AI, SIMULATION & PLANNING IN HIGH AUTONOMY SYSTEMS

April 7-10, 2002

Hotel Tivoli Lisboa
Lisbon, Portugal

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AI, SIMULATION & PLANNING IN HIGH AUTONOMY SYSTEMS

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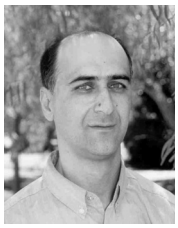
Adelinde Uhrmacher, University of Rostock, Germany
Hamid Vakilzadian, University of Nebraska, USA
Gabriel Wainer, Carleton University, Canada

Sunday, April 7, 2002

Registration 14:00-18:00
LOBBY OF TIVOLI ROOM

Tutorial: Hessam S. Sarjoughian..... 14:00-15:00
SINTRA ROOM

Title: **DEVS Component-Based M&S Framework: An Introduction**



Hessam S. Sarjoughian is Assistant Professor of Computer Science and Engineering at Arizona State University, Tempe. Since 1996, his research activities have focused on theory, methodology, and development of distributed/collaborative modeling & simulation including distributed co-design, hybrid agent and simulation modeling, software engineering, and artificial intelligence.

Tutorial: Hans Vangheluwe..... 15:00-16:00
SINTRA ROOM

Title: **An Introduction to Multi-Paradigm Modelling and Simulation**

Hans Vangheluwe is Assistant Professor in the School of Computer Science at McGill University, Montréal, Canada. He holds a D.Sc. degree, as well as a M.Sc. in Computer Science, and B.Sc. degrees in Theoretical Physics and Education, all from Ghent University in Belgium. He has been a Research Fellow at the Centre de Recherche Informatique de Montréal, Canada, the Concurrent Engineering Research Center, WVU, Morgantown, WV, USA, at the Delft University of Technology, The Netherlands, and at the Supercomputing and Education Research Center of the Indian Institute of Science (IISc), Bangalore, India. At McGill University, he teaches Modeling and Simulation, as well as Software Design. He also heads the Modeling and Simulation and Design (MSDL) research lab. He has been the Principal Investigator of a number of research projects focused on the development of a multi-formalism theory for Modeling and Simulation. Some of this work has led to the WEST++ tool, which was commercialized for use in the design and optimization of Waste Water Treatment Plants. He was the co-founder and coordinator of the European Union's ESPRIT Basic Research Working Group 8467 "Simulation in Europe", a founding member of the Modelica Design Team, and an advisor to the Flemish Institute for the Promotion of Scientific-Technological Research in Industry (IWT), as well as to the European Commission's 5th Framework program. He is a reviewer for the Society for Computer Simulation (SCS), and for diverse research funding agencies. He is currently a guest editor for an ACM TOMACS special issue on "Multi-Paradigm Modeling".

Coffee Break..... 16:00-16:20
LOBBY OF SINTRA ROOM

Sunday, April 7, 2002

Tutorial: Jerzy W. Rozenblit 16:20-17:20
SINTRA ROOM

Title: **Model-Based Design and Testing of Embedded Systems**

Jerzy W. Rozenblit is Full Professor of Electrical and Computer Engineering at The University of Arizona, Tucson. He holds the PhD and MS degrees in Computer Science from Wayne State University, Michigan and the MSc in Computer Engineering from the Technical University of Wroclaw, Poland. His research and teaching are in the areas of complex systems design and simulation modeling. His research in design has been supported by the National Science Foundation, Siemens AG, Semiconductor Research Corporation, McDonnell Douglas, and the US Army Research Laboratories. Dr. Rozenblit serves as Associate Editor of ACM Transactions on Modeling and Computer Simulation, Associate Editor of IEEE Transactions on Systems, Man and Cybernetics, and Executive Board Member of IEEE Technical Committee on Engineering of Computer Based Systems. He was Fulbright Senior Scholar and Visiting Professor at the Institute of Systems Science, Johannes Kepler University, Austria and has held visiting professorship appointments at the Technical University of Munich, Central Research Laboratories of Siemens AG, and Infineon Technologies AG, in Munich.

AIS'2002 Get-Together-Party..... 18:00-19:00
LOBBY OF SINTRA ROOM

Monday, April 8, 2002

Registration 8:30-18:00
LOBBY OF TIVOLI ROOM

Introduction 8:30-8:40
TIVOLI ROOM

Keynote: Axel Lehmann 8:40-9:40
TIVOLI ROOM

Title: **Comparison of Approaches and Conceptual Frameworks for Component-Based Modeling and Simulation**

Axel Lehmann earned his diploma degree in Electrical Engineering (1973) and his doctoral degree in Computer Science/Informatics (1982) at the University of Karlsruhe, Germany. He was Visiting Professor of Informatics at the University of Hamburg, Germany (1983-1984) and is Full Professor of Informatics at the Federal Armed Forces University Munich, Germany (since 1987). He was Dean of the Faculty of Informatics (1995-1998) and hold various responsible positions as Chairman of the Institute for Computer Engineering at the Federal Armed Forces University Munich (since 1987), as member of the Board of the German Informatics Society (GI); (since 1996) and was President of the Society for Modeling and Simulation International (SCS, 1998-2000). Besides his research and teaching activities at the Federal Armed Forces University Munich he is Vice President of ITIS (Institut für Technik Intelligenter Systeme e.V. at the UniBwM), (since 1996). Major topics of his research and teaching include modeling and simulation methodology, performance and reliability analysis of computer and telecommunication networks, fault diagnoses and management of telecommunication networks and intelligent tutoring systems. He has published more than 60 papers and was Editor of 8 Conference Proceedings or books on the above topics. Since 1994 he is a Co-Editor of the book series "Frontiers in Simulation" (Society for Modeling and Simulation International, Erlangen-Gent-San Diego) and an Associate Editor of "Transactions" (Society for Modeling and Simulation International, SCS).

Technical Sessions 9:50-11:00

SESSION 1: **M&S Methodologies/Practices I**

CHAIR: **Bernard P. Zeigler** TIVOLI ROOM

Using the Symbolic DEVS Simulation to Generate the Optimal Traffic Signal Time

Jong-Keun Lee, Min-Woo Lee, Sung-Do Chi
Hangkong University, Korea

Interval-Enhanced Arithmetic Compilers Simulated Under a DEVS Framework

James E. Stine, Fernando Martinez-Vallina
Illinois Tech, USA

Hardware Implementation of Control Systems from DECM High Level Specifications

Jean-Luc Paillet
LSIS/Université d'Aix-Marseille I, France

Norbert Giambiasi
LSIS/Univesité d'Aix-Marseille III, France

Monday, April 8, 2002

Coffee Break 11:00-11:20
LOBBY OF TIVOLI ROOM

Technical Sessions 11:20-12:30

SESSION 2: **Component-Based Modeling and Simulation** (*PARALLEL*)

CHAIR: **Norbert Giambiasi** TIVOLI ROOM

Towards a Component-Oriented Design of Modeling and Simulation Tools

Michael Syrjakow, Elisabeth Syrjakow
University of Karlsruhe, Germany

Helena Szczerbicka
University of Hanover, Germany

Simulation using Building Blocks

Edwin Valentin, Alexander Verbraeck
Delft University of Technology, The Netherlands

Abstract Simulators for Dynamic Structure Hybrid Components

Fernando J. Barros
Universidade de Coimbra, Portugal

SESSION 3: **Simulation for Transport Problems I** (*PARALLEL*)

CHAIR: **Philippe Mussi** SINTRA ROOM

PACSIM: A dynamic, Behavioural and Multimodal Urban Traffic Simulation Model

Eric Cornelis, Ludovic Platbrood
FUNDP/University of Namur, Belgium

An Open Framework for Traffic Simulation Tools using the High Level Architecture (HLA)

Narain Ramluchumun, Stephen Ijaha, Stephen Winter, Nasser Kalantery
University of Westminster, United Kingdom

Investigation on the Influence of the Road Traffic Network Conditions on the Development of Regions by Means of AI Controlled Simulation

András Jávor, Gergely Mészáros-Komáromy
International McLeod Institute of Simulation Sciences Hungarian Center, Hungary

Lunch 12:30-13:50
BEATRIZ COSTA RESTAURANT

Monday, April 8, 2002

Luncheon Speaker: Fernando Carvalho Rodrigues

Topic: **Battlefield Simulation**

Fernando Carvalho Rodrigues is Professor at Universidade Independente in Lisbon, where he his the Pro-Rector for industrial research. Since 1999 he serves as Science Administrator of NATO. Holder of five patents, he has designed and developed the engineering of various products currently in industrial production. He was the chief of the PoSAT Consortium which build and sucessfully launched Po-SAT1, a portuguese satellite, on 1993. As a specialist in the theory of information, optics and optoelectronics he has published worldwide over two hundred papers. Dr. Carvalho Rodrigues has four books published in Portugal (1983; 1991; 1994; 1995), one in the Russian Federation (1996) and contributed to another one in the U.S.A. (1993). He his member of several Academies and Scientific and Profissional Societies. For his contribution to the advancement of scientific and technical knowledge of communications systems, electronics, intelligence and information theory he was awarded a Meritorious Service Award by AFCEA-International in 1994. In 1996 he received the Albert J. Myer Achievement Award for his work on information theory. In 1998 the National Opticians Association honoured him with the "Diploma of Merit" for his research results in Optics. At present his main subject is Information Theory.

Technical Sessions 14:00-15:30

SESSION 4: **Agents I**

CHAIR: **Ryo Sato** TIVOLI ROOM

Multi-Agent Modelling in Comparison to Standard Modelling

Franziska Klügl, Christoph Oechslein, Frank Puppe, Anna Dornhaus
Universität Würzburg, Germany

Adaptiveness of Agent Through Structural Modelling in Generic Spaces: The Example of Sachem

Marc Le Goc, Claude Thirion
DISA-USINOR, France

Michel Gaeta
IMRA-Europe, France

DEVS/RAP: Agent-Based Simulation

Mehmet Fatih Hocaoğlu, Cüneyd Firat
ITRI, Turkey

Hessam S. Sarjoughian
Arizona State University, USA

Technical Meeting..... 14:00-15:30

DEVS Standardization Working Group 14:00-15:30

CHAIR: **Gabriel Wainer** SINTRA ROOM

Coffee Break..... 15:30-15:50
LOBBY OF TIVOLI ROOM

Technical Sessions 15:50-17:00

SESSION 5: **Modeling & Simulation Environments** (*PARALLEL*)

CHAIR: **Hans Vangheluwe** TIVOLI ROOM

Developing a Web-Based Models Library for a DEVS Modeling and Simulation Environment

Fabrice Bernardi, Jean-François Santucci
University of Corsica, France

CNJ: A Visual Programming Environment for Constraint Nets

Fengguang Song, Alan K. Mackworth
University of British Columbia, Canada

Performance Analysis of DEVS Environments

Ezequiel Glinsky
Universidad de Buenos Aires, Argentina

Gabriel Wainer
Carleton University, Canada

SESSION 6: **AI & Simulation** (*PARALLEL*)

CHAIR: **Andreas Gehrmann** SINTRA ROOM

A Natural Language Multi-Agent System for Controlling Model Trains

Alexander Huber, Bernd Ludwig
University of Erlangen, Germany

An Integrated Tool for Modelling, Generating and Exhibiting Narratives

Angelo E. M. Ciarlini, Bruno Feijó, Antonio L. Furtado
Pontifícia Universidade Católica do R.J., Brazil

Decision Support for the Logistics of Refuse Collection in a Large Metropolitan Area

Alessandro Testa, Pietro Giribone, Alessandra Orsoni, Roberto Revetria
University of Genoa, Italy

Coffee Break 17:00-17:20
LOBBY OF TIVOLI ROOM

Panel Session 17:20-19:00
TIVOLI ROOM

CHAIR: **András Jávor**

TITLE: **How close are we to a Unified Discipline of Modeling & Simulation?**

PANELISTS: **Bernard P. Zeigler, Norbert Giambiasi, Axel Lehmann, Hessam S. Sarjoughian**

Tuesday, April 9, 2002

Registration 8:30-16:00
LOBBY OF TIVOLI ROOM

Keynote: Norbert Giambiasi.....8:30-9:30
TIVOLI ROOM

Title**: Timed Automata, DEVS and Formal Verifications**

Norbert Giambiasi is a full Professor at the University of Aix-Marseille since 1981. In October 1987, he created a new engineer school and a research laboratory LERI in Nîmes (France). He was the Director of Research and Development in this engineer school. In 1994, he comes back to the University of Marseilles in which he creates a new research team in simulation. He is now the project leader of a new CNRS laboratory in Marseilles with one hundred researchers. He has written a book on CAD and he is author of more than 150 international publications. He was and is scientific manager of more than 50 research contracts (with E.S Dassault, Thomson-Cimsa, Bull, Siemens, Cnet, Esprit, Euréka, Usinor, …). He was the research director of more than 40 PhD students. He is member of the program committee of several international conferences and he created the international conference "Neural-network and their Applications". He is referee for national and European research projects. His main current interests converge on: specification formalisms of hybrid models, discrete event simulation of hybrid systems, CAD systems and Design Automation.

Technical Sessions 9:30-11:00

SESSION 7: **M&S Methodologies/Practices II**
(*PARALLEL*)

CHAIR: **Sung-Do Chi** TIVOLI ROOM

Expressing ODE Models as DEVS: Quantization Approaches

Jean-Sébastien Bolduc, Hans Vangheluwe
McGill University, Canada

Towards Standard Interfaces in Dynamic Structure Discrete Event Models

Fernando J. Barros
Universidade de Coimbra, Portugal

Hybrid Mathematical Modeling and pH Control of Anaerobic Waste Waters Treatment Processes

Ivan Simeonov
Bulgarian Academy of Sciences, Bulgaria

Aziz Naamane
LSIS/University of Aix-Marseilles III, France

DEVS Wind Turbine Modelling and Simulation

Christophe Halupka, Paul Bisgambiglia, J.F. Santucci
Université de Corse, France

SESSION 8: **PhD Session I** (*PARALLEL*)

CHAIR: **Raphäel Duboz** SINTRA ROOM

Using Markov's Theory to Represent Behavior of Complex Systems

Philippe Bouché
Laboratoire des Sciences de l'Information et des Systèmes, France

Language Independent Modelling of Discrete Event Simulation – AIMS

António G. Rodrigues, Luís S. Dias
Universidade do Minho, Portugal

DECM-DEVS Methodology for Control Systems

Watcharee Jumpamule
Université d'Aix-Marseille I, France

Coffee Break 11:00-11:20
LOBBY OF TIVOLI ROOM

Technical Sessions 11:20-12:30

SESSION 9: **M&S of Natural Systems** (*PARALLEL*)

CHAIR: **Maria J. Vasconcelos** TIVOLI ROOM

Using JDEVS for the Modeling and Simulation of Natural Complex Systems

Jean-Baptiste Filippi, Frederic Chiari, Paul Bisgambiglia
University of Corsica, France

Scalable DisPar: A Component-Based Application for 2D Advection-Diffusion Distributed Simulation

Manuel Costa, João S. Ferreira, Fernando Lobo, Edmundo Nobre, António Câmara
Universidade Nova de Lisboa, Portugal

Comparing Simulation Methods for Fire Spreading across a Fuel Bed

Alexandre Muzy, Eric Innocenti, Antoine Aiello, Jean-François Santucci
University of Corsica, France

Gabriel Wainer
Carleton University, Canada

SESSION 10: **INTELLIGENT CONTROL** (*PARALLEL*)

CHAIR: **Mustapha Ouladsine** SINTRA ROOM

Four Wheel Steering Control by Fuzzy Approach

A. El Hajjaji, A. Ciocan, D. Hamad
Centre de Robotique, d'Electrotechnique et Automatique, France

Decentralized Predictive Longitudinal Control for Automated Highway Systems

M. El Adel
LESSI, Morocco

A. El Hajjaji
CREA-UPJV, France

Neural Modeling and Control of a Diesel Engine with Pollution Constraints

X. Dovifaaz, G. Bloch
Centre de Recherce en Automatique de Nancy, France

M. Ouladsine
LSIS/IUSPIM, France

A. Rachid
Université de Picardie Jules Verne, France

Lunch 12:30-13:50
BEATRIZ COSTA RESTAURANT

Technical Sessions 14:00-15:30

SESSION 11: **Agents II** (*PARALLEL*)

CHAIR: **Marc Le Goc** TIVOLI ROOM

A Multi-Agent Simulation Prototype for Decision Support in Electricity Markets

Isabel Praça, Carlos Ramos, Zita Vale
Polytechnic Institute of Porto, Portugal

Manuel Cordeiro
Universidade de Trás-os-Montes e Alto Douro, Portugal

Which Ties to Choose? A Survey of Social Networks Models for Agent-Based Social Simulations

Frédéric Amblard
Laboratory of Engineering for Complex Systems, France

PLEXUS-FEM Simulation Environment for Coupled Multi-Physics Phenomena

Felix C. G. Santos, Isledna Rodrigues, Maria Lencastre
Federal University of Pernambuco, Brazil

SESSION 12: **PhD Session II** (*PARALLEL*)

CHAIR: **Alessandra Orsoni** SINTRA ROOM

XML for the representation of Semantic in Model Coupling

Raphäel Duboz
Laboratoire d'Informatique du Litoral, France

Dynamic Models as Knowledge in Operating Systems Kernel

Mauro M. Mattos
Universidade de Blumenau, Brazil

Roberto Pacheco
Universidade Federal de Santa Catarina, Brazil

System Architecture for Integrated Fleet Management: Advanced Decision Support in the Logistics of Diversified and Geographically Distributed Chemical Processing

Agostino G. Bruzzone, Roberto Mosca, Roberto Revetria, Alessandra Orsoni
University of Genoa, Italy

Coffee Break 15:30-15:50
LOBBY OF TIVOLI ROOM

Technical Sessions 15:50-17:00

SESSION 13: **Simulation for Transport Problems II**

CHAIR: **Eric Cornelis** TIVOLI ROOM

Tuning Car Following Algorithms for Realistic Behaviour

Philippe Mussi
INRIA/CNRS/University of Nice, France

Urban Traffic System: A Multi-Modeling Approach

Michelle Chabrol, David Sarramia, Nikolay Tchernev
Université Blaise Pascal, France

Robustness Evaluation of Solutions for the Capacitated Arc Routing Problem

Gérard Fleury, Philippe Lacomme
University Blaise Pascal, France

Christian Prins, Wahiba Ramdane-Chérif
University of Technology of Troyes, France

Departure for Conference Banquet.....18:30
HOTEL LOBBY

Conference Banquet 19:30-22:00

Special Presentation..... 20:00-20:30

Speaker: Bernard P. Zeigler

Title: **Discrete Event Modeling and Simulation of the Continuous World**

Bernard P. Zeigler (PI) is Professor of Electrical and Computer Engineering at the University of Arizona, Tucson and Director of the Arizona Center for Integrative Modeling and Simulation. Receiving awards for his books and articles in the foundations of simulation, he was named Fellow of the IEEE for his theory of discrete event simulation based on the Discrete Event System Specification (DEVS) formalism in 1995. In 2000 he received the McLeod Founder's Award by the Society for Computer Simulation, its highest recognition, for his contributions to discrete event simulation. From 1993 to 1996, he headed a multidisciplinary team to demonstrate an innovative approach, based on DEVS, to massively parallel simulation supported by NSF's HPCC Grand Challenge initiative. He was also sponsored by Rome Labs to research the use of such high performance simulation technology in support of optimization and model abstraction. He was the PI on a DARPA Advanced Simulation Technology Thrust project to develop the DEVS framework for the DOD High Level Architecture (HLA) distributed simulation standard and its application to message reduction through predictive filtering. This research received Honorable Mention in the 1999 DMSO (US Defense Modeling and Simulation Organization) Awards – the only university-based work to be so recognized. A book on the modeling and simulation, organized by the Air Force Academy, Colorado Springs, has adopted the framework originated in his classic text, "Theory of Modeling and Simulation," which itself has been revised for a second edition and was published by Academic Press in Jan. 2000. Zeigler served on two National Research Council committees to recommend directions for information technology and simulation modeling in the 21st Century. He has been appointed to a third NRC committee on simulation enhancements to manufacturing. Serving from 1996 to 2000 as editor-in-chief of the Transactions of the Society for

Computer Simulation, Zeigler is currently Vice President in charge of Publications (web and print). He has given numerous keynote talks, tutorials and short courses, and organized symposia and conferences that were the first to promote modeling and simulation fundamentals and theory.

Wednesday, April 10, 2002

Registration 8:30-12:30
LOBBY OF TIVOLI ROOM

Keynote: Luís Camarinha-Matos.....8:30-9:30
TIVOLI ROOM

Title: **Multi-Agent Systems in Virtual Enterprises**

Luís Camarinha-Matos received his PhD in Computer Engineering from the New University of Lisbon in 1989, and he is currently professor of Robotics and Integrated Manufacturing at the same university. He is co-founder of the Center for Intelligent Robotics and coordinator of the Robotics and CIM research unit of the Uninova Institute. He has participated in many international and national projects, both as project leader and as researcher in the areas of virtual enterprises, advanced manufacturing and intelligent supervision systems. In the framework of IFIP he is the founder and first chairman of the new Working Group on Co-Operation infrastructures for Virtual Enterprises and electronic business having received the Silver Core Award for relevant services. He has been involved in the organization and program committees of more than 90 international conferences, being the founder of the IEEE/IFIP BASYS series of conferences on Information Technology for Balanced Automation Systems (steering committee chairman), and the IFIP PRO-VE series of conferences on Infrastructures for Virtual Enterprises (Steering Committee and Program Chair). He has edited various issues of Journals and several books, and he has more than 190 publications in Journals and conferences proceedings. He has also been reviewer and evaluator of projects for the European Commission and other research programs (Portugal, Brazil, Ireland and Argentina).

Technical Session 9:30-10:40

SESSION 14: **Business Modeling**

CHAIR: **David Hill** TIVOLI ROOM

On Planning and Control of Business Processes
Ryo Sato
University of Tsukuba, Japan

Identifying and Modeling of Organizational Logic with JavaBeans and Generic Management Standards
A. Gehrmann, S. Ishizu
Aoyama Gakuin University, Tokyo

A Comparison between Qualitative Simulation and Traditional Simulation: Bridging the Conceptual Gap
Mehmet Fatih Hocaoğlu
ITRI, Turkey

Coffee Break..... 10:40-11:00
LOBBY OF TIVOLI ROOM

Technical Session 11:00-12:10

SESSION 15: **M&S Methodologies/Practices III**

CHAIR: **Claudia Frydman** TIVOLI ROOM

An Environment Based on Formal Specification Transformations for Complex Embedded Multi-Agent Systems Co-Design

Abdelfettah Hasbani
IUT/Clermont-Ferrand, France

Towards Improving Multi-Agent Simulation in Safety Management and Hazard Control Environments

Dionisis Kechagias, Andreas L. Symeonidis, Pericles A. Mitkas
Aristotle University of Thessaloniki/ITI/CERTH, Greece

Miguel Alborg
IDI EIKON, Spain

Object-Oriented Modelling and Post-Genomic Biology Programming Analogies

David Hill
ISIMA, France

Concluding Remarks/Wrap-Up 12:10-13:00
TIVOLI ROOM

Lunch 13:00-14:20
BEATRIZ COSTA RESTAURANT

Visit to Lisbon 15:00-17:30