancements, image filtering. Histogram and modification in compensation. Methods of edge detection, edge enhancement, smoothing. Line and curve detection, Hough transform. Morphological operations. Texture analysis. Frequency domain methods, FFT, DFT, filtering, deconvolution. Image segmentation. Edge and region-based methods. Detecting corner points (Harris, KLT), analyzing image regions. Invariant features, edges, texture, color, topology. PCA transformation. Camera calibration. Motion detection, object tracking. Optical flow models and calculations. SSD algorithms. Stereo methods, epipolar geometry. Model-based image processing: active contour methods, splines, ASM, AAM. Content-based image retrieval methods. Outlook for parallelization opportunities, multithreading and GPGPU implementations.

Literature

Zoltán Kató and László Czúni: Computer Vision, Typotex, 2011 (in Hungarian, electronic notes)
Kálmán Palágyi: Image Processing for advanced, Typotex, 2011 (in Hungarian, electronic notes)
R. Szeliski: Computer Vision Algorithms and Applications, Springer, 2011 (electronic notes)
Gonzales, Woods: Digital Image Processing, 3rd edition. Prentice Hall, 2008