

Special Session by ISI Center:

„CA and Complex Systems from theory to practice”

Kraków, September 24, 2014 - Conference ACRI 2014

14.30 – 14.55	<p><i>Leszek Kotulski and Igor Wojnicki</i> ISI Center and AGH University of Science and Technology</p> <p>Outdoor lighting optimization and other research projects at the ISI Center.</p> <p>Abstract: <i>ISI Center supports research regarding energy efficiency which is one of the important issues of contemporary economy. Outcomes of an interdisciplinary project resulting in tools improving energy efficiency for outdoor lighting systems will be presented. They regard design, control and optimization of such systems. The approach is based on formal methods, distributed computing with agent-based solutions, heuristic search and rule-based processing. Other ongoing projects will be briefly presented as well.</i></p>
14.55 – 15.20	<p><i>Kenichiro Shimura</i> Research Center for Advanced Science and Technology, The University of Tokyo</p> <p>Project Time Management: A Cellular Automata Approach</p> <p>Abstract: <i>For any project, it is of great interest to improve the accuracy of planning since a delay in the project causes extra cost. This presentation describes a method for dynamical simulation of a project by use of a Cellular Automata. The method provides probabilistic estimate of project time and gives project manager a chance to make preemptive action to avoid major delay.</i></p>
15.20 – 15.55	<p><i>Bernhard Steffen</i> Institute for Advanced Simulation (IAS) Jülich Supercomputing Centre (JSC)</p> <p>Advanced techniques for the stable high resolution measuring of quantities of pedestrian flow using Voronoi diagrams.</p> <p>Abstract: <i>I will compare established methods for getting flow quantities like density, flow across a line, or average speed in an area over some time from measured trajectories. Objectives are high resolution in time and space, low scatter, independence from arbitrary parameters and ease of use. We show that for many applications Voronoi diagrams are a useful tool allowing superior resolution without excessive scatter. The computational</i></p>

	<i>burden involved is higher than that of traditional methods, but no serious handicap in the time of ubiquitous computers.</i>
15.55 – 16.20	<p><i>Stefania Bandini</i> Complex Systems & Artificial Intelligence Research Center</p> <p>University of Milano-Bicocca</p> <p>and CROWDYXITY s.r.l. – Milano</p> <p>Driving research towards business: the case of ELIAS38 for crowd and pedestrian cellular automata based simulation</p> <p>Abstract: <i>The main aim of this talk is to present the experience of the path from the creation of a CA (Cellular Automata) and agent-based simulation system born in an academic research environment towards the delivery of ELIAS38, a computer-based system for the dynamical simulation of crowds and pedestrians, and the creation of the university spin-off CROWDYXITY s.r.l. (Milan, ITALY).</i></p>
Coffe break	
16.50-17.15	<p><i>Jun Zhang</i> Institute for Advanced Simulation Jülich Supercomputing Centre</p> <p>Empirical studies on pedestrian crowd---Hermes and BaSiGo projects</p> <p>Abstract: In this presentation, series of well controlled experiments in BaSiGo and Hermes project will be shown. To resolve the fine structure of the resulting velocity-density relations, fundamental diagram, the Voronoi method is used to analyze these experiments. The factors that could influence the characteristics of different kinds of streams including uni- and bidirectional flow as well as crossing flow will be explained. The similarities and differences among these streams, which are necessary for fire safety design as well as pedestrian model calibration, will be presented.</p>
17.15 -17.40	<p><i>Georgios Ch. Sirakoulis</i> Democritus University of Thrace (DUTH)</p> <p>Crowd Evacuation Anticipative Systems</p> <p><i>The main aim of the talk is to present an anticipative system which operates during pedestrian evacuation processes and prevents escape points from congestion. The processing framework of the system includes four discrete stages: a) the detection and tracking of pedestrians, b) the estimation of possible route for the very near future, indicating possible congestion in exits, c) the proposal of free and nearby escape alternatives, and d) the activation of guiding signals, sound and optical. Detection and tracking of pedestrians is based on an enhanced implementation of a system proposed by Viola, Jones, and Snow that incorporates both appearance and motion information in near real-time.</i></p>

18.05 – 18.30

Jarosław Waś, Robert Lubaś
AGH University of Science and Technology

Towards realistic and effective models of crowd dynamics

The authors propose a new methodology for creating realistic and effective models of crowd dynamics, which takes into account the Agent-based approach combined with non-homogeneous and asynchronous Cellular Automata. The proposed approach was tested in large-scale test cases, namely the evacuation of the Allianz Arena football stadium in Munich and other stadiums like Wisła Krakow Stadium or GKS Tychy Stadium, as well as AGH University facilities.