AI, Simulation, and Planning in High Autonomy Systems

MONDAY, MARCH 6, 2000

Registration	7:00 am – 5:00 pm
Authors' Breakfast	7:30 – 8:15 am
Introduction	**8:30 – 8:40 am**
Keynote: Wayne A. Wymore	**8:40 – 9:40 am**
Title: Simulation of Hybrid Systems	

Bio-Sketch:

Wayne A. Wymore earned BS and MS degrees at Iowa State University, and the PhD at the University of Wisconsin, Madison, all in mathematics. He is Visiting Professor of Systems Engineering at De Montfort University, Leicester, UK, and Professor of Systems and Industrial Engineering (SIE), Emeritus, at the University of Arizona where he was founder and first chairman of the SIE Department and first Director of the Computing Center. He is charter member #25 of the International Council on Systems Engineering (INCOSE), elected to the first Board of Directors and subsequently reelected, founder and first President of the Southern Arizona Chapter of INCOSE and among the first seven Fellows designated by INCOSE. While managing the SIE Department, teaching and developing courses, researching into the system theoretic foundations of systems engineering and consulting (50 organizations in 13 countries in 21 fields of application), he authored A Mathematical Theory of systems engineering: The Elements, 1967, systems engineering Methodology for Interdisciplinary Teams, 1976, and Model-Based systems engineering, 1993, at an average rate of 11 years per book. System Functional Analysis and System Design, Phase 2 of Model-Based systems engineering is forthcoming soon from CRC press.

Technical Sessions:	9:50 – 11:00 am

Session 1: Modeling & Simulation Theory   **Chair: B.P. Zeigler**

Adaptive Designs for Multiresolution, Multiperspective Modeling (MRMPM)
Paul Davis
RAND Corporation, USA

Towards a Modeling Formalism for Conflict Resolution and for Sociocybernetics
Tuncer Oren
Marmara Research Center, Turkey

Simulation of Meaning Generation: Multiscale Coalitions of Autonomous Agents
Alexander M. Meystel
Drexel University, USA

Coffee Break   11:00 – 11:20 am

Technical Sessions   11:20 – 12:30 pm

Session 2 – Ontologies (Parallel)   **Chair: E. Gelenbe**

DEVSIF: A Relational Algebraic DEVS Intermediate Format
Ki Jung Hong, Tag Gon Kim, KAIST, Korea
In Sup Kwon, Korea
Pyungchang Computer & Communication Inc, Korea

A Methodology for the Translation of Knowledge Between Heterogeneous Planners
Sujata Ramachandran, Michael Marefat, USA
The University of Arizona, USA

Ontology Engineering for Distributed Collaboration in Manufacturing
Line Pouchard, Oak Ridge National Laboratory, USA
Nenad Ivezic, Craig Schlenoff, NIST, USA

Session 3 - Traffic Simulation (Parallel)   **Chair: T. H. Cho**

Model-Based Artificial Life Systems: Card Game Player Example
Jang-Se Lee, Jong-Keun Lee, Sung-Do Chi
Hangkong University, Korea

Decomposition of a Traffic Flow Model For a Parallel Simulation
Matthias Schmidt
GMD-FRIST, Germany

Experimental Results of Timed Cell-DEVS Quantization
Garbriel A. Wainer, Universidad de Buenos Aires
Bernard P. Zeigler, The University of Arizona, USA

Luncheon   12:30 – 1:50 p.m.

Speaker: Colonel John C. Deal, U.S. Army, Fort Huachuca. Arizona
Topic: *Training, Operational Planning, Design and Development in the Virtual Domain*

Technical Sessions   2:00 – 3:30 pm

Session 4 - Agents I (Parallel)   **Chair: A. Uhrmacher**

Evolutionary Learning in Agent-based Modeling
Shingo Takahashi
Chiba Institute of Technology, Japan

Integrating Computable General Equilibrium Models & MultiAgent Systems - Why & How
Irene Peters,
Swiss Federal Institute for Environmental Science & Technology, Switzerland
Kai-H. Brassel, Technical University of Darmstadt, Germany

A Generic Distributed Simulation System For Intelligent Agent Design and Evaluation
John Anderson
University of Manitoba, Canada

Dynamic Interest Management in the Distributed Simulation of Agent-Based Systems
Brain Logan, University of Nottingham, United Kingdom
Georgios Theodoropoulos, University of Birmingham, United Kingdom

Session 5 - Neural Networks (Parallel)   **Chair: H. Szcerbicka**

Comparison of Neural Network Learning Methods in Application for Objects Recognition in Radar Systems
Zbigniew Swiatnicki,
Military University of Technology, Poland
Radoslaw Semklo, Air Force Computer Center, Poland

Enhanced Equal Frequency Partition Method For the Identification of a Water Demand System
Antoni Escobert, Rafael M. Huber, Angela Nebot,
University Polytechnic Catalunya, Spain
François E. Cellier, The University of Arizona, USA

Dynamic Neuronal Ensembles: A Complementary Development of Artificial Neural Networks
Sankait Vahie, i2 Technologies, USA

The Time Adaptive Self-Organizing Map With Neighborhood Functions for Bilevel Thresholding
Hamed Shah-Hosseini, Reza Safabakhsh
Amirkabir Technical University, Iran

Coffee Break   3:30 – 3:50 pm

Technical Sessions   3:50 – 5:20 pm

Session 6 - Agents II   **Chair: S. Takahashi**

Variable Structure/Agents Model Representation
Adelinde Uhrmacher
University of Ulm, Germany

Framework for Modeling/Simulation ofMobile Agent Systems
Jae-Hyrun Kim, Tag Gon Kim
KAIST, Korea

Resources Management System ForDistributed Platforms Based On Multi-Agent Systems
Francisco Hidrobo, Jose Aguilar
Universidad de los Andes, Venesuela

Towards Semiotic Agent-Based Models Of Socio-Technical Organizations
Cliff Joslyn, Luis M. Rocha
Los Alamos National Laboratory, USA

Special Panel Session   5:30 – 7:00 pm

Chair: Tuncer Oren
*Panelists***:** F. Cellier, E. Gelenbe, J. Rozenblit, W. Wymore, B.P. Zeigler

TUESDAY, MARCH 7, 2000

Registration   7:00 am – 5:00 pm
Authors' Breakfast   7:30 – 8:15 am
Keynote: Alexander M. Meystel   8:30 – 9:30 am
Title: Learning-Planning-Control Continuum

Bio-Sktech:
A. M. Meystel is a Professor of Electrical and Computer Engineering at Drexel
University. Since 1995, he is also at the National Institute of Standards and Technology
(NIST), Gaithersburg, MD as a Senior scientist, then as a Guest Researcher. He
developed a theory of the multiresolutional (multigranular, multiscale) intelligent systems
architecture and implemented it as the Planner-Navigator-Pilot for Autonomous Dune
Buggy (1984-1987) and robotic spray-casting machine (1987-1990). Now, he participates
in the NIST-guided work on a team of unmanned autonomous vehicles.

He is an author of more than 300 papers and 17 books including "Autonomous Mobile
Robots: Vehicles with Cognitive Control", World Scientific, 1991. He was one of the
initiators of the IEEE International Symposium on Intelligent Control, and served as a
general and program chair at four out of 14 meetings. He is on the IEEE Technical
Committee on Intelligent Control and is the moderator of the internet-based AICS-L list:
a discussion group on Architectures for Intelligent Control Systems.

Technical Sessions: 9:30 – 11:00 am

Session 1 - DEVS Theory I (Parallel)   **Chair: D. Hill**

*DEVS Framework for Systems Development: Unified Specification for Logical Analysis,
Performance Evaluation & Virtual Prototyping*
T.G. Kim, KAIST, Korea

Time Cell-DEVS: Modeling and Simulation of Cell Spaces
Gabriel A. Wainer, Universidad de Buenos Aires
Norbert Giambiasi, Université d'Aix-Marseille III, France

Generalised Discrete Event Abstractions of Dynamic Systems
Norbert Giambiasi
Université d'Aix-Marseille III, France

A Framework For Representing Numerical Multirate Integration Methods
Fernando J. Barros
Universidade de Coimbra, Portugal

Session 2 – System Design & Networks (Parallel)   Chair: D-K Baik

Entity Aspect Analysis and OO Design of Call Agents for NGN
Sung-Kong Park, Young-Joon Kim, Doo-Kwon Baik
South Korea

VHDL-Based Analysis of Network-Centric Systems
Mohammad A. Mikke, Abdullah Balamash, Salim Hariri
The University of Arizona, USA

Modeling of Communications Networks For the Virtual Radiology Environment Project
Ralph Martinez, Stelios Agapiou, Dan Bradford, Jay Cook
The University of Arizona, USA

Coffee Break   11:00 – 11:20 am

Technical Sessions: 11:20 – 12:30 pm

Session 3 - Military Applications (Parallel)   Chair: J. Anderson

Rational Agents, Simulation and Military Operations
John R. Surdu, Udo W. Pooch
Texas A&M University, USA

Maneuvering Agents Within A Synthetic Battlefield
Anthony J. Courtemanche
Science Applications International Corporation, USA

Towards an Integrated C31 Framework For Human Performance Modeling &Analysis
Beverly Knapp, John Warner
Army Research Laboratories, USA
Jerzy W. Rozenblit, The University of Arizona

Session 4 - Simulation Environments (Parallel)   Chair: R. Sato

Acquisition of Knowledge Based DEVS Models Using Extended Event Graphs
C. Frydman, N. Giambiasi, L. Torres
DIAM-IUSPIM, France

Virtual Simulation Environments
Christopher Landauer , Kirstie L. Bellman
Aerospace Integration Science Center, USA

Component Object Model Approach To Distributed Simulation Development
Tian Yuan
HiSense Software Co., Ltd, P.R. China

Lunch   12:30 – 1:30 pm

Technical Session   1:30 – 3:20 pm

Session 5 - Object Oriented Modeling & Design   Chair: T.G. Kim

Simulation and Analysis of Legal Processes
Maryam A. Purvis, Martin K. Purvis
University of Otago, New Zealand

Multimodeling & Object-Oriented Design Patterns Application to Bio-Control Simulation
D. R. C. Hill, M. K. Traore
B. L. Garcia, C. Mazel, A. Campos,
Université Blaise Pascal, France
P. Coquillard, Université d'Auvergne, France
T. Thibault, Université de Buce-Sophia Antipolis, France

Towards A System Methodology for Object-Oriented Software Analysis
Herbert Praehoper
Joahnnes Kepler University, Austria

Coffee Break	3:20 – 3:40 pm

Technical Session	3:40 – 4:50

Session 6 - Distributed Simulation	**Chair: F. Barros**

Simulation-Based Planning and Optimization of Assembly Processes
Wilfried Sihn, Jörg Pirron, Ruediger Weller, Matthias Brenner
Franunhofer Institute for Manufacturing Engineering and Automation, Germany

*Modeling and Simulation of Supply Chain Management Based on DEVS
and COBRA Framework*
Doohwan Kim, Heng Cao, Stephen J. Buckley
IBM T.J. Watson Research Center, USA

Design Considerations for Distributed Real-Time DEVS
Y.K. Cho, B.P. Zeigler, H.J. Cho, H.S. Sarjoughian, S. Sen
The University of Arizona, USA

Conference Banquet	6:00 – 8:00 pm

WEDNESDAY, MARCH 8, 2000

Registration	7:00 am – 4:00 pm
Authors' Breakfast	7:30 – 8:15 am
Keynote: Norman Foo	8:30 – 9:30 am

Title: Why Engineering Models Do Not Have A Frame Problem?

Bio-Sketch:
Norman Foo graduated B.E. (1965) and ME (1966) in Electrical Engineering, Canterbury University, and M.A. (1970) and PhD (1974) in Computer and Communication Sciences, University of Michigan. He has been assistant and visiting associate professor in SUNY Binghamton and visiting professor in the IBM Systems Research Institute and T.J. Watson Research Laboratories in Hawthorne, New York. From 1975 he was with the Basser Department of Computer, Sydney University where he eventually held a personal chair as Professor of Knowledge Systems. In 1996 he moved to the Department of Artificial Intelligence, School of Computer Science and Engineering, University of New South Wales.

Norman's research has ranged in the past from algorithm analysis, abstract datatypes, complexity theory, and modelling and simulation to his present interests in logic programming, knowledge representation, artificial intelligence logics, and cognitive science. He has graduated 16 doctoral and 3 masters students. In 1998 the Australian Research Council gave him a five-year Special Investigator Award.

Technical Sessions   9:30 – 11:00 am

Session 1 - DEVS Theory II (Parallel)   **Chair: G. Wainer**

DEVS-Based Modeling and Simulation of Intelligent Transportation Systems
Sung-Do Chi, Jong-Keun Lee
Hangkong Univiersity, Korea

Representation of Dynamic Structure Discrete Event Models: A Systems Theory Approach
Fernando J. Barros
Universidade de Coimbra, Portugal

FEOS-DECM: A High Level Event Oriented Formalism for the Specification of Control Systems
Norbert Giambiasi, Université d'Aix-Marseille III, France
Jean-Luc Paillet, Université d'Aix-Marseille I, France

Traffic Control Specifications Using Discrete Events Cellular Models
Gabriel A. Wainer, Alejandra Davidson
Universidad de Buenos Aires

Session 2 - Enterprise Manufacturing (Parallel)   **Chair: N. Giambiasi**

A Framework For Modeling, Designing And Simulation of Management Systems - A Generic Standard Approach
Andreas Gehrmann, TUV Rheinland Japan LTD System Certification Dept., Japan
Syohei Ishizu, Aoyama Gakuin University, Japan

Modeling and Simulation of Business- Logistics With Business Process Equation
Ryo Sato
University of Tsukuba, Japan

Hierarchical Animation Environment
Tae Ho Cho, Mi Ra Yi

Sungkyunkwan University, South Korea

DEVS-Based Business Planning Tool For Manufacturing Systems
Iyer Subramanian, Bernard Zeigler, Hyup Cho,The University of Arizona, *USA*
Jerry Couretas, Terra Sun, LLC, USA

Coffee Break   11:00 – 11:20 am

Technical Sessions   11:20 – 12:30 pm

Session 3 - Machine Learning (Parallel)   **Chair: P. Davis**

Discrete Event Simulation Using Goal Oriented Learning Agents
Erol Gelenbe, Esin Seref, Zhiguang Xu
University of Central Florida, USA

Flexible and Fast Convergent Learning Agent
Michael M. Marefat, Miguel A. Soto Santibanez
The University of Arizona, USA

How to Execute a Tutoring Process
A. Martens, A. Uhrmacher
University of Ulm, Germany

Session 4 - Hybrid M&S (Parallel)   **Chair: S. Ishizu**

Model Based Design
Jerzy W. Rozenblit
The University of Arizona, USA

Automatic Derivation of Meaningful Experiments for Hybrid Systems
Angelo E. M. Ciarlini, Pontifica Universidad Catolica do R.J., Brazil
Thom Frühwirth, University of Munich, Germany

Automated Validation of System Requirements For Embedded Systems Design
Yarisa Jaroch, Steven Cunning, Jerzy W. Rozenblit
The University of Arizona, USA

Lunch   12:20 – 1:30 pm

Technical Session   2:00 – 3:10 pm

Session 5 – Robotics & Neural Nets   **Chair: C. Joslyn**

Neural Networks Application For Medical Image Analysis
Zbigniew Swiatnicki, Waclaw Bejtan
Military University of Technology, Poland

Discrete Event Modeling and Simulation Of Multi-Robot Systems
S. Akhavan, M. Jamshidi, The University of New Mexico, USA
H.S. Sarjoughian, B. P. Zeigler, The University of Arizona, USA

*Modeling and Simulating Distributed Object Computing Systems: A Case Study
of a DEVS/HLA System*
Daryl R. Hild, MITRE Corporation, USA
Hessam S. Sarjoughian, The University of Arizona, USA

Concluding Remarks/Wrap-Up: 3:30 – 4:00 pm