

## Editors

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# Latest Trends in Energy, Environment and Development

- Proceedings of the 7<sup>th</sup> International Conference on Environmental and Geological Science and Engineering (EG '14)
- Proceedings of the 7<sup>th</sup> International Conference on Urban Planning and Transportation (UPT '14)
- Proceedings of the 3<sup>rd</sup> International Conference on Energy Systems, Environment, Entrepreneurship and Innovation (ICESEEI '14)

Salerno, Italy, June 3-5, 2014

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Cilento Vallo di Diano e  
Alburni-Geopark, Italy



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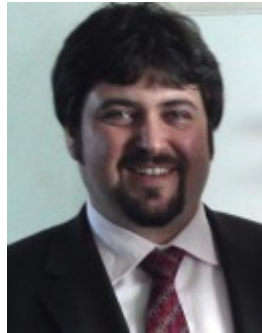
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## Plenary Lecture 1

### Interactive Simulation in the Field of Human–Machine Interaction in Transport Systems: Tools and Methods for Research, Training and Education



#### Associate Professor Petr Bouchner

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**Abstract:** Problems of reliability and safety of interaction between the human operator (driver) and him/her controlled artificial system (machine, vehicle) are the crucial research tasks within the scope of safety in transport. Most of the accidents happened due to the failure of a human factor. It can either happen when controlling (driving) the machine (vehicle) but also when maintaining it or even sooner when it is manufactured or designed. A failure is often caused either by a bad design of the system or an insufficient or unsuitable training of the human operators. Since the only communication between the operator and artificial systems is realized via the interfaces, just the field of interfaces is the topic of our contemporary research performed in our laboratories.

The lecture introduces problems of the Human-Machine Interaction (HMI) research field as well as problems of user interfaces in systemic point of view. These will be discussed in general, seamlessly moving towards the field of driver-vehicle interaction reliability and safety. The objective approaches and measures to investigate in the reliability of operator-machine interaction are discussed as well as mathematical modeling tools. Beside those general approaches, the lecture introduces in more detail our main research focus - ergonomics and human factors in vehicle control.

The presentation shows and explains main principles of the research tools – the advanced interactive ground vehicle simulators, which are continuously being developed by the Driving Simulation Research Group at Czech Tech Univ. It encompasses passenger cars, two-wheelers, trucks and/or rail engines. This field of R&D deals with simulation technology but also scenario and experiment design and mainly measurement tools and methods, which are fitted for particular experiment types. Indisputable role in this area is played by measuring devices, especially those which work with so called psychophysiological measures. The data measured during the experiments are usually hard to be interpreted in a straightforward way, mainly those which have biological nature - therefore also some advanced analytical and classification tools are discussed.

At the end of the presentation most recent and/or most valuable results and conclusions, which presents outputs of almost 15 years research effort in this area, will be shown. The lecture is accompanied with vivid videos.

**Brief Biography of the Speaker:** Academic career: 2003 - Master Degree at CTU Prague (Faculty of Electro-engineering), specialization in computer engineering, 2007 - Doctoral Degree at CTU Prague (Faculty of Transportation Sciences) "Driving simulators for HIM research", 2011 degree of associate prof. (doc.) at CTU Prague. Since 2003 researcher and university teacher, since 2007 Head of Driving Simulation Research Group, since 2008 deputy head of Laboratory of Systems Reliability of FTS, CTU and Institute of Informatics of Academy of Sciences of Czech Republic, since 2011 head of Department of Transporting Technologies.

Scientific activities: research activities in interactive and driving simulator construction and development, HMI in vehicles, human factors in transportation, measurements and analysis of complex data, implementation of virtual reality tools into the experiments, design of experiments and their analysis, member of editorial board of scientific journal Neural Network World.

Since 2003 wrote several tens of papers, chapters in journals, book chapters, research report with topics on interactive simulators, human factors in transportation, ergonomics, driver's attention and fatigue, worked in expert groups of PIARC and European Committee. Main solver of several national scientific and applied research projects (grants).

## Plenary Lecture 2

### Cooperative Intelligent Transport Systems



**Professor Sadko Mandzuka**

Faculty of Traffic Science

Department of Intelligent Transport System

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**Abstract:** Intelligent Transport System (ITS) is an holistic, control and ICT upgrade of classic transportation and traffic systems which significantly improves system performance, traffic safety, efficiency in transportation of goods and passengers, increases passenger protection and comfort, reduces pollution, etc. A particularly potent approach was recognized in the possibility of application of cooperative systems in traffic. The main characteristics of a cooperative approach are: a) Considers the driver, vehicle, infrastructure and other road users as a unique system, b) Considers operational and management needs of the entire system, c) Integrated approach to safety of traffic and all participants, d) Applies technology in a coherent manner in order to support overall integration of system parts. Currently we recognize next systems onto which the cooperative approach can be successfully applied: navigation systems and travel information systems, warning systems, emergency services' vehicle management, priority management in urban public transport, intelligent systems for speed management, support systems for endangered transport users and others. In the narrow sense of the cooperation definition, the following communications were recognized: V2V – vehicle to vehicle, V2I – vehicle to infrastructure, V2P – vehicle to pedestrian, I2P – infrastructure to pedestrian etc.

**Brief Biography of the Speaker:** Prof. Sadko Mandzuka is currently Head of Transportation Telematics Chair at the Department of Intelligent Transportation System, Faculty of Traffic Science, University of Zagreb. He has wide experience in the area of floating vessels control theory, Intelligent Transport System, artificial intelligence, traffic incident management system etc. He had the opportunity to work both in academic and industrial environments including Brodarski Institute, Consulting in the Innovation Area for SME's, etc. He is currently setting up a spin-off company providing consulting services for Intelligent Transport System (Incident Management System and other) while at the same time advancing his academic career. He is a founding member of Croatian Robotic Association, President of ITS-Croatia, and Collaborating member of Croatian Academy of Engineering. He is a member of Technical Committee on Marine Systems (Coordinating Committee on Transportation and Vehicle Systems - IFAC (International Federation of Automatic Control)). Finally he has served in the program committees and as reviewer at several international Congress and Conferences. He is author of more than 100 internationally reviewed publications.



## Plenary Lecture 3

### Discrete Event Templates for Environment Sustainable Development



**Associate Professor Calin I. Ciufudean**  
“Stefan Cel Mare” University of Suceava  
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**Abstract:** Discrete Event Templates for Environment Sustainable Development expounds upon an important chapter of artificial intelligence; respectively, discrete event systems applied for modeling and simulation of control, logistic supply, chart positioning, conservation and protection of natural resources in order to have a clean and healthy environment capable to ensure a sustainable development of modern global society.

All these factors allow for a new design of artificial social systems dotted with intelligence, autonomous decision-making capabilities, and self-diagnosing properties.

Artificial social systems were defined by Y. Moses and M. Tennenholtz in their work "Artificial Social Systems," [www.home.cs.utwente.nl](http://www.home.cs.utwente.nl): "An artificial social system is a set of restrictions on agents' behaviors in a multi-agent environment. Its role is to allow agents to coexist in a shared environment and pursue their respective goals in the presence of other agents."

Heuristics techniques, data mining planning activities, scheduling algorithms, automatic data identification, processing, and control represent as many trumps for these new systems' analyzing formalism.

This lecture aims to provide relevant theoretical frameworks and the latest empirical research findings. Social simulations grounded on solid conceptual models from the social sciences, such as discrete event social simulations, provide a fully traceable implementation of these concepts that readily accommodate the varying timescales in gaining a better understanding of the complex, adaptive system that is society.

The tutorial introduces real, e.g. implemented by the author, approaches and frameworks for modeling and simulation process, kinematic constraints of the trophic closed loop chains as well as modern issues for automatic control of diverse pollution systems.

We challenge the reader to reveal the development stage of social networks appliance upon environmental issues and to anticipate their future evolution in respect to technological and climatic changes.

#### **Brief Biography of the Speaker:**

- Academic Positions: Assoc. Professor Ph.D. Eng., Dept. of Automatics and Computers, Faculty of Electrical Engineering and Computer Science, “Stefan cel Mare” University of Suceava, Romania.
- Fields of Scientific Activities: Discrete Event Systems, Complex Measurement Systems, Reliability and Diagnosis of Control Systems, Environmental Management.
- He published 11 books, 14 patents and over 170 scientific papers in conference proceedings and journals.
- Honor Member of the Romanian Society of Electrical & Control Engineering - Member of the Romanian Technical Experts Corp.
- Technical Expert of the Romanian Ministry of Justice.
- President of the Romanian Society of Electrical & Control Engineering, Suceava Branch.
- He is a member of the editorial boards of several international scientific journals and conferences of control systems and electric engineering science. He was designated chairmen at 27 international conferences.

## Plenary Lecture 4

### Sustainability According to the Viable Systems Approach. The Relevance of the Philosophical Values of the Kybernetes



#### **Professor Gandolfo Dominici**

Vice President and Scientific Director  
Business Systems Laboratory (Italy)  
Tenured Assis. Professor of Business Management  
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**Abstract:** An organization is viable if it survives, remains united and is complete; it is homeostatically balanced both internally and externally and furthermore has mechanisms that allow it to grow, learn, develop, and adapt, and thus become increasingly more effective in its environment. The more the organization is able to preserve and regenerate, the more possibilities it has to maintain viability in the long term.

Therefore viability assumes the relevance of "time" as an important factor in decision-making and action. If we consider the organization to be a dissipative system, then in order to counterbalance the consumption of relevant resources, it is necessary to think ahead to a time horizon that extends beyond the mere achievement of functioning resources in the short to middle term.

Therefore, we can consider sustainability as systemic viability in the long term. This broader time horizon entails that the role of the "kybernetes" not be limited to the quest for functioning resources within a limited timeframe but rather must be developed in a more general way as a philosophy guiding the kybernetes in every decision and action.

This implies that it is essential to involve "values" in the decision-making and action-taking processes. For these reasons, the kybernetes' role, values and education are of extreme importance to the sustainability –and thus the long-term viability – of human organizations.

**Brief Biography of the Speaker:** Gandolfo Dominici is a Ph.D. in Business Management at "Sapienza" University of Rome in 2004. In 2003 he was visiting researcher at the Faculty of Economics of Nagasaki University, Japan developing a research about the cultural roots of Japanese Toyota Production Systems.

Since 2005 he is Assistant Professor of Business Management at the University of Palermo (Italy), where from 2006 he holds the Chair of Marketing and from 2008 of Systems and Organizational Processes. He got his tenure at University of Palermo in 2008.

He is co-founder, Vice President and Scientific Director of the scientific nonprofit association Business Systems Laboratory (B.S.Lab - [www.bslaboratory.net](http://www.bslaboratory.net)), board member of the World Organisation of Systems and Cybernetics (WOSC- <http://wosc.co/>) and the Consorzio Universitario di Economia Industriale e Manageriale (CUEIM - [www.cueim.com](http://www.cueim.com)). He is author of about 50 published articles and books and member of the editorial board of 14 international peer reviewed journals.

His main research interests are: Systems Thinking, Managerial Cybernetics, Marketing, Consumer ethnography, SCM and Innovation Management.

For further information: [www.unipa.it/gandolfodominici/](http://www.unipa.it/gandolfodominici/)

## Plenary Lecture 5

### Innovative Energy System, Environmentally Friendly for Thermo-magnetic Appliance



#### Associate Professor Carmen Vasile

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**Abstract:** Our aim and the goal of this innovative thermo-magnetic technology is to improve the energy efficiency of our equipments and to preserve our quality of life, by having access to all refrigeration and heating technologies, without damaging the planet.

This innovative energy system is based on the concept of the thermo-magneto effect which will be presented. The description of the prototypes design and the results for temperature span between negative  $-20^{\circ}\text{C}$  up to  $+60^{\circ}\text{C}$ , will be presented as well.

Energy conversion and thermal exchanges are in the heart of our daily life through the household appliances as fridges, freezers; at home: the air conditioner; in shops: the refrigerated show cases, beverage dispensers, cold room; in the food-processing industry: storage of foodstuffs, cold chain; in companies: industrial process; in motor cars: 90 % of new vehicles integrate an air conditioning system, etc...

For all these applications it is possible to completely eliminate the refrigerant gas system and to use instead the thermo-magnetic system, which is already in the pre-industrialization phase.

The presentation will show that the thermo-magnetic technology meets all the needs for versatile next-generation equipment for cooling and heating, because it is environmentally friendly; because it emits no greenhouse gasses and no toxic fluids (using a water/glycol mix for cooling circuits); because is energy efficient: 40% to 60% less energy consumption compared to classical systems; and also for economical reasons: initial costs are similar to existing systems, maintenance costs are lower.

We are convinced the energy is clearly one of the critical global challenges facing humankind, and we must put in work all our forces in order to find efficient sustainable solutions.

**Brief Biography of the Speaker:** Carmen VASILE MULLER is Associate Professor at INSA (Graduate School of Science and Technology) the Department of Energy, Heating & Air Conditioning and researcher at LGeCo (Design Engineering Laboratory) in Strasbourg, France.

She has a PhD in Energy Engineering (expertise in Systems and Heat & Mass Transfer).

She performs since 1990 research activities and academic teaching in the field of heat and mass transfer, fluid dynamics, energy efficiency, magnetic cooling, renewable energies.

Her research work is visible in an important number of international scientific journals and in national and international conferences all over the world. She is member of different scientific societies and she leads the subgroup of machines inside the Standardisation Group for Magnetic Refrigeration Working Party of the International Institute of Refrigeration (IIF-IIR).