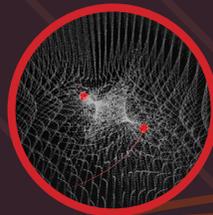# Invitation

The Institute of Biomatics (John von Neumann Faculty of Informatics, Obuda University) cordially invites you to the lecture of:

Toksaitov Dmitrii Alexandrovich

about

Development of a real-time 3-D rendering system optimized for tile-based deferred graphics processing units.

on 18th May 2018, Friday, at 09:00 am

Venue: Obuda University, F.09. Pauli auditorium
(H-1034 Budapest, Bécsi str. 96/b.)

Short summary of the presentation:

Contemporary mobile devices such as phones and tablets contain ports of desktop rendering programming interfaces oblivious to the design of the underlying mobile graphics accelerators which are considerably different in terms of architecture from their desktop counterparts.

Mobile graphics chips are built on top of a tile-based architecture of delayed rendering to minimize the electrical power consumption of the host device. The architecture of delayed rendering requires the central processing unit to collect information about draw calls for each object of the scene in a temporary buffer in advance to verify the data and to transmit it later to the graphics accelerator. This approach of interaction between a CPU and a GPU allows, on one hand, to simplify the circuitry of the mobile graphics chip, to minimize the memory consumption of the system, and to reduce the power draw of the device.

On the other hand, it requires the central processor to perform additional operations to collect the data and to support the buffers for every consequent frame. That imposes serious limitations on the maximum number of objects that can be presented to the screen simultaneously due to the limited size of the aforementioned buffers. Deferred systems require developers to spend precious CPU time maintaining the graphics subsystem and NOT performing the useful work of their programs. This work presents the research conducted by the Software Engineering program at the American University of Central Asia to develop a real-time graphics rendering engine optimized for work on the tile-based deferred mobile graphics processors. The engine minimizes the cost of data transfers between the CPU and the GPU by keeping a sorted tree of state changes to allow resubmission of objects in batches and only in cases of data modifications between consequent draw calls.

Presenter's short biography:

Toksaitov Dmitrii Alexandrovich (BSSE; MSSE, MSCS (in progress)) is an instructor with more than 8 years of teaching experience at the American University of Central Asia. Dmitrii leads and helps to conduct more than 5 undergraduate courses at the Software Engineering program on a number of topics ranging from game development and graphics programming to operating system's design and implementation. His research interest lies in studying tile-based deferred mobile graphics systems and developing library operating systems and unikernels. Dmitrii began his career building a 2-D rendering engine for portable digital assistants running the Microsoft Pocket PC and Windows Mobile operating systems back in 2002. Later he worked on various projects for the Symbian platform and is currently leading the development of a 3-D rendering system for astronomical data visualization on the iOS mobile platform.

Toksaitov Dmitrii Alexandrovich
Instructor