



THE SOCIETY FOR
MODELING & SIMULATION
INTERNATIONAL

PROUDLY PRESENTS

SUMMER SIM

Summer Simulation Multi-Conference 2013

July 7 - 10, 2013

The Fairmont Royal York, Toronto, Canada



2013 SummerSim

PROGRAM BOOK

July 7 - 10, 2013
Fairmont Royal York Hotel
Toronto, ON, Canada

General Chair
Dr. Abdolreza Abhari



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Conference Information

2013 Summer Simulation Multi-Conference (SummerSim'13)

General Chair: Abdolreza Abhari, Ryerson University

Program Chair: Francesco Longo, University of Calabria

Program Co-Chair: Linda Ann Riley, Roger Williams University

Publicity Chair: Maryam Davoudpour, Ryerson University

Local Chair: Hooman Tahayori, Ryerson University

Summer Computer Simulation Conference (SCSC'13)

General Co-Chair: Agostino Bruzzone, University of Genoa

General Co-Chair: Peter Kropf, University of Neuchatel

Program Chair: Adriano Solis, York University

The Summer Simulation Conference 2013 (SummerSim'13) is SCS's premier international conference. The conference focuses on modeling and simulation, tools, theory, methodologies and applications and provides a forum for the latest R&D results in academia and industry.

Grand Challenges in Modeling and Simulation (GCMS'13)

Honorary Chair: Roy Crosbie, California State University, Chico

General Chair: Hamid Vakilzadian, University of Nebraska-Lincoln

Program Chairs: Ralph Huntsinger, California State University, Chico
Kelly Cooper, Office of Naval Research

The 6th International Conference on Grand Challenges in Modeling and Simulation (GCMS'13) is one of the constituent conferences of the 2013 Summer Simulation Multi-Conference (SummerSim'13). Following the success of the earlier conferences in Ottawa, Genoa and The Hague the focus of GCMS'13 continues to be on the major challenges that must be met if the full potential of modeling and simulation is to be realized. Significant progress in M&S methods and applications has accompanied the rapid growth in the power and cost-effectiveness of available computer systems, but many challenges remain.

Conference Information

International Symposium on Performance Evaluation of Computer and Telecommunication Systems (SPECTS '13)

- General Chair:** Pere Vila, Univ.of Girona, Spain
Program Chair: Isaac Woungang, Ryerson Univ., Canada
Program Co-Chair: Mario Marchese, Univ. of Genoa, Italy
Program Co-Chair: Floriano DeRango, Univ. of Calabria, Italy

This annual International conference is a forum for professionals involved in the performance evaluation of computer and telecommunication systems. Performance evaluation of computer systems and networks has progressed rapidly in the past decade and has begun to approach maturity. Significant progress has been made in analytic modeling, simulation and measurement approaches for performance evaluation of computer and telecommunication systems.

Work in Progress (WIP'13)

- General Chair:** Linda Riley, Roger Williams University
General Co-Chair: Maryam Davoudpour, Ryerson University

The Work in Progress Session of the 2013 Summer Simulation Multiconference provides authors with a unique opportunity to present papers on work that is currently in progress or work exploring emerging themes in modeling and simulation. This year's session offers a range of papers covering a variety of topics. Some of the common themes include: propositions for new high-level simulation and modeling frameworks, optimization approaches using new applications of evolutionary algorithms, applied simulation of specific societal and organization challenges, and social network modeling using custom-designed algorithms.

Registration

Your registration for SCS's 2013 Summer Simulation Multi-conference (SummerSim'13) includes morning and afternoon breaks each day, the Monday evening reception and access to all sessions, tutorials and special presentations (unless otherwise noted).

Registration Hours (Ballroom Foyer):

Sunday, July 7th – 3:00pm-6:00pm

Monday, July 8th – 7:00am–5:00pm

Tuesday, July 9th – 7:00am–5:00pm

Wednesday, July 10th – 7:30am–3:00pm

Conference Information

Breaks

Coffee Breaks (Ballroom Foyer):

Monday, July 8th – 10:00am–10:30am | 3:00pm–3:30pm

Tuesday, July 9th – 10:00am–10:30am | 3:00pm–3:30pm

Wednesday, July 10th– 10:00am–10:30am | 3:00pm–3:30pm

Monday Evening Reception

There will be a reception with drinks and appetizers in the Ballroom Foyer area for all attendees, on Monday, July 8, beginning at 5:00pm.

Speakers' Breakfasts

Speakers' breakfasts will be held Monday–Wednesday from 7:15am–8:15am in the Ballroom Foyer. The presenters for each day are invited to join their session chairs at a breakfast on the morning of their presentation. Each paper's presenter should receive a ticket with their registration material indicating the time, day and room for the breakfast they may attend.

Best Paper Award

Each Symposium will have a best paper chosen and the awards will be presented during the conference.

Keynote Presentations Located in the Ballroom

Monday 8:30am–10:00am

Azam Khan

Tuesday 8:30am–10:00am

Shikharesh Majumdar

Wednesday 8:30am–10:00am

Mhamed Itmi

Bahram Nassersharif

Conference Information

Meetings and Workshops

Confidence in Simulations for Science Workshop

July 10, 2013, 1:30-3:00 break 3:30-5:00pm

York Room

Modeling and simulation are increasingly used to understand and analyze systems across a range of scientific disciplines including biological, sociological, ecological and economics. This is a highly challenging interdisciplinary endeavor, requiring practitioners to consider whether their simulation outputs are truly representative of the systems they simulate. This workshop explores the issue of building confidence in scientific simulation results, and draws together the experiences from different domains and applications. The aim is for participants to understand how these issues differ and are addressed across various domains, discuss best practice and recognize outstanding issues. This workshop explores methodologies and techniques for the construction and analysis of simulations, including: stakeholder engagement and interaction; identifying and managing levels of required confidence; guiding simulation development to appropriate levels of abstraction; model inference from domain data; dealing with a lack of domain data; parameterizing simulations; calibration; analysis of simulation results; and examples, and implications of, simulation found to be either high or low quality representations of their target systems.

Organizers: Dr. Mark Read, Prof. Jon Timmis, Dr. Paul S. Andrews, Dr. Kieran Alden

Sim Summit Meeting

July 10, 2013 10:30-12:00pm

York Room

SimSummit is an informal roundtable of leading organizations with broad interest in M&S technology, professional development, industry and market, including government, commercial, academic and professional. *SimSummit* member organizations are particularly invited, but other individuals and organizations are fully welcome also.

Body of Knowledge Workshop

July 8, 2013 10:30-12:00pm

York Room

The Modeling and Simulation Body-of-Knowledge (BOK) is conceived to be that set of knowledge elements and associated competencies that definitively characterize the M&S community-of-practice. Formally:

- Body-of-Knowledge (BOK) – The set of justified true beliefs and competencies - explicit and implicit - that define a discipline, practice, role, or field-of-endeavor.
- BOK Index – The set of denotative references to knowledge elements comprised in the BOK

The specification of the M&S BOK is essential to establish a sound scientific basis for M&S technology investment and education; as well as to support establishing the identity of modeling and simulation as a distinctive technical field or discipline, as a viable profession, and as a powerful emerging information-industry.

The subject workshop is intended to address ways and means to support the broad-based collaboration on the subject of the M&S BOK so as to result in a persistent, dynamic, open, accessible BOK specification database.

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The Society for Modeling & Simulation International (SCS)

Sponsored by SCS in cooperation with IEEE Communications Society & ACM

Welcome to SummerSim'13

Welcome from the General Chair

Welcome to 2013 Summer Simulation Multi-Conference (SummerSim'13) in Toronto, Canada. SummerSim'13 is sponsored by the Society for Modeling and Simulation International (SCS) in cooperation with ACM and IEEE and provides an excellent opportunity for experts from industry and academia to meet and exchange ideas about advancements of modeling and simulation.



This year's SummerSim'13 features various tracks, keynote speeches and peer reviewed paper presentations in several sessions. One of the symposiums of SummerSim'13 is Summer Computer Simulation Conference (SCSC'13) that includes a number of tracks and subgroups in the areas of modeling and simulation, tools, theory, methodologies and applications. Another symposium is 2013 International Symposium on Performance Evaluation of Computer and Telecommunication Systems (SPECTS 2013). This annual international conference is a forum for professionals involved in the performance evaluation of computer and telecommunication systems. SummerSim'13 is also co-located with Grand Challenges in Modeling and Simulation (GCMS'13) symposium. GCMS'13 focuses on challenges related to modeling and simulation (M&S), Methodology, Tools, and Software Applications (MTSA), and M&S issues concerning Very Large and Complex Systems (VLCS). In addition, SummerSim'13 includes Work in Progress Session (WIP13). WIP13 is a forum for researchers and graduate students to present their ongoing research activities, projects or dissertation works.

I would like to express my gratitude to Society of Modeling and Simulation (SCS) organizers and the technical committee members of all tracks of SummerSim'13 conferences. The technical committee members have greatly helped in ensuring the rich quality of the conference programs. I also want to thank Faculty of Science (FOS) of Ryerson University for supporting this event. In particular, I would like to thank the following SummerSim organizers for their thorough work:

2013 Summer Simulation Multi-Conference (SummerSim'13)

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- Program Co-Chair: Dr. Linda Ann Riley, Roger Williams University, US.
- Publicity Chair: Dr. Maryam DavoudPour, Ryerson University, Canada
- Local Chair: Dr. Hooman Tahayori, Ryerson University, Canada

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- General Co-Chair: Dr. Peter Kropf, University of Neuchatel, Switzerland
- Program Chair: Dr. Adriano Solis, York University, Canada

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- Honorary Chair: Dr. Roy Crosbie, California State University, Chico, US.
- General Chair: Dr. Hamid Vakilzadian, University of Nebraska-Lincoln, US.
- Program Co-Chair: Dr. Ralph Huntsinger, California State University, Chico
- Program Co-Chair: Kelly Cooper, Office of Naval Research

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- Program Co-Chair: Dr. Mario Marchese, University of Genoa, Italy
- Program Co-Chair: Floriano De Rango, University of Calabria, Italy

Work in Progress Session (WIP13)

- Chair: Dr. Linda Riley, Roger Williams University, US.
- Co-Chair: Dr. Maryam Davoudpour, Ryerson University, Canada

My final thanks go to the VP of SCS conferences Dr. Gabriel Wainer and all my colleagues in the office of SCS, especially Oletha Darensburg, Aleah Hockridge, and Yen-Trang Tran. At the end, I would like to invite you to join me and applaud the main contributors of this event, the authors and presenters of the papers, who made SummerSim'13 possible and a successful event.

Abdolreza Abhari

General Chair of SummerSim 2013
Department of Computer Science, Faculty of Science (FOS), Ryerson University
Toronto, Canada

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KEYNOTE SPEAKERS

Keynote Speaker

TITLE: eScience as Knowledge-building

AUTHOR: Azam Khan

TIME: Monday, 8:30am-10:00am

LOCATION: Ballroom



ABSTRACT:

Today, new knowledge is built by doing research, writing a paper that describes the insights discovered, and by publishing the paper. Recently, the term "e-Science" has been used to describe the digitization of this process but falls short as it only applies to step one: doing research. However, it could be so much more. When e-Mail became the "killer app of the internet", it didn't just change how we create mail and then we print it out and put it in an envelope with a stamp and send it through the post. For e-Science to become a "killer app of science", it must go beyond writing papers based on big data, high-performance computing, and machine learning, and include the digitization of the description of insights discovered and the publishing of those insights. This is where modeling and simulation become critical as a mechanism to encode new knowledge. But a complete e-Science domain must also include the collaborative authoring of a domain ontology and data model together with the simulation model. We sketch out a vision for e-Science that could significantly change the way we think of -and participate in- knowledge-building.

SHORT BIO:

Azam Khan is the Head of the Environment & Ergonomics Research Group at Autodesk Research. He is the Founder of the Parametric Human Project Consortium, SimAUD: the Symposium on Simulation for Architecture and Urban Design, and the CHI Sustainability Community. He is also a Founding Member of the International Society for Human Simulation and is currently the Velux Guest Professor at The Royal Danish Academy of Fine Arts, School of Architecture, at the Center for IT and Architecture (CITA) in Copenhagen, Denmark. He received his B.Sc. and M.Sc. in Computer Science at the University of Toronto. He has published over 50 articles in simulation, human-computer interaction, architectural design, sensor networks, and sustainability. His team is currently developing a new experimental DEVS simulator to explore simulation as a component of eScience.

Keynote Speaker

TITLE: Cloud Computing: From Enterprises to Cyber-Physical Systems

AUTHOR: Shikharesh Majumdar

TIME: Tuesday, 8:30am-10:00am

LOCATION: Ballroom



ABSTRACT:

The popularity of cloud computing that provides resources on demand and empowers its users with the ability to increase or shrink their resource requirements dynamically is growing rapidly. The pay as you go model employed by the cloud and its ability to unify geographically dispersed virtualized resources are spreading its deployment to multiple domains that include enterprise computing, scientific and engineering applications as well as cyber-physical systems such as sensor equipped bridges and other infrastructures. An effective management of resources is crucial in each of these scenarios to effectively harness the power of the underlying resource pool and achieve high system performance. Focusing on resource management this talk will address the various challenges and potential solutions in the context of a cloud deployed in these various application scenarios. The issues that will be addressed include:

- **Performance and Revenue:** How to provide the desired quality of service as reflected in service level agreements (SLAs) between users and providers while achieving an adequate revenue for the service provider? What role does energy management play in this context?
- How to handle uncertainties regarding the workload and local policies deployed at a large number of diverse resources in the context of resource management?
- How to exploit the elasticity provided by a cloud in dynamic resource provisioning for achieving a desired grade of service?
- **Handling mobility:** In addition to mobile clients mobile servers need to be considered. The challenges and potential solutions for hosting a service on a mobile device will be discussed.
- **Cyber-Physical systems:** Additional challenges in the context of cyber-physical systems that include “network enabling” of diverse resources as well services for low latency data transfers and fast analysis of sensor data will be discussed.

SHORT BIO:

Shikharesh Majumdar is a Professor and the Director of the Real Time and Distributed Systems Research Centre at the Department of Systems and Computer Engineering at Carleton University in Ottawa, Canada. He represents Carleton University in the board managing the Huawei-TELUS Centre of Innovation for Enterprise Cloud Services that focuses on collaborative research among Huawei, TELUS and Carleton. Dr. Majumdar is a member of the faculty team actively involved with Carleton University’s Canada-India Centre for Excellence. He holds a Ph.D. degree in Computational Science from University of Saskatchewan, Saskatoon, Canada. His research interests are in the areas of cloud and grid computing, operating systems, middleware and performance evaluation. Dr. Majumdar actively collaborates with the industrial sector and has performed his sabbatical research at Nortel and Cistech. He is the area editor for the Simulation Modeling Practice and Theory journal published by Elsevier. Dr. Majumdar is a member of ACM and IEEE and was a Distinguished Visitor for the IEEE Computer Society from 1998 to 2001.

Keynote Speaker

TITLE: Dealing with systems of systems and autonomy

AUTHOR: Dr. Mhamed Itmi, LITIS EA4108 (Computer Science, Information Processing, and Systems Laboratory), INSA, Rouen, France

TIME: Wednesday, 8:30am-9:15am

LOCATION: Ballroom



ABSTRACT:

Although systems of systems (SoS) are recognized among industry and academia, they still have different meanings. In the most relevant sense a SoS is seen as a complex system with a multi-disciplinary approach. Dealing with SoS generally means working with distributed heterogeneous systems that work independently but with coordination objectives to meet the SoS needs. Such SoS raise different kinds of problems, particularly in their dynamics, related to the emergence and autonomy of systems. However there are various interpretations of the autonomy. Autonomy calls for another level of complexity because we cannot anticipate the behavior of an autonomous system. Then what about the control of a SoS? This will be discussed.

The talk will have concerns with some theoretical aspects as well as with applications, particularly some current experiments in the domains of logistics and transportation. It will also focus on the education aspects.

SHORT BIO:

Dr. Mhamed Itmi is an Associate Professor at INSA-Rouen (France), a member of the research laboratory LITIS EA4108 (Computer Science, Information Processing, and Systems Laboratory, France) and Past Adjunct Research Associate Professor at CSU-Chico (CA, USA). He earned a Ph.D. degree in Probability theory and Statistics, a second Ph.D. degree in Computer Science and an HDR: a habilitation diploma that allows supervising PhD students. His research interests are on distributed systems, modeling and simulation, performance evaluation of Discrete Event Systems. He has published more than a hundred publications in conferences and journals. He supervised several Ph.D. theses, and managed different research projects in Logistics and Transportation domains particularly for container terminals. He received recently a large financial award for excellent research, scholarship and teaching. Dr. Itmi is in charge of IT technology transfer at INSA-Rouen and actively collaborates with the industrial sector. He is a member of different professional societies and an active member of SCS (The Society for Modeling and Simulation International). He is the International Associate co-Director of the SCS International Network MISS (McLeod Institute of Simulation Sciences), co-Editor of the SCS journal SIMULATION (SAGE Publications) and of the IJMSSC journal (World Scientific).

Keynote Speaker

TITLE: Supercomputing and Challenges for the Future

AUTHOR: Dr. Bahram Nassersharif

TIME: Wednesday, 9:15am-10:00am

LOCATION: Ballroom



ABSTRACT:

A historical review and perspective on the development and advancement of high-performance computing architectures will be presented covering the development of scalar, superscalar, vector, parallel-vector, massively parallel, parallel clusters, hybrid clusters, and large scale parallel multicore and many core systems will be reviewed. The relationship between simulation software computational requirements and architectural developments will be reviewed. The new architectures for high-performance computing present many new challenges for simulation software development to adapt to and scale with them. Challenges in developing new algorithms and software that are fault-tolerant, precision-preserving, self-adapting, and auto-tuning will be discussed. High-performance computing system's performance characteristics with respect to computational speed and power consumption will be discussed.

Particular simulations methods for neutron transport and complex porous media multiphase flows developed by Dr. Nassersharif and his students will be introduced. The cellular automata method developed for neutron transport and its implementation for high performance computing systems will be introduced and some sample application presented. The method of lattice-Boltzmann developed for simulation of multiphase flows in complex porous media will be introduced and some sample implementation for high-performance computers will be shown. The scalability of the methods and mapping to many core architectures will be discussed.

SHORT BIO:

Dr. Bahram Nassersharif is Distinguished University Professor in the Department of Mechanical, Industrial, and Systems Engineering at the University of Rhode Island. His research and teaching interests for the past 25 years have focused on engineering analysis and design utilizing high performance computing systems. He completed his Ph.D. in Nuclear Engineering with a minor in Applied Mathematics in 1982 from Oregon State University (OSU). His research and teaching career over the past 30 years included position as Scientific Staff Member at Los Alamos National Laboratory, Professor of Computer Science and Nuclear Engineering at Texas A&M, Professor of Mechanical Engineering (since 1991) at UNLV, New Mexico State University, and University of Rhode Island. He was the founding director of the Texas A&M University Supercomputer Center in 1988 and the first director of the National Supercomputing Center for Energy and the Environment.

His administrative career has included Directorship of several university and national research centers, Department Head of Mechanical Engineering, and most recently Dean of Engineering at the University of Rhode Island.

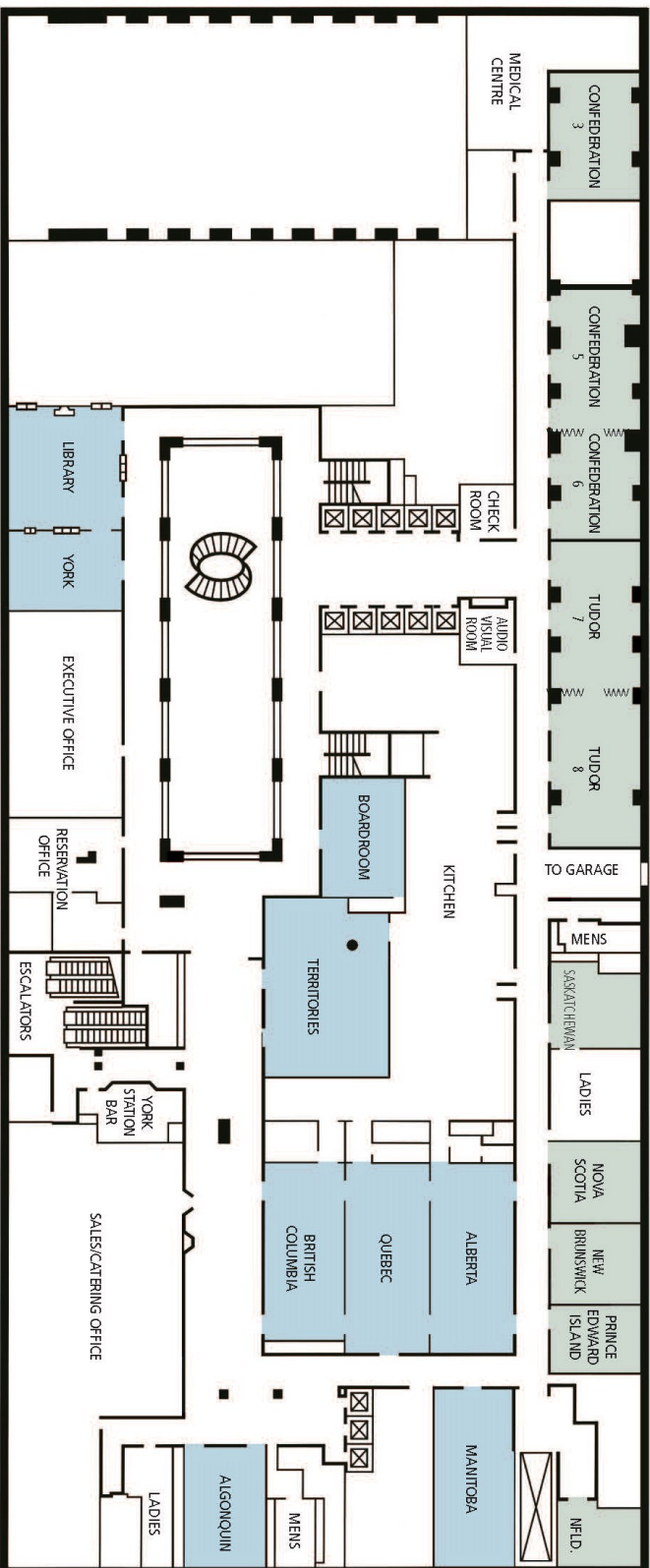
Notes

Notes

MAPS

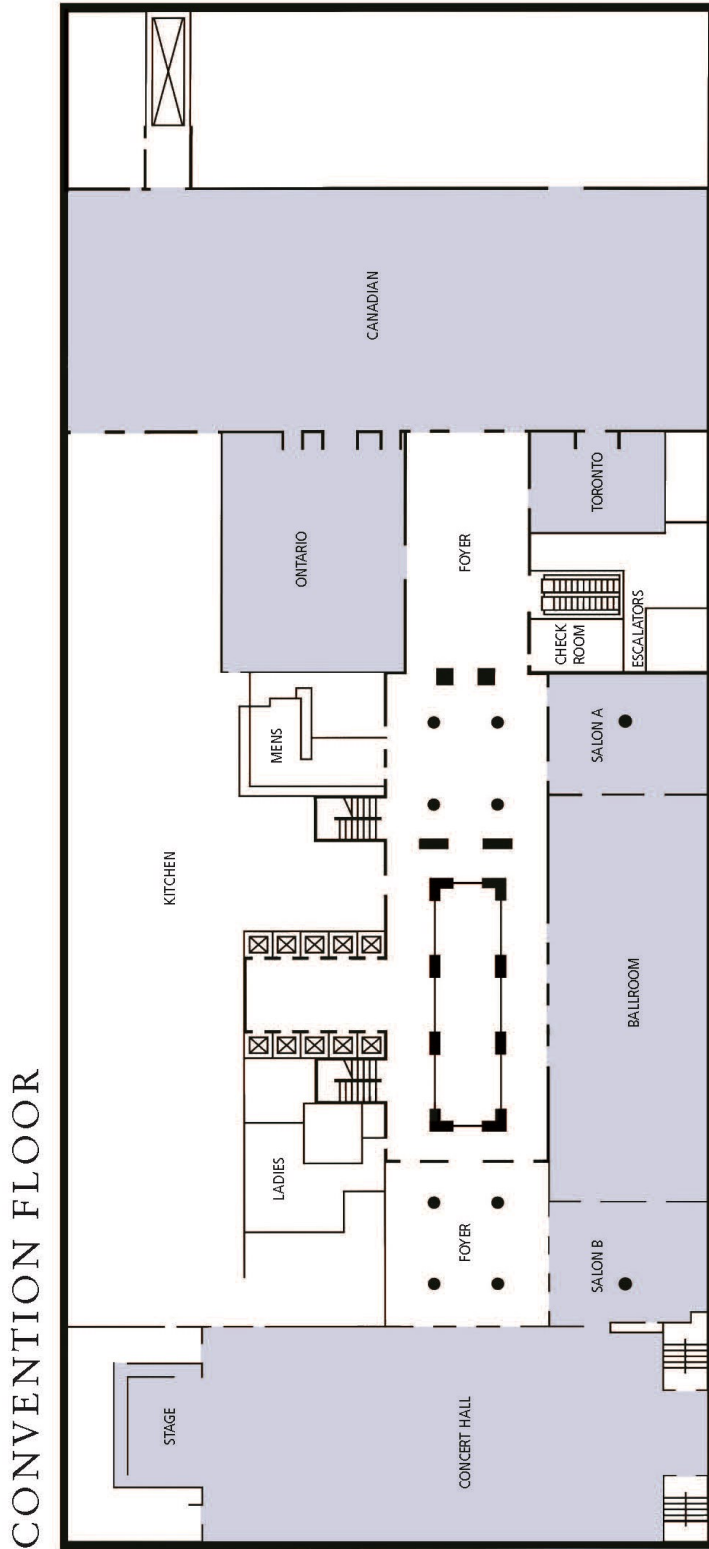
Hotel Floor Plan

MAIN MEZZANINE FLOOR



The Main Mezzanine is located on the floor above the lobby

Hotel Floor Plan (Cont.)



The Convention floor is above the Main Mezzanine

SummerSim'13 At A Glance Sessions

		SCSC 1	SCSC 2
Monday	8-July-2013		
0830 – 1000	SCS Plenary		
1000 – 1030	Coffee Break		
1030 – 1200	Session Block I	Saskatchewan	
1200 – 1330	Lunch (on your own)		
1330 – 1500	Session Block II	Saskatchewan	York
1500 – 1530	Coffee Break		
1530 – 1700	Session Block III	Saskatchewan	York
Tuesday	9-July-2013		
0830 – 1000	SCS Plenary		
1000 – 1030	Coffee Break		
1030 – 1200	Session Block IV	Saskatchewan	
1200 – 1330	Lunch (on your own)		
1330 – 1500	Session Block V	Saskatchewan	
1500 – 1530	Coffee Break		
1530 – 1700	Session Block VI	Saskatchewan	
Wednesday	10-July-2013		
0830 – 1000	SCS Plenary		
1000 – 1030	Coffee Break		
1030 – 1200	Session Block VII	Saskatchewan	
1200 – 1330	Lunch (on your own)		
1330 – 1500	Session Block VIII	Saskatchewan	
1500 – 1530	Coffee Break		
1530 – 1700	Session Block IX	Saskatchewan	
	Conference Ends		

SummerSim'13 At A Glance Sessions

	GCMS	SPECTS	WIPS
Monday			
0830 - 1000			
1000 - 1030			
1030 - 1200	New Brunswick	Nova Scotia	Ballroom
1200 - 1330			
1330 - 1500	New Brunswick	Nova Scotia	Ballroom
1500 - 1530			
1530 - 1700	New Brunswick	Nova Scotia	
Tuesday			
0830 - 1000			
1000 - 1030			
1030 - 1200	New Brunswick	Nova Scotia	Ballroom
1200 - 1330			
1330 - 1500	New Brunswick	Nova Scotia	Ballroom
1500 - 1530			
1530 - 1700	New Brunswick	Nova Scotia	
Wednesday			
0830 - 1000			
1000 - 1030			
1030 - 1200	New Brunswick	Nova Scotia	
1200 - 1330			
1330 - 1500	New Brunswick	Nova Scotia	
1500 - 1530			
1530 - 1700	New Brunswick		
Conference Ends			

SCSC Agenda

Monday, 8 July 2013

Session I 10:30 – 12:00 Room: Saskatchewan Session Chair: Agostino Bruzzone

Simulation for Training and Serious Games

- A Virtual Training System Based on Computer Sensing and Football Kicking Dynamics Using Real-Time Wireless Feedback (*Alyssa Schaeftbauer, Cole Meyers, Aaron Stout, Ehrin Biglari, Jacob Kantor and Yusheng Feng*)
- Mobile Simulation with Applications for Serious Gaming (*Andrew Jeffery, Jonathon Panke, Nick Eaket, Gabriel Wainer*)
- Serious Games as Enablers for Training and Education on Operations on Ships and Off-Shore Platforms (*Agostino G. Bruzzone, Marina Massei, Adriano O. Solis, Simonluca Poggi, Christian Bartolucci, Lorenzo D'Agostino Capponi*)

Session II 13:30 – 15:00 Room: Saskatchewan Session Chair: Francesco Longo

Cloud Computing and Internet Simulation

- Research and Application on Cloud Simulation (*Bo Hu Li, Xudong Chai, Baocun Hou, Chen Yang, Tan Li, Tingyu Lin, Zhihui Zhang, Yabin Zhang, Wenhai Zhu, Zenghui Zhao*)
- Cloud ERP Simulation in Powersim Environment (*Victor Romanov, Alexandra Varfolomeeva*)
- OSSim: A Generic Simulation Framework for Overlay Streaming (*Giang Nguyen, Mathias Fischer, Thorsten Strufe*)
- Self-Similarity of the Simulated Internet Traffic from the Source with Clustered Fragmented Periodic Output (*Yuri B. Boiko, Tet H. Yeap*)

Parallel Session (York Room)

Session II 13:30 – 15:00 Room: York Session Chair: Adriano O. Solis

Simulation of Machining, Materials Processing, and Industrial Systems

- Application of AMESim and Matlab Simulation on Hydraulic Servo Control System of Spinning Lathe (*Feiku Zhang, Hui Li, Xudong Yang*)
- Enhancing Product Performance in Machining Processes: Statistical Analysis and Development of Predictive Models (*Giovanna Rotella, Stefania Rizzuti, Domenico Umbrello*)
- Bottleneck Analysis in a Pharmaceutical Production Line Using Simulation Approach (*Hamidreza Eskandari, Nazanin Babolmorad, Nastaran Farrokhnia*)

SCSC Agenda

Monday, 8 July 2013

- Simulation and Optimization of Haulage System of an Open Pit Mine (*Hamidreza Eskandari, Hadi Darabi, Seyed Amirhamed Hosseinzadeh*)
- Data Driven Process Modeling and Simulation: An Applied Case Study (*ZhiJun Lu, Qian Xiang, Jun Gu*)

Session III 15:30 – 17:00 Room: Saskatchewan Session Chair: Gianfranco Fancello

Simulation for Transportation

- Traffic Light Regime for a Specific Approach to a City (*Reuben Thieberger*)
- Improving Scenario Selection for Simulations by Run Time Control Flow Analysis (*Christian Berger*)
- Optimization Validation of a High Speed Boat (*Ben Rosenthal, Raju Datla, Dave Greeley, David Kring, Troy Keipper, Bill Milewski*)
- Design of a 3D Interactive Simulator for Driver Behavior Analysis (*Smaragda Christodoulou, Despina Michael, Andreas Gregoriades, Maria Pampaka*)
- A Causal Model to Schedule Efficient Ground Delays in Present Air Traffic Management Systems: Modeling and Simulation for Complex Networks Management (*Jenaro Nosedal, Miquel A. Piera, Sergio Ruiz*)

Parallel Session (York Room)

Session III 15:30 – 17:00 Room: York Session Chair: Peter Kropf

Emergency Simulation

- Disaster Scene Reconstruction: Modeling and Simulating Urban Building Collapse Rubble within a Game Engine (*Alexander Ferworn, Scott Herman, Jimmy Tran, Alex Ufkes, Ryan McDonald*)
- The EvacSim Pedestrian Evacuation Agent Model: Development and Validation (*Sean Og Murphy, Kenneth N. Brown, Cormac Sreenan*)
- Humanitarian/Emergency Logistics Models: A State of the Art Overview (*Rafael Diaz, Joshua Behr, Ange-Lionel Toba, Bridget Giles, ManWo Ng, Francesco Longo, Letizia Nicoletti*)

SCSC Agenda

Tuesday, 9 July 2013

Session IV 10:30 – 12:00 Room: Saskatchewan Session Chair: Levent Yilmaz

Agent-Directed Simulation

- An Efficient Approach to Solving the Agent Training Problem for a Sustainable Group (*Haibin Zhu, Luming Feng, Ratvinder Singh Grewal*)
- RAMS: A Fast, Low Fidelity, Multiple Agent Discrete Event Simulator (*Tim Bakker, Garrett L. Ward, Siva T. Patibandla, Robert H. Klenke*)
- A DEVS Based M&S Method for Large-scale Multi-Agent Systems (*Mingxin Zhang, Mamadou Seck, Alexander Verbraeck*)
- WSN Simulation Model with a Complex Systems Approach (*Daniela Aguirre Guerrero, Ricardo Marcelin Jimenez, Enrique Rodríguez-Colina*)

Session V 13:30 – 15:00 Room: Saskatchewan Session Chair: Peter Kropf

Modeling and Simulation for Defense & Security

- A Simulation Study of the Shift System at a UK Police Communications Centre (*Andrew Greasley, Tony Taylor, Chris M. Smith*)
- A Methodology for Civilian Forecasting in DND (*Amy Cameron, Lise Arseneau*)
- Integrating Legacy Simulation Models into Component-Based Weapon System Simulation Environment (*Do Hyung Kim, Hyun Shik Oh, Seong Wook Hwang*)
- A Measure to Assess Combat Effectiveness Using Network Representation (*Youngwoo Lee, Taesik Lee*)

Session VI 15:30 – 17:00 Room: Saskatchewan Session Chair: John Sokolowski

Simulation of Complex Social Systems

- A Simulation Analysis to Weigh the Impact of Obesity: Corresponding Patient Need with Medical Capacity (*John A. Sokolowski, Catherine M. Banks, Saikou Y. Diallo, Jose J. Padilla, Christopher J. Lynch*)
- Toward an Agent Based Ecological Model of the Triple Helix Theory of Innovation Dynamics (*James R. Morris-King, Levent Yilmaz*)
- Reflections on a Virtual Experiment Addressing Human Behavior During Epidemics (*Liam Delaney, Adam Kleczkowski, Savi Maharaj, Susan Rasmussen, Lynn Williams*)

SCSC Agenda

Wednesday, 10 July 2013

Session VII 10:30 – 12:00

Room: Saskatchewan

Session Chair: Helena Szczerbicka

Modeling & Simulation of Dynamic/Interactive Systems

- Failure Development in Dependent Networks (*Ilya B. Gertsbakh, Yoseph Shpungin*)
- Explicit Modelling of Statechart Simulation Environments (*Sadaf Mustafiz, Hans Vangheluwe*)
- Cellular Simulation of Asymmetric Energy Requirements in Wireless Sensor Networks (*Mohammad El-Shabani, Mohammad Moallemi, Gabriel Wainer*)

Session VIII 13:30 – 15:00

Room: Saskatchewan

Session Chair: Kieran Alden

Miscellaneous Simulation Models and Applications

- Discrete Event Simulation for Design of Evolving Project Schedules (*Sanja Lazarova-Molnar, Rabeb Mizouni*)
- On the Potential of Semi-Conservative Look Ahead Estimation in Approximative Distributed Discrete Event Simulation (*Desheng Fu, Matthias Becker, Helena Szczerbicka*)
- Computational and Mathematical Models of the JAK-STAT Signal Transduction Pathway (*Vishakha Sharma, Adriana Compagnoni*)
- Petri Nets Extension to Model State Varying Failure Rates (*Sanja Lazarova-Molnar*)

Session IX 15:30 – 17:00

Room: Saskatchewan

Session Chair: Zhi Han

Utility/Game Theory and Graph-Theoretic Modeling & Simulation

- A Bayesian Approach to Assessing Expected Utility in the Simulation Decision (*Eric W. Weisel, Mikel D. Petty*)
- A Simulation on the Shapley Values (*Toshitaka Fukiharu*)
- A Graph Algorithm for Linearizing Simulink Models (*Zhi Han, Pieter J. Mosterman, Fu Zhang*)
- GTNA 2.0 – A Framework for Rapid Prototyping and Evaluation of Routing Algorithms (*Benjamin Schiller, Thorstne Strufe*)

GCMS Agenda

Monday, 8 July 2013

Session I 10:30 – 12:00 Room: New Brunswick Session Chair: Dietmar Moeller

Experimental Validation of Medium Fidelity Hydrodynamic Models

- Proof of Concept Development and Motion Verification of a Swimming Anguilliform Robot (Neelbot-1.0) (*John Baker Potts, Brandon Taravella and Ryan Thiel*)
- Transom Stern Modeling and Validation Through Ventilation Transition Speeds (*David Kring, Troy Keipper, Ben Rosenthal, Chris Szlatenyi and Raju Datla*)
- Modeling the Flow Over Planning Hulls with Ventilated or Cavitating Steps (*Neal Fine and David Kring*)

Session II 13:30 – 15:00 Room: New Brunswick Session Chair: Hamid Vakilzadian

Modeling Structural Behavior

- Modeling of Railroads in Approach Zones to Bridges (The Bridge End Problem) (*Juliusz Solkowski*)
- Finite Element Simulation of Composite Ship Structures Under Extreme Wave and Slamming Loads (*Md Hafizur Rahman, Siyuan Ma and Hassan Mahfuz*)
- Modeling of Cutting Force on a Viscoelastic Body for Surgical Simulation (*Yun Peng and Debao Zhou*)
- Simulation and Scale Testing to Improve the Next Generation of Wave Adaptive Modular Vessels (*Andrew Peterson, Mehdi Ahmadian, Michael Craft and Andrea Shen*)

Session III 15:30 – 17:00 Room: New Brunswick Session Chair: Roy Crosbie

Applications of M&S for Aircraft Operations

- Prototypical Implementation Of An Agent Based Framework for Modeling Flight Information Of Civil Aircrafts (*Yousef Farschtschi, Dietmar Moeller and Volker Gollnick*)
- Estimation of Ridas Performance by Means of Close to Reality Simulation (*Janis Schoenefeld and Dietmar Moeller*)
- Using Model Pipelines to Simulate the Processes in and Around an Airport through a Web Interface (*Mark Widemann and Dietmar Moeller*)

GCMS Agenda

Tuesday, 9 July 2013

Session IV 10:30 – 12:00 Room: New Brunswick Session Chair: Ralph Huntsinger

Models Including Response to Emergent Situations and Societal Considerations

- Response Information System on Oil Logistics Unexpected Emergency Situations (*Victor Romanov, Ilyya Moskovoy and Kseniya Grigoryeva*)
- EkuSim: Fast Hierarchical Algorithms for Realistic Evacuation Simulations (*Alexander Mihm, Andre Drews and Dietmar Moeller*)
- Modeling for Personal Well Being – time for paradigm Change (*Farzaneh Salamati and Zbigniew Paszek*)
- Multidisciplinary Approach to Building Regional Competitiveness (*Jerome Verny, Mhamed Itmi, Abdelkhalak El Hami, Habib Abdulrab, Alain Cardon and Ludovic Courturier*)

Session V 13:30 – 15:00 Room: New Brunswick Session Chair: Janel Nixon

Exercises in Modeling and Simulation

- Ubiquitous Learning: Teaching M&S with Technology (*Dietmar P.F. Moeller, Roland E. Haas and Hamid Vakilzadian*)
- Simulation of a Squirrel-Cage Induction Motor: An Exercise in Modeling and Simulator (*Richard Bednar, John Zenor and Roy Crosbie*)
- An Efficient FPGA Matrix Multiplier for Linear System Simulation (*Sam Mish, John Zenor and Roy Crosbie*)

Session VI 15:30 – 17:00 Room: New Brunswick Session Chair: William Waite

Panel: What More Do We Want in Modeling and Simulation Interoperability and Reuse?

Panelists: William Tucker, Agostino Bruzzone, Lin Zhang

- What More Do We Want in Modeling and Simulation Interoperability and Reuse? (*William Tucker and David Gross*)

GCMS Agenda

Wednesday, 10 July 2013

Session VII 10:30 – 12:00 Room: New Brunswick Session Chair: Mhamed Itmi

M&S for Manufacturing and Logistics

- Using Simulation Tool for Verifying Automated Guide Vehicle System Modeling and Cyclic Scheduling (*Gregorz Bocewicz and Pawel Pawlewski*)
- Complex Assembly Line Production Simulation Modeling Considering Robot Failures and Operator Cycle Times (*Annamalai Pandian*)
- Modeling and Simulation Workbench for International Student Team Projects in Transportation and Logistics (*Dietmar Moeller, Fabian Wagner, Isabell Alexandra Jahle, Valentina Fermanelli and Xiang Gao*)

Session VIII 13:30 – 15:00 Room: New Brunswick Session Chair: David Kring

Simulations Approaches for Analysis of Electric System Performance

- Application of Multi Tone Approach in Three Phase AC system Impedance Measurement (*Bo Zhou, Marko Jaksic, Zhiyu Shen, Paolo Mattavelli, Rolando Burgos and Dushan Boroyevich*)
- Experimental Evaluation of Voltage Source Inverter Switching Model with Embedded C Code Controller (*Bo Wen*)
- Simulation Validation of Design of Single Phase Multilevel Cascaded H-Bridge Shunt Current Injection Power Converter (*Marko Jaksic, Shen Zhiyu, igor Cvetkovic, Dushan Boroyevich and Rolando Burgos*)
- Synchronous Generator-Based Grid Interface Converter for Improved Grid Performance and Energy Storage Systems Integrator (*Igor Cvetkovic, Dushan Boroyevich, Rolando Burgos, Fred C. Lee and Qing-Chang Zhong*)

Session IX 15:30 – 17:00 Room: New Brunswick Session Chair: Neal Fine

Approaches for Improvements in Modeling and Simulation

- A Domain Dependant Approach to Determining File Importance (*K.C. Wong*)
- “JaamSim” Open-Source Simulation Software (*Harry King and Harvey Harrison*)
- Modeling and Robust Stability Analysis of Uncertain Systems (*Sharmila Sumsurooah, Milijana Odavic and Dushan Boroyevich*)

NOTES

SPECTS Agenda

Monday, 8 July 2013

Session I 10:30 – 12:00 Room: Nova Scotia Session Chair: Enrique Rodriguez-Colina

Software and Simulation Tools

- An Automated Tool Selection Method based on Model Transformation: OPNET and NS-3 Case Study (*Iyas Alloush, Yvon Kermarrec and Siegfried Rouvrais*)
- Architecture-Based Software Reliability with Error Propagation and Recovery (*Lance Fiondella and Swapna Gokhale*)
- NS-3 Module for Routing and Congestion Control Studies in Mobile Opportunistic DTNs (*Work in Progress*) (*Jani Lakkakorpi and Philip Ginzboorg*)
- LgDb 2.0 : Using Lguest for Kernel Profiling, Code Coverage and Simulation (*Eviatar Khen, Nezer Zaidenberg, Amir Averbuch and Evgeny Fraimovitch*)

Session II 13:30 – 15:00 Room: Nova Scotia Session Chair: Floriano De Rango

Wireless and Sensor Networks

- Broadcast Performance Analysis of IEEE 802.11 Networks Under Fading Channels (*Jinsong Zhang and Xiaomin Ma*)
- A Novel Strategy for Cognitive Radio Networks with Diversity and Non-Identical Fading Channels (*Sattar Hussain and Xavier Fernando*)
- Failure Impact on Coverage in Linear Wireless Sensor Networks (*Nader Mohamed and Jameela Al-Jaroodi*)

Session III 15:30 – 17:00 Room: Nova Scotia Session Chair: Pere Vila

Modeling and Performance Evaluation

- The Impact of Weights on the Performance of Server Load Balancing Systems (*Jörg Zinke and Bettina Schnor*)
- Performance Analysis of a Discrete-Time Queueing System with Customer Deadlines (*Herwig Bruneel and Tom Maertens*)
- Modeling and Analysis of the Survivability of Telecommunication Networks (*Lang Xie, Yuming Jiang and Poul E. Heegaard*)
- The Influence of the Buffer Size in Packet Loss for Competing Multimedia and Bursty Traffic (*Luis Sequeira, Julián Fenández-Navajas, Jose Saldana, José Ruiz-Mas, Idelkys Quintana and Luis Casadesus*)

SPECTS Agenda

Tuesday, 9 July 2013

Session IV 10:30 – 12:00 Room: Nova Scotia Session Chair: Pere Villa

Quality of Service Solutions and Algorithms

- Performance Evaluation of Telecommunication Systems with Repeated Attempts and Two Servers Classes (*Nawel Gharbi and Lynda Mokdad*)
- Network Controlled Cross Layer Fast Handover for MIPv6 Over IEEE 802.16m Networks (*Youngsong Mun and Kyunghye Lee*)
- Characterization of the Buffers in Real Internet Paths (*Luis Sequeira, Julián Fernández-Navajas and Jose Saldana*)
- Performance Evaluation of Scalable and Energy Efficient N Epidemic Routing in Delay Tolerant Networks (*Floriano De Rango and Salvatore Amelio*)

Session V 13:30 – 15:00 Room: Nova Scotia Session Chair: Floriano De Rango

Network Optimization and Power Control

- Power Aware Load Balancing in Heterogeneous Clusters (*George Terzopoulos and Helen Karatza*)
- Simulative Performance Comparison of Network Selection Algorithms in the Framework of the 802.21 Standard (*Igor Bisio, Stefano Delucchi, Fabio Lavagetto and Mario Marchese*)
- Decentralized Routing Algorithm for Wireless Mesh Network Based on Multi-Objective Optimization (*Carlos Lozano Garzon, Miguel Camelo, Pere Vila and Yezid Donoso*)

Session VI 15:30 – 17:00 Room: Nova Scotia Session Chair: Helene Karatza

Challenging Platforms and Applications

- Identity Matching in Social Media Platforms (*Reza Soltani and Abdolreza Abhari*)
- Cloud Service Level Planning Under Burstiness (*Anas Youssef and Diwakar Krishnamurthy*)
- Performance Comparison of a Probabilistic Fingerprint Based Indoor Positioning System over Different Smartphones (*Igor Bisio, Fabio Lavagetto, Mario Marchese and Andrea Sciarrone*)
- Evaluation of TCP Versions Over GEO Satellite Links (*Mauro Tropea and Peppino Fazio*)

SPECTS Agenda

Wednesday, 10 July 2013

Session VII 10:30 – 12:00 Room: Nova Scotia Session Chair: Helen Karatza

Communications Systems and Modulations

- Performance of Quadratic and Exponential Multiuser Chirp Spread Spectrum Communication Systems (*Muhammad Ajmal Khan, Raveendra Rao and Xianbin Wang*)
- Underlay Control Channel using Adaptive Hybrid Spread Spectrum Techniques for Dynamic Spectrum Access (*Salvador Perez-Salgado, Enrique Rodriguez-Colina, Michael Pascoe-Chalke and Alfonso Prieto-Guerrero*)
- Performance of Multiuser MIMO Communication System Using Chirp Modulation (*Muhammad Ajmal Khan, Raveendra Rao and Xianbin Wang*)
- Decision Aided Detection and Performance of Continuous Phase Chirp Keying (*Mohammed Zourob and Raveendra Rao*)

Session VIII 13:30 – 15:00 Room: Nova Scotia Session Chair: Isaac Woungang

Resource Control and Protocols

- Extensible and Realistic Modeling of Resource Contention in Resource Constrained Nodes (*Torsten Meyer, Bernd E. Wolfinger, Stephan Heckmüller and Alireza Abdollahpouri*)
- Dynamic Allocation of Sensor Nodes in Wireless Sensor Networks Hosting Multiple Applications (*Navdeep Kapoor, Shikharesh Majumdar and Biswajit Nandy*)
- Power Management in Multi-Core Processors Using Automatic Dynamic Pipeline Stage Unification (*Saravanan Vijayalakshmi, Alagan Anpalagan, Isaac Woungang and D. P. Kothari*)

NOTES

WIP Agenda

Monday, 8 July 2013

Session I **10:30 – 12:00** **Room: Ballroom** **Session Chair: Dr. Bahram Nassersharif**

- Designing an Agent Based Model for the Efficient Removal of Red Imported Fire Ant Colonies (*James Johnson and David Hoe*)
- Adapting a Natural System Simulation Model to a General-Purpose Metaheuristic: Toward Engineering Emergent Distributed Decision-Making (*Alexander Mentis and Levent Yilmaz*)
- Dot Matrices and Genetics Algorithms for MSA (*John Tsiligaridis and Fabian Ochoa*)
- Image Segmentation on GPGPUs: A Cellular Automata-based Approach (*Irving Olmedo, Yessika Guerra Perez, James Johnson, Lakshman Raut and David Hoe*)

Session II **13:30 – 15:00** **Room: Ballroom** **Session Chair: Dr. Linda Riley**

- Dynamic Network Analyzer - Building a Framework for the Graph-theoretic Analysis of Dynamic Networks (*Benjamin Schiller and Thorsten Strufe*)
- Social Network Modeling Using the DAWN (Dynamic Adjustable Weighted Network) Algorithm (*Nakisa Nassersharif*)
- Identification of Radio Disturbances of Wireless Sensor Networks (*Marina Eskola, Tapio Heikkilä and Tero Peippola*)
- A Model of An Open Exponential Queuing Network with Losses Due To Finite Shared Buffers in Multi-Queue Nodes (*Miron Vinarskiy*)

WIP Agenda

Tuesday, 9 July 2013

Session IV 10:30 – 12:00 Room: Ballroom Session Chair: Dr. Linda Riley

- Simulation Validation Using the Compatibility Between Simulation Model and Experimental Frame (*Damien Foures, Vincent Albert and Alexandre Nketsa*)
- Integrated Hybrid Systems Modeling and Simulation Methodology Based on HDEVS Formalism (Se Jung Kwon, Changho Sung, Hae Sang Song and Tag Gon Kim)
- Towards a Predictive Model Architecture for Current or Emergent Pandemic Situations (*Fortune S. Mhlanga, E. L. Perry, Ching-Song Don Wei and Peter A. Ng*)
- Simulation of Two Phase Flow in a Complex Porous Medium (*Bahram Nassersharif*)

Session V 13:30 – 15:00 Room: Ballroom Session Chair: Dr. Maryam Davoudpour

- A Multi-Objective Optimization Approach to Selecting Sets of Training Devices (*Stuart Grant and Slawo Wesolkowski*)
- An Adaptive Pitch Control Strategy for a Doubly FedWind Generation System (*Syed Ahmed Raza and Abu Hameed Mohamed Abdur Rahim*)
- Real-time Simulations to Support Operational Decision Making in Healthcare (*Sepideh Bahrani, Renaud Bougueng Tchemeube, Alain Mouttham and Daniel Amyot*)
- Discrete Event Simulation Optimization: A Review of Past Approaches and Propositions for Future Direction (*Linda Riley*)

Things to Do in Toronto

Art Gallery of Ontario—With a permanent collection of more than 73,000 works of art, the Art Gallery of Ontario is among the most distinguished art museums in North America. The Gallery began an extraordinary new chapter in 2008 when a stunning new design by world-renowned architect Frank Gehry opened its doors to the public amid international acclaim. Highlights include the Galleria Italia, a gleaming showcase made of wood and glass running the length of two football fields along the Gallery's façade, and the iconic staircase, spiraling up through the roof of Walker Court and into the new Contemporary Galleries above. From the extensive Group of Seven collection to the unique African Art Gallery; from David Altmejd's monumental installation The Index to Peter Paul Rubens' masterpiece The Massacre of The Innocents, a highlight of the internationally acclaimed Thomson Collection; there is truly something for everyone at the new AGO.

<http://www.ago.net/>

Casa Loma—Visit Canada's Majestic Castle, Casa Loma and step back in time to a period of European elegance and splendor. The former home of Canadian financier Sir Henry Pellatt, Canada's foremost castle is complete with decorated suites, secret passages, an 800-foot tunnel, towers, stables, and beautiful 5-acre estate gardens (open May through October).

<http://www.casaloma.org/>

CN Tower-Canada's National Tower and Wonder of the Modern World offers spectacular views, spell-binding Glass Floor, motion theatre ride and fantastic shopping. Visit Horizons for casual fare, or experience award-winning fine dining in 360 The Restaurant at the CN Tower

<http://www.cntower.ca/en-CA/Home.html>

Hockey Hall of Fame—The world's one and only! Experience the game that defines Canada and a sport that has been adopted by over 80 countries. Spread across over 60,000 square feet, the Hall of Fame offers something for everyone: the finest collection of hockey artifacts at all levels of play from around the world; state-of-the-art games that challenge shooting and goalkeeping skills; themed exhibits dedicated to the game's greatest players, teams and achievements; an extensive array of multimedia stations; theatres; larger-than-life statues; a replica NHL dressing room; an unrivalled selection of hockey-related merchandise and memorabilia within our new and expanded store; and NHL trophies including, best of all, hands-on access to the STANLEY CUP.

<http://www.hhof.com/>

Ontario Science Centre—With hundreds of engaging interactive exhibits and daily science demonstrations, the Ontario Science Centre will delight, inform and challenge visitors of all ages: KidSpark is a unique discovery playground for children eight and under, the Weston Family Innovation Centre has 50 open-ended experiences that allow youth to create and innovate, the Space Hall is home to Toronto's only public planetarium and the Shoppers Drug Mart® OMNIMAX® Theatre features a great lineup of IMAX® films that run hourly throughout the day

<http://www.ontariosciencecentre.ca/>

Royal Ontario Museum—No trip to Toronto is complete without a visit to the Royal Ontario Museum - Canada's largest museum of world cultures and natural history located in the heart of

Things to Do in Toronto

downtown. Explore special exhibitions, permanent galleries of dinosaurs, ancient Egypt, Canada's First Peoples, gems & minerals, dinosaurs and more, alongside world-class dining, shopping and breathtaking architecture
<http://www.rom.on.ca/>

Toronto Zoo—Canada's premier Zoo offers over 5,000 animals and incredible exhibits including the award winning 30-acre "African Savanna", the "Gorilla Rainforest" (the largest indoor gorilla exhibit in North America), Great Barrier Reef and the new 10-acre Tundra Trek exhibit including polar bears and Arctic wolves—all free with admission.
<http://www.torontozoo.com/>

Toronto City Tour

A tour company that offers a hop on/hop off tour in Toronto it would be Gray Line. With this tour, you can stay on the bus for the entire loop which would take about 2 hours where you'll get the history of the city and then if you choose to, hop on and hop off at the many different attractions as buses will come by every 40 minutes with the first one starting at 9:05am.

You can start your tour at 123 Front Street West (3 minute walk from the hotel) or at any of our 25 scheduled stops. This loop features attractions such as the Hockey Hall of Fame, CN Tower, Toronto's Harbour front, St. Lawrence Market, Distillery Historic District and the Entertainment District. Also featured are the Royal Ontario Museum, Casa Loma, Bata Shoe Museum, Eaton Centre, and the trendy Village of Yorkville.

Prices (plus applicable taxes):

- Adult: \$34.96
- Senior (60 yrs and over) / Student (12-18): \$30.97
- Children (5-11): \$19.47

Niagara Falls Tour

They have a tour that picks up at 9:30am on York Street (the west end of the hotel). Includes a buffet lunch overlooking the Falls at Sheraton on the Falls, and ride the Maid of the Mist, one of the main attractions! In the afternoon, you will have ample time for souvenir shopping and picture taking at the Table Rock Complex. The tour will be complete with a stop at Niagara-on-the-Lake, the historical town of Niagara Falls, wine tasting at a local winery & photo stops. This tour will be returning back at approximately 7:00pm.

Prices (plus applicable taxes):

- Adult: \$131.86
- Senior (60 yrs and over) / Student (12-18): \$118.58
- Children (5-11): \$86.73

Reserving seats for the Niagara Falls and city tour in advance is recommended if interested and a credit card number will guarantee your seat.

Things to Do in Toronto

Restaurants

1. **Vertical:** Southern Italian/Mediterranean, moderately priced with a very extensive wine list. Vertical is located in First Canadian Place at King and Bay Street which is a seven minute walk from the Hotel. www.verticalrestaurant.ca
2. **Jump Cafe:** Moderately priced continental cuisine in a lively atmosphere. Jump is located at 18 Wellington Street West which is a five minute walk from the Hotel. <http://www.oliverbonacini.com/Jump.aspx>
3. **O&B:** Moderately priced with an extensive menu located two blocks from the Hotel at Front and Yonge Street. <http://www.oliverbonacini.com/Yonge-Front.aspx>
4. **Far Niente:** Mediterranean Restaurant featuring fresh fish and an extensive wine list. Far Niente is located at 187 Bay Street at the corner of Wellington which is a five minute walk from the Hotel. www.farnienterestaurant.com
5. **Carisma:** Family run Italian Restaurant featuring fresh pasta and extensive wine list. Carisma is located at 73 King Street East which is approximately 10-12 minutes walking from the Hotel. www.carismarestaurant.com
6. **Red's Bistro:** Moderately priced restaurant featuring many fresh fish dishes and a very nice wine list. Red's is located at 77 Adelaide Street West which is three blocks north of the Hotel. www.redsbistro.com
7. **Paese:** Traditional Italian located in the Theatre District which is a ten minute walk from the Hotel. Moderately priced with a nice atmosphere and extensive wine list. www.paeseristorante.com
8. **E11even:** Moderately priced restaurant with a continental menu and extensive wine/cocktail list. E11even is located at 15 York Street which is a 6-8 minute walk from the Hotel. www.e11even.ca
9. **Nota Bene:** Trendy Italian/California fusion located at 180 University Avenue @ Queen which is a 15 minute walk from the Hotel. www.notabenerestaurant.com
10. **Origin:** Trendy Tapas style restaurant located at 107 King Street East @ the corner of Church St. Origin is approximately a 15 minute walk from the Hotel. www.origintoronto.com

ABSTRACTS

Summer Computer Simulation Conference (SCSC)

Abstract

A Simulation Analysis to Weigh the Impact of Obesity: Corresponding Patient Need with Medical Capacity

John Sokolowski, Catherine Banks, Saikou Diallo, Jose Padilla and Christopher Lynch

Summary

U.S. population data indicate upsurges in obesity that can outpace the medical community's ability to provide care. Identifying that "outpaced" tipping point can mitigate shortages in healthcare capacity. A simulation model was developed to determine the burden of patient need vis-à-vis the medical community's ability in two U.S. cities to establish the tipping point. The model captured medical capacity via Primary Care Physician and Emergency Room usage by two patient types: Patient A-endeavoring to maintain good health and Patient B-indifferent. Demographic statistics were drawn from CDC and census data. Outputs indicated significant queue lengths for both cities with queues reached differing tipping points per city, per patient degree of concern, and per patient-to-physician ratio. Additional alarming results showed Patient A becoming obese and Patient B sustaining obese weight. Assessing medical capacity is critical to averting foreseeable deficits in healthcare as the population continues to succumb to the obesity epidemic.

A Graph Algorithm for Linearizing Simulink Models

Zhi Han, Pieter Mosterman and Fu Zhang

Summary

This paper presents a new efficient approach for performing linearization of Simulink models. It improves the efficiency of existing linearization algorithms using a Jacobian graph, a graph-based data structure that captures the linear relationship between input, output and state variables. The graph-based algorithm enables the use of graph transformations to reduce the size of the Jacobian data structure, thereby improving the efficiency of subsequent computations. This paper presents a heuristic implementation of the graph-based algorithm. Experimental results on a number of Simulink models of different sizes show how the approach is able to significantly improve computational efficiency and memory use especially in models with large numbers of blocks and states.

An Efficient Approach to Solving the Agent Training Problem for a Sustainable Group

Haibin Zhu, Luming Feng and Ratvinder Singh Grewal

Summary

Adaptive Collaboration (AC) aims at building a sustainable group that can work well even though the environment and the state of the group change. Initial role assignment or agent training is an important task for a group to be sustainable. There are many variations and different requirements in the process of role assignment. In this paper, an efficient approach is proposed to solve the problem of agent training plan for a sustained group. This approach is based on the IBM ILOG CPLEX Optimization Package. The performance is verified by experiments with randomly created groups. The major contribution of this paper is to clarify the problem of initial group role assignment for a sustainable group and proposes an efficient and practical solution.

Summer Computer Simulation Conference (SCSC)

Abstract

A Simulation Study of the Shift System at a UK Police Communications Centre

Andrew Greasley, Tony Taylor and Chris Smith

Summary

The UK Police Force is required to operate communications centres under increased funding constraints. Staff represent the main cost in operating the facility and the key issue for the efficient deployment of staff, in this case call handler staff, is to try to ensure sufficient staff are available to make a timely response to customer calls when the timing of individual calls is difficult to predict. A discrete-event simulation study is presented of an investigation of a new shift pattern for call handler staff that aims to improve operational efficiency. The communications centre can be considered a specialised case of a call centre but an important issue for Police Force management is the particularly stressful nature of the work staff are involved with when responding to emergency calls. Thus decisions regarding changes to the shift system were made in the context of both attempting to improve efficiency by matching staff supply with customer demand, but also ensuring a reasonable workload pattern for staff over time.

Disaster Scene Reconstruction: Modeling and Simulating Urban Building Collapse Rubble within a Game Engine

Alexander Ferworn, Scott Herman, Jimmy Tran, Alex Ufkes and Ryan McDonald

Summary

Various natural and human-made events can occur in urban settings resulting in buildings collapsing and trapping victims. The task of a structural engineer is to survey the resulting rubble to assess its safety and arrange for structural stabilization, where necessary. Urban Search and Rescue (USAR) operations can then begin to locate and rescue people. Our previous work reported the use of an Unmanned Aerial Vehicle (UAV) equipped with a RGB-Depth sensor to build 3D point cloud models of disaster scenes. In this paper we extend this work by converting the point clouds into 3D models and importing them into a state-of-the-art game engine. We present a method to use these models to allow first responders to interact with the simulated rubble environment in real-time, without risk to human life. Experiments are conducted measuring traversal time both in the real world environment and using the simulation. We argue that this work will improve the safety of workers and allow a better understanding of extremely dangerous environments without unnecessary exposure during disaster response planning.

A Bayesian Approach to Assessing Expected Utility in the Simulation Decision

Eric Weisel and Mikel Petty

Summary

The study of the complex relationship between simulation and reality is a defining characteristic that differentiates simulation science from science that uses simulation. Significant progress has been made toward a robust understanding of accuracy in this relationship. Although broadly accepted by the community as an important consideration, how a simulation is, or is to be, used has received less rigorous attention. Decision theory provides a mathematical structure to define use that is suitable to inform decision-making using models and simulations. Posed in this way, use is essentially formulated in the style of a decision problem within the context of theoretical computer science. While decision theory is useful to frame the decision problem, quantifying error remains as a key challenge that must be resolved before a meaningful evaluation of expected value or expected utility can be calculated. In this paper we demon-

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Abstract

strate the use of Bayes Rule to update the probability estimates for the various outcomes framed in the decision problem, given a known simulation response, as additional evidence becomes available.

The EvacSim Pedestrian Evacuation Agent Model: Development and Validation

Seán Óg Murphy, Kenneth N. Brown and Cormac Sreenan

Summary

EvacSim is a multi-agent building evacuation simulation featuring pedestrian occupant agents occupying two-dimensional continuous free-space to simulate pedestrian egress for building evaluation and evacuation planning support. We detail pedestrian model elements that govern microscopic agent movement such as personal space preservation, obstacle avoidance and moving together as a crowd. We validate the EvacSim pedestrian model against real-world pedestrian data, comparing flow rates, density and velocity for corridor entry and for merging crowds, and we demonstrate that EvacSim simulations are consistent with the real-world data.

Discrete-Event Simulation for Design of Evolving Project Schedules

Sanja Lazarova-Molnar and Rabeb Mizouni

Summary

It is a well-researched fact that success of projects depends to a great extent on the quality of their initial project schedule. However, the way they are typically described is too rigid with respect to the spectrum of possible uncertainties that projects typically face during their implementation, and too restrictive for various on-the-fly interventions. This has been our motivation in defining a novel model for describing project schedules, which would make them: 1) more realistic, to better reflect the uncertainties that can take place, 2) dynamic, to keep in line with project's dynamics, and 3) decision-making aid to project managers in various uncertain situations. We term our model evolving project schedule (EPS) model. EPS defines project schedules, subjected to uncertainties, in a way that they also encompass recommendations on what remedial actions to take when specific uncertainties arise. The remedial action recommendations are selected using simulation with respect to project goals and uncertainties modeled in schedules. In this paper we detail the discrete-event simulation methodology and algorithms used for selecting an optimal remedial action scenario. We further illustrate our approach by a detailed example that features a number of candidate-remedial action scenarios, in which we select the optimal one based on project goals and success criteria.

Integrating Legacy Simulation Models into Component-Based Weapon System Simulation Environment

Do Hyung Kim, Hyun Shik Oh and Seong Wook Hwang

Summary

In recent times, interoperation of simulation models in a component-based simulation environment has become an important issue because of high reusability and composability of simulation models. AddSIM is a component-based simulation environment which has been developed for the purpose of weapon system modeling and engagement simulation. This paper describes three ways to integrate legacy models into AddSIM. Especially to make AddSIM interoperate with legacy C/C++ models externally, we also propose external C/C++ interface libraries. Using the proposed libraries, C/C++ legacy programs with mini-

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Abstract

mal code changes, adding interfacing codes, can interoperate with AddSIM. To validate the effectiveness of the conversion methods and the function of the libraries, an anti-aircraft warfare simulation programs are developed in AddSIM with the libraries and evaluated.

A Measure to Assess Combat Effectiveness Using Network Representation

Youngwoo Lee and Taesik Lee

Summary

A conceptual definition of combat effectiveness is an overall capability of a force to produce a desired outcome from a combat against an enemy force. An ability to measure combat effectiveness is critical to strategic and tactical decision making, but it is a challenging task to develop an operational measure for combat effectiveness due to large complexity presented by a rich context of a combat environment. We argue that under a direct fire engagement combat effectiveness can be reasonably assessed by the number of attack opportunities a force creates in a combat environment. This paper proposes a measure to quantitatively measure combat effectiveness of a military force in a direct fire engagement environment. The proposed metric is based on a meta-network representation that captures various aspects of a combat environment. Using a meta-network representation, two types of basic unit structures of attack opportunity – isolated and coordinated – are identified, which are then used as a basic element of combat effectiveness. Prevalence of network motifs in a networked combat environment is computed as a measure of a military force's combat effectiveness.

On the Potential of Semi-Conservative Look-Ahead Estimation in Approximative Distributed Discrete Event Simulation

Desheng Fu, Matthias Becker and Helena Szczerbicka

Summary

One major problem of distributed discrete event simulation is the poor performance due to the huge overhead for maintaining the order of causality, so that the execution time cannot be reduced significantly compared to sequential simulation. This holds especially when the processes are tightly coupled and the look-ahead is very short. On the other hand, results of many simulations are obtained from a number of independent outputs, which are of stochastic nature and a small deviation of a limited amount of outputs is acceptable. Acceptance of such deviations in a controlled way could affect a trade-off between the simulation accuracy and the execution time.

The goal of our investigation is to develop a methodology to handle the trade-off. In this paper, we propose a new way of distributed simulation with semi-conservative look-ahead estimation, where we accept causality errors to a certain and limited extent. In our approach, we consider a semi-conservative estimation allowing limited over-estimation. If the look-ahead is over-estimated, unsolved causality errors will be resolved by a very efficient recovery procedure at the expense of simulation errors. Results from a case study demonstrate that our approach is able to maximize the look-ahead with respect to the predefined error bounds and can reduce the execution time of many simulations. We do however also point out the limitations of the mechanism and the trend of our further investigation.

Summer Computer Simulation Conference (SCSC)

Abstract

Toward an Agent-Based Ecological Model of the Triple Helix Theory of Innovation Dynamics

James Morris-King and Levent Yilmaz

Summary

Regional governments face challenges for economic growth while operating under significant budgetary constraints. Although empirical studies and statistical models are valuable tools for evaluating the impacts of economic policy on such systems, they focus on deterministic representations of system processes while avoiding social and environmental relationships. In this work, we propose economy conceptual model of an agent-based simulation of an innovation ecosystem using the Overview, Design concepts, and Details protocol (ODD). This model exposes several endogenous roles and parameters which are not captured in deterministic representations of such systems and offers a specification of regional innovation systems in terms of social cooperation and competition between populations of investigators.

Traffic Light Regime for a Specific Approach to a City

Reuben Thieberger

Summary

We examine the traffic lights regime for a specific approach to a city. On a certain spot on the main road, a traffic light enables to continue on the main road, into which additional cars are entering or to move to an alternative route, which is longer but into which no additional cars are entering and which later merges with the main road. We are interested in the velocities for different car densities and different relations between the green light time for the main road and the alternative road. We were also interested in the $1/f^{\alpha}$. We check by least square the values of α .

Improving Scenario Selection for Simulations by Run-Time Control Flow Analysis

Christian Berger

Summary

Cyber-physical systems like active safety systems in recent vehicles are significantly driven by software and rely predominantly on data that is perceived by cameras, laser scanners, and the like from the system's environment. For example, these sensor-based systems realize pedestrian protection functionalities, which cannot be tested under simplified conditions on proving grounds only or by arbitrary test-runs on public roads anymore. Instead, simulative environments are used nowadays, which provide the virtual surroundings for such a system where its real input sources are replaced with simplified sensor models. Thus, interactive and hazard-free system tests and automated system evaluations can be carried out easily. However, the simple strategy to run all available modeled traffic scenarios in the simulation on any change of the implementation would consume too much computation time to provide effective and fast feedback for developers. In this article, an improved strategy for selecting scenarios that shall be run in a simulation based on run-time control-flow analysis is proposed, which resulted from the in-depth analysis of the revision history of the source code and their accompanying simulations for two self-driving vehicles. The outlined strategy is evaluated on a self-driving miniature vehicle.

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Abstract

Application of AMESim and Matlab Simulation on Hydraulic Servo Control System of Spinning Lathe

Feiku Zhang, Hui Li and Xudong Yang

Summary

This paper conducts a joint simulation on the hydraulic servo control system with AMESim and Matlab for a spinning lathe design project. A PID hydraulic servo control system model and a self-adaptive one are built with AMESim and Matlab. Comparison and analysis of both control systems performances are conducted by changing the parameters (input, load added, etc.) and introducing an external disturbance. The results reveal the self-adaptive hydraulic servo control system with the self-adaptive controller has better performance than the system with PID controller. The self-adaptive hydraulic servo control system can reduce or even eliminate the system model parameters' changing effects and random external disturbance fast. The self-adaptive hydraulic servo control system doesn't oscillate when large load added or input signal changing; besides, the system self-tuning process is fast when constant external disturbance introduced. The self-adaptive hydraulic control system satisfies the spinning process specification well.

GTNA 2.0 - A Framework for Rapid Prototyping and Evaluation of Routing Algorithms

Benjamin Schiller and Thorsten Strufe

Summary

Routing in complex networks is increasingly optimized towards situation and properties of the underlying network. Quick hypothesis testing with respect to the performance of different strategies, however, is posing to be an unnecessarily complicated task. To this end we propose GTNA-2, the enhanced second version of Graph-Theoretic Network Analyzer. Based on the broadly used GTNA, it allows both for the efficient and simple analysis of a large set of graph metrics, but additionally has been extended with support for rapid prototyping and quick evaluation of arbitrary routing algorithms. In this paper, we discuss the implementation and evaluation of routing algorithms in GTNA-2. As a proof of concept, we demonstrate the framework's ease of use by comparing the routing performance of Named data Networking with basic IP-based routing.

Failure Development in Dependent Networks

Ilya Gertsbakh and Yoseph Shpungin

Summary

We consider two models of failure development in dependent networks.

The first model assumes that there are two networks A and B, and some of the nodes of network A are connected to subsets of the node set of network B. The assumption is made that if a node in A fails, and this node is connected to subset of B nodes, then all nodes in this subset also fail. Node failure means that all edges incident to this node are erased. We compute, using Monte Carlo calculation of the spectra the probability that network B fails if nodes of A fail independently with given probability.

The second model considers one central network B whose nodes are "infected" in a random way by a collection of periphery networks. Each node of periphery network delivers with given probability infection to a randomly chosen node in B. A node in B which gets infected at least once fails. Assuming that the number of infected nodes in B has a Poisson distribution, we find out analytically the probability that network B will be DOWN as a result of joint infection originated from the periphery networks.

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Abstract

Optimization Validation of a High Speed Boat

Ben Rosenthal, Raju Datla, Dave Greeley, David Kring, Troy Keipper and Bill Milewski

Summary

An optimization of an 80 foot, canoe stern boat with integrated lifting surfaces was performed using automatic geometry morphing and potential flow methods. The optimization looked to improve the flat water efficiency across the speed range as well as the unsteady motions in a seaway across the speed range. The goal was to show that benevolent wave cancellation could be produced at multiple speeds through simultaneous changes in hull shape and lifting surface size and placement while still maintaining a boat with very good seakeeping behavior. A propeller was designed for the optimized boat. A model boat and propeller were built and tested at 1/10th scale at the Stevens Institute tow tank both for steady resistance and propulsive performance. The steady resistance results were validated against CFD and the correlation was within 2% of the predicted values lending confidence that the optimization process is valid. The propulsive efficiency was compared and the correlation was good at most advance coefficients with some discrepancies at values around 1.5.

Reflections on a Virtual Experiment Addressing Human Behavior During Epidemics

Liam Delaney, Adam Kleczkowski, Savi Maharaj, Susan Rasmussen and Lynn Williams

Summary

This paper is appropriate for the "Simulation of Complex Social Systems" track.

We report on preliminary results from a pilot study using a virtual experiment to analyse human behavior during epidemics of an infectious disease. The experiment used a two-dimensional computer game representing an epidemic scenario, linked to an agent-based simulation of an epidemic spreading through a large population. 230 participants played the game and completed questionnaires about their characteristics in relation to a psychological model of health behaviour, Protection Motivation Theory. The results show that participants responded to increasing infection load in their local neighbourhood by reducing their social contacts, as they would be expected to do in reality. However, there was no correlation between the strength of this response and a number of psychological factors that are known to be associated with health protective behavior in the real world. This suggests that participants might not have responded to the game in the same way they would respond to a real epidemic. We discuss possible explanations for this mismatch, drawing on ideas from experimental behavioral economics, psychology, computer game design, and the study of virtual worlds, and suggest ways in which our experimental methodology could be improved to produce a more realistic response.

OSSim: A Generic Simulation Framework for Overlay Streaming

Giang Nguyen, Mathias Fischer and Thorsten Strufe

Summary

Overlay streaming systems have recently been favored by the academic community as a viable approach for IPTV. Over the last years, a multitude of different overlay streaming approaches have been proposed. Most of them, however, have been evaluated individually. The lack of a common simulation framework makes it difficult to compare the properties of the different systems with each other. To bridge this gap, we introduce OSSim, a general-purpose simulation framework that allows the instantiation of different overlay streaming protocols. For this purpose, it provides a generic and modular structure, and several

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membership management and overlay streaming protocols as well. Our simulation results indicate that the framework is accurate and flexible to simulate different overlay streaming systems.

RAMS: A Fast, Low-Fidelity, Multiple Agent Discrete-Event Simulator

Tim Bakker, Garrett Ward, Sivateja Patibandla and Robert Klenke

Summary

The paper describes the design and architecture of a low-fidelity simulator able to simulate multiple agents and robots. The simulator was built out of a need to simulate and test algorithms used for collaborative interaction between agents. The architecture is highly modular and is easy to extend into new research fields with new emerging technologies. The agent is a self-contained robot able to move in 3-d space, and directed by waypoints. These waypoints are generated by algorithms that can be dynamically loaded at run-time. The simulator is structured such that, once tested in simulation, these algorithms can directly be loaded, without change to the software, onto a physical agent for real-world testing.

Similar projects include CoUAV (Happe and Berger 2010), which is a simulator designed for discrete-event simulation at a high-level, thus reducing the overhead by not simulating low-level decisions of the FCS. This simulator is designed for simulating a collaborative set of UAVs (unmanned aerial vehicles) performing a search on a specified area.

The simulator will be distributed as open-source software under public license and can be used in other academic research and/or fields.

Works Cited:

Happe, Jens, and Jean Berger. "CoUAV: A Multi-UAV Cooperative Search Path Planning Simulation Environment." Summer Computer Simulation Conference. Ottawa, Canada, 2010. 86-93.

Research and Application on Cloud Simulation

Bo Hu Li, Xudong Chai, Baocun Hou, Chen Yang, Tan Li, Tingyu Lin, Zhihui Zhang, Yabin Zhang, Wenhai Zhu and Zenghui Zhao

Summary

This paper expounds comprehensively research results of our team on cloud simulation since authors have published the paper. These results consist of the evolved technology connotation and features of cloud simulation, its expansion and development versus the cloud computing, the architecture of the cloud simulation system, 4 kinds of service patterns of cloud simulation, body of technological knowledge on cloud simulation, 9 key technologies broken through recently by our team, including unified management technology for simulation resources, individuation virtual desktop technology, multi-users oriented dynamic building technology of virtual simulation environment, automatic composition technology of simulation models, fault tolerance technology for resources in cloud simulation, multi-core cluster oriented hierarchical parallel simulation engine, high efficient and collaborative running supporting technologies, monitoring and evaluation technology for cloud simulation, and cloud simulation system security technology. In addition, a typical application demonstration system and the application prospect are given. The primary research and practice show that our research results can further strengthen the abilities of cloud simulation. Finally, the paper gives the prospect of the next work of cloud simulation.

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Abstract

A DEVS Based M&S Method for Large-scale Multi Agent Systems

Mingxin Zhang, Mamadou Seck and Alexander Verbraeck

Summary

In this paper, we combined cognitive modelling, agent organization theory and DEVS-based framework together in order to realize a new M&S method for large-scale multi-agent systems. In general, our research is novel in terms of both agent representations and agent structure all abstracted by DEVS formalism to meet the needs of large-scale multi-agent systems simulation construction. As the agent model interface remains the same and the intelligence and dynamics are hidden inside the model, the individual agent model can be considered as a normal model in the DEVS model hierarchy which improves the system scalability and interoperability. Further research will focus on the simulation aspect of M&S for large-scale multi-agent systems.

A Methodology for Civilian Forecasting in DND

Amy Cameron and Lise Arseneau

Summary

Attrition forecasting of civilian occupations within the Department of National Defence (DND) plays an important role in assisting human resources planning in DND in order to ensure that strategic priorities are met and supported. Extensive work has been conducted in DND in developing a forecasting methodology for the Canadian Forces Regular Force personnel. Given the complexities of DND civilian workforce planning, which could be characterized as more challenging in some respects, there is an increasing interest and need to also conduct demographic forecasting for DND civilian occupations. This paper discusses a DND civilian two-parameter "Propensity-to-Leave" attrition forecasting model that has been developed by Director General Military Personnel Research and Analysis (DGMPRA). Using this methodology, sample analyses and forecasts of two main DND civilian occupation groups are presented, and some advantages and challenges of the methodology are discussed.

Computational and Mathematical Models of the JAK STAT Signal Transduction Pathway

Vishakha Sharma and Adriana Compagnoni

Summary

The JAK (Janus kinase)-STAT (Signal transducer and activator of transcription) signal transduction pathway is a cascade of downstream cellular events initiated from outside of the cell through the cell surface to the DNA in the nucleus, causing transcription. The conventional modeling approach for signal transduction pathways involves solving ordinary differential equations (ODEs). We study here a computational alternative

We build two models of 46 reactions in the JAK-STAT pathway and compare the results. We implement a deterministic mathematical model using the ODEs solver COPASI, and we build a stochastic computational model using the Stochastic Pi Machine (SPiM).

Since dysregulation in the functionality of JAK-STAT pathway results in immune deficiency syndrome and cancers, like lymphomas, leukemia and breast cancer, we believe that models like this have the potential

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Abstract

to contribute to cancer research.

Bottleneck Analysis in a Pharmaceutical Production Line Using Simulation Approach

Hamidreza Eskandari, Nazanin Babolmorad and Nastaran Farrokhnia

Summary

The main purpose of this paper is to introduce a new framework to more efficiently investigate the pharmaceutical high-speed production line in order to find out improving scenarios which could reduce the bottleneck effect and increase the production line output. A pharmaceutical company named Exir in Tehran, Iran was chosen to study the framework applicability. The proposed methodology integrates the simulation model of the line and bottleneck detection methods. Bottleneck detection methods could detect bottleneck machine by using the simulation model outputs. The improving scenarios could be designed based on bottleneck detection results. These scenarios are then evaluated and compared with the base model upon desired performance measurements such as average daily production. The results analysis indicates that the average daily production could be increased by 20%.

Simulation and Optimization of Haulage System of an Open Pit Mine

Hamidreza Eskandari, Hadi Darabi and Seyed Amirhamed Hosseinzadeh

Summary

This paper presents a practical application of simulation modeling approach to the design of a constrained haulage system of Sarcheshmeh open-pit copper mine located in the Kerman Province of Iran. The management of Sarcheshmeh copper complex desired to enhance the available resources of the haulage system so that this system had to be capable of transporting a certain daily capacity subject to some budget limitation. Design of such a system is capital-intensive and thus, management had to ensure that the enhanced haulage system is capable of achieving the desired goals within the given budget constraints. To do so, simulation-based multi-objective optimization is used to find appropriate number of mining resources that maximize the monthly throughput subject to a specified minimum budget. Results indicate that the maximized daily throughput has almost a linear relationship with the assigned budget.

Cloud ERP Simulation in Powersim Environment

Alexandra Varfolomeeva and Victor Romanov

Summary

Cloud-based ERP solutions, providing business processes automation and improving visibility across the entire organization, are becoming an extremely popular alternative to traditional ERPs. One of the important challenges faced by cloud service providers is the effective management of cloud services performance. The ultimate goal of a cloud service provider is the maximization of its profit through reducing the number of quality of service (QoS) violations and decreasing service costs. The effective resource provisioning is still a challenging task for cloud computing providers because of the high variability of workload over time. On the one hand, cloud providers can respond to most of the queries owning only a restricted amount of resources, but this results in customers rejection during peak hours. On the other hand, valley hours incur in under-utilization of the resources, which forces the providers to increase their prices to be profitable. This paper represents cloud ERP query flow control model, built in Powersim, sup-

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porting cloud provider's decision-making process of resource allocation in order to provide SLA-aware profit optimization, based on query flow control and cloud services demand forecast.

Data Driven Process Modeling and Simulation: An Applied Case Study

Zhi Jun Lu, Qian Xiang and Jun Gu

Summary

The yarn production is a very complex industrial process, and the relation between the spinning variables and the yarn properties has not been established conclusively so far. However, the existing process cases which were recorded to ensure the ability to trace production steps can also be used to control the process itself. This paper presents a novel process simulation model with data driven approaches such as case based reasoning and support vector machine hybrid algorithms for optimization of complex spinning parameters. The process simulation model is able to predict the yarn properties through continually self-learning, which can help the yarn producer to make the best process decision. The applied cases are demonstrated that the intelligent system for the solving the hard problem of complex process control is promising.

WSN Simulation Model with a Complex Systems Approach

Daniela Aguirre, Ricardo Marcelin and Enrique Rodriguez-Colina

Summary

We present a new simulation analysis, with a complex systems perspective, in order to study WSN operations. We have built different scenarios on which we evaluate the congestion control and the routing mechanisms. An agent-directed simulation has been developed, where data packets are regarded as active entities, i.e., agents. With this approach, it is possible to analyze the system behavior, either from a microscopic or macroscopic view. The simulation model proposed fosters the development of solutions for routing and congestion control.

Design of a 3D Interactive Simulator for Driver Behaviour Analysis

Smaragda Christodoulou, Despina Michael, Andreas Gregoriades and Maria Pampaka

Summary

Diagnosing the causes of road accidents and the development of effective countermeasures to reduce accident rates is of key importance in road safety. Human error is one of the principal influencing factors that lead to road accidents, and is attributed to increased mental workload induced by distractions. Workload, however, is characterized by intrinsic properties that are difficult to observe. Hence, phenotype behaviors, such as lane deviations, could act as good predictors of driver workload. Driving simulators emerged as a promising technology for the analysis of driving conditions and road users' behaviour in an attempt to tackle the problem of road accidents. However, the cost of designing or owning a simulator to conduct a safety analysis is prohibitive for many government agencies. The work presented herein demonstrates the design and development of a driving simulator, using a 3D game engine that aims to contribute towards evaluating black spots in road networks by promoting rapid design of realistic models and facilitating the specification of test scenarios. The developed simulator was employed to conduct a set of preliminary experiments that analyzed driving behaviors of local road users for a chosen black spot

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in a road network in Limassol-Cyprus. Data collected from the experiments are analyzed, results are presented and conclusions are drawn.

A Simulation on the Shapley Values

Toshitaka Fukiharu

Summary

On the one hand, it is a classical theorem in economics that in the market economy the allocation in the competitive equilibrium belongs to the core, and when the market economy is replicated indefinitely, the core shrinks to the competitive equilibrium. On the other hand, it is well known that the core does not necessarily contain the set of Shapley values in the coalitional game with finite players. Starting from the famous 3 player coalitional game with the Shapley values not belonging to the core, we show by simulation that the set of Shapley values tends to converge to the core as a part of the players are replicated indefinitely. Then, a variant model is constructed which shows tendency of non-convergence to the core. It is also shown by simulation, that the probability of “the set of Shapley values belongs to the core” is approximately 65% when the number of players is three. It is finally shown that what is called the paradox of Shapley-Shubik power index does not take place when the election result is one-seat loss (gain), by simulation. Thus, it is shown that the simulation approach is useful in the game theory as the proposition-finding means.

Petri Nets Extension to Model State Varying Failure Rates

Sanja Lazarova-Molnar

Summary

One of the most common assumptions in reliability modeling is the constant failure rate. This has been increasingly changing lately, yielding significant research towards abandoning simulation results based on this assumption; thus, deeming constant failure rates as inadequate to model failures accurately. The improvement is the time-varying failure rate. However, besides time, in reality failure rates can be affected by the state of the system (or its history, in terms of sequences of states and events that it has been through). In this paper we define and distinguish several classes of state-varying failure rates and extend the formalism of Petri nets to model them. To illustrate our approach we provide an example model that features state-varying failure rates.

Explicit Modelling of Statechart Simulation Environments

Sadaf Mustafiz and Hans Vangheluwe

Summary

In this paper, we propose an experimentation environment for the interactive simulation of Statechart models. We choose the Statecharts formalism as the most appropriate formalism to model and synthesize the environment. We take inspiration from software debugging as well as from simulation experimentation to explicitly model the detailed reactive behaviour of our environment. We map program debugging techniques such as execution modes, steps, and breakpoints to the simulation domain. We further explore how to integrate the notion of simulation time for the purpose of (scaled) real-time visualisation. Finally, we provide support for a (browser)client- server architecture, again making use of the features of

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Abstract

Statecharts. We build the experimentation model on top of the model to be simulated by instrumenting it using model transformation techniques. The entire Statechart modelling, simulation, and experimentation environment described in this work is supported by our tool, AToMPM.

Humanitarian/Emergency Logistics Models: A State of the Art Overview

Rafael Diaz, Joshua Behr, Lionel Toba, Bridget Giles, Manwoo Ng, Francesco Longo and Letizia Nicoletti

Summary

The occurrence of a natural disaster is generally characterized not only by a tremendous physical and material damage, but also by a substantial social and economic impact. Over the years, the research community attempts to investigate the different dimensions of these events such that these incidents may be understood and competent procedures that properly assess and deal with these occurrences may be developed. A critical question in this context relates to the regional ability to deal with it and organize responders, communities, and material means to mitigate the adverse effects that stem from the occurrence of these incidents. Emergency Management and Humanitarian Logistics provide tools and knowledge that assist decision makers in preparing for the occurrence of a catastrophic event while coping with the material and humanitarian response. This paper provides an overview of some of the most relevant modeling efforts discussed in the literature. Opportunities for the application of modeling and simulation (M&S) in specific areas of humanitarian logistics and emergency management are presented.

A Causal Model to Schedule Efficient Ground Delays in Present Air Traffic Management Systems: Modeling and Simulation for Complex Networks Management

Jenaro Nosedal, Miquel A. Piera and Sergio Ruiz

Summary

The current air traffic flow management (ATFM) situation and the forecast growth, imply that the handling of capacity-demand imbalance situations is, and will continue to be, one of the main ATM problems. To mitigate these imbalances in the air sector, some ATFM initiatives such as the Ground Delay program the airspace flow program (AFP) has been designed. By assigning delays on ground at the departure airports to certain trajectories (4DT), an extra decision variable is introduced in the capacity-balance problem to tackle the air traffic control workload while improving the airside capacity. This paper presents a Decision Support System (DSS) to deal with an efficient ground delay configuration for the future ATM system based on 4DT, in which a Causal Discrete Event model has been developed to deal with the generation of several feasible conflict-free solutions for air traffic networks.

A Virtual Training System Based on Computer Sensing and Football Kicking Dynamics Using Real Time Wireless Feedback

Alyssa Schaeftbauer, Cole Meyers, Aaron Stout, Ehrin Biglari, Jacob Kantor and Yusheng Feng

Summary

The objective of the Virtual Training System Based on Computer Sensing and Football Kicking Dynamics Using Real-Time Wireless Feedback we have designed is to have a real-time training tool that would give a kicker the ability to practice off the field and receive the same kind of attention to detail they would experience at a training camp. This was started with a desire to create a training tool for the kicker of our foot-

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ball team to be able to practice no matter the weather or time of day and receive the same kind of constructive feedback they would from a team of coaches. Also giving coaches a tool to evaluate their players from a set of data, to help them know what would be best for the team on game day. The training tools involved in this project are; calculation of trajectory taking into consideration real life circumstances of drag and lift on the football for players to know the range covered by their kick, the left to right angles of the kick which will be beneficial for coaches to know during a game knowing which hash would be best to kick off for each player, a pressure sensing mat that would show the kicker their foot print trail so they can adjust their footsteps or make sure it is consistent, noise to simulate a crowd and give a sense of pressure that would be on the field, and have high speed cameras taking video from different views for the player or coach to replay and evaluate the kick.

Self Similarity of the Simulated Internet Traffic From the Source with Clustered Fragmented Periodic Output

Yuri Boiko and Tet Yeap

Summary

The property of self-similarity for various time scales of the internet traffic is considered for the cluster model of the source with fragmented distribution of the activity rate, constant within each mode of the cluster fragment. It is demonstrated that the clustering itself provides the level of self-similarity, which is dependent on the size of the cluster zones. Specifically, it is shown that scaling up the size of the clusters extends self-similarity to the higher levels of traffic aggregation. For example, simulation experiment reveals that by doubling the size of the clusters the threshold of the traffic self-similarity has been upgraded by two aggregation levels.

Mobile Simulation with Applications for Serious Gaming

Andrew Jeffery, Jonathon Panke, Nick Eaket and Gabriel Wainer

Summary

Since simulation is normally required as the basis for serious gaming applications, using RISE simulation services a serious game application can be deployed on a mobile device using a properly developed mobile client. We propose a mobile client that leverages the cloud services provide by a RISE server to obtain simulation data to be used in a serious gaming application. In particular, our prototype will provide a stock trading game which will be based on a Brownian motion economic model that will be analyzed comparatively to real data. The merits of the mobile client created as a serious game will also be discussed.

Cellular Simulation of Asymmetric Energy Requirements in Wireless Sensor Networks

Mohammad El-Shabani, Mohammad Moallemi and Gabriel Wainer

Summary

This paper presents the importance of careful energy requirement planning in Wireless Sensor Networks (WSN) to optimize and reduce cost. Different cellular discrete-event models of WSN are presented and visualized. An experiment is carried out using the enhanced CD++ tool and interesting results were generated that cover an adequate range of realistic scenarios. The scenarios show the importance of energy

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management in these networks. The results are also compared with the older CD++ implementation and the advantages are discussed.

Enhancing Product Performance in Machining Processes: Statistical Analysis and Development of Predictive Models

Giovanna Rotella, Stefania Rizzuti and Domenico Umbrello

Summary

Process parameters, tool geometry and operating conditions considerably influence the quality and the functional performance, including the service-life, of machined components. Surface characteristics of the machined products such as hardness and roughness can influence the sustainability performance of the machined product and they have to be taken into account while changing the process conditions for improving its sustainability aspects. In this paper, a statistical analysis has been performed on the experimental data derived by external turning operations of aluminum AA 7075-T651, in dry, near dry and cryogenic conditions. The influence of lubrication, cutting speed and tool nose radius on some product and process performance has been analyzed. Predictive models for the surface roughness and hardness of the machined part has been derived at the varying of the lubrication system.

Serious Games as Enablers for Training and Education on Operations on Ships and Off Shore Platforms

Agostino G. Bruzzone, Marina Massei, Adriano O. Solis, Simonluca Poggi, Christian Bartolucci and Lorenzo D'Agostino Capponi

Summary

This paper is focused on design and development of an advanced serious game for the maritime domain. The authors propose an innovative approach to developing training and educational support for navy vessels and/or off-shore platforms. This serious game is a distributed and multi-user simulation framework that allows the reduction of time, costs, and risks of training, by introducing the crew to operating procedures before having to carry out real tests at sea. The research is based on development of educational programs and virtual frameworks supporting cooperative training for complex operations management.

Grand Challenges in Modeling and Simulation (GCMS)

Abstract

A Domain-Dependent Approach to Determining File Importance

K. C. Wong

Summary

In this paper we demonstrate how significantly domain-dependent predictors contribute to determining file importance. A predictor is a piece of information associated with the file under consideration collected and used to determine file importance. Using the approach described in Rawlings (1988), domain-dependent predictors seem to contribute more significantly than those domain-independent predictors. This has been manifested by the observation that those predictors dominant in the canonical models (e.g. linear weighting model) may no longer be so once the domain-dependent predictors are included in the models. The observation suggests that the domain-dependent approach may be more favorably adopted by the subjects in this study than the canonical approach in determining file importance.

Modeling the Flow over Planing Hulls with Ventilated or Cavitating Steps

Neal Fine and David Kring

Summary

High-speed planing boats often employ stepped hulls to reduce frictional drag. The reduced drag is achieved through the formation of a vaporous cavity, which reduces the wetted surface area on the submerged hull. We are in the process of developing a numerical method to solve for the six-degree-of-freedom forces experienced by a cavitating, stepped planing hull. The approach will use a three-dimensional, time-domain potential-flow analysis embodied in the established code, Aegir. Aegir is a high-order boundary element method in which the source and dipole distributions on the boundary are represented by B-splines. Results of a two-dimensional implementation are presented in this paper, in which we examine the accuracy of a linearized solution. New model testing is underway in order to provide detailed validation for the proposed method.

PROTOTYPICAL IMPLEMENTATION OF AN AGENT-BASED FRAMEWORK FOR MODELING FLIGHT IN FORMATION OF CIVIL AIRCRAFTS

Yousef Farschtschi, Dietmar Moeller and Volker Gollnick

Summary

Flight in formation (FiF) has been applied for decades in the military domain to improve operational and strategic possibilities in aerospace and air transport. The economic benefits have been discovered by observing migratory birds at the beginning of the 20th century. This phenomenon was used in military FiF and could also be used in civil aviation to reduce the emission of greenhouse gases and fuel consumption. Therefore, the paper introduces an agent-based simulation framework as a test platform for benchmarking flight operation including FiF from take-off to landing. It illustrates different formation shapes and their algorithms for building, holding, rotating and rearranging formations which have been tested. To evaluate the outcome of the FiF approach and the implemented algorithms a fuel consumption model has been implemented for benchmarking.

Grand Challenges in Modeling and Simulation (GCMS)

Abstract

Using Model Pipelines to Simulate the Processes In and Around an Airport through a Web Interface

Mark Widemann and Dietmar Moeller

Summary

Model pipelines are a novel approach to realize model coupling in heterogeneous and complex environments such as aerospace and air transport. A prototype of this idea has been implemented as part of the "Airport 2030" cluster of excellence project, funded by the German Federal Ministry of Education and Research. This project brings together partners from the aviation industry, airports, airlines, and universities to cooperate on the analysis of the strategic processes in and around Hamburg Airport. Due to the complexity of the overall process work flow various models have been developed to create an abstract representation of the passenger flow in an Airport. The implemented model pipeline architecture is used to couple those models in an overall simulation framework. The technology also allows an easy integration in a web-driven user interface to operate the simulation for different scenarios.

Modeling and Simulation Workbench for International Student Team Projects in Transportation and Logistics

Dietmar Moeller, Fabian Wagner, Isabell Alexandra Jehle, Valentina Fermanelli and Xiang Gao

Summary

The Internet provides a high opportunity for international collaboration in computational modeling and simulation in specific areas of concentration. Transportation and logistics are the areas of concentration for which models have been developed and implemented to monitor and control the underlying transportation and logistics processes dependent on constraints essential to study different transportation and logistics scenarios. Besides this the Internet also allows international student access to run the foregoing mentioned transportation and logistics scenarios. This is introduced as a virtual teaching and learning opportunity in transportation and logistics to support collaboration between international student team members. Thus, the students can develop plans and procedures for classes, use cases and student team projects, to perform measurements and data processing as part of their transportation and logistics project. Moreover this approach allows collaborative work at an international level independently of location and time.

Complex Assembly Line Production Simulation Modeling Considering Robot Failures and Operator Cycle Times

Annamalai Pandian

Summary

This assembly line production research paper demonstrates how to develop Simulation Model for a complex assembly processes which consists of about 13 assembly stations, 80 robots, 6 conveyors and 7 manual operator load stations. The simulation model was developed for the assembly process, verified and validated the results. The simulation modeling also incorporated the effects of the robot failures and operator cycle times on production. The simulation model was run using Arena software for model verification and validation. The findings were analysed using DOE and presented improvement ideas to increase production. The general tendency to improve production in the plant is to buy more equipment but, also require more maintenance. It is very interesting to see how the robot failures affect the production. The bottleneck issues are identified for the assembly line.

Grand Challenges in Modeling and Simulation (GCMS)

Abstract

Response Information System on Oil Logistics Unexpected Emergency Situations

Victor Romanov, Ilya Moskovoy and Kseniya Grigoryeva

Summary

Two main types of situations, which are unexpected, may arise in the oil logistics systems. The system has space, technological and organizational sides of complexity. Space side is determined by fact, that pipelines, run over thousands of miles and across different climate zones, somewhere in not populated or very distant from inhabited localities, over rivers, wild forests, swamps.. In case of spill an essential point of restoring consequences of the oil transportation system unexpected situations is appropriate planning to provide the sequence of adequate actions (plans) and support these actions by actors (personnel) and by resources. The plan may needs coordination with local, municipal, territorial, regional or federal departments and include ground and air transportation means, logistics support, spill reagent supply and repair equipment delivery. Another kind of unexpected situations may be associated with customers. Unpredictable demand for increasing, decreasing or even rescission of a contract of oil product supply imply significant level of loss for oil company in case of reaction will not be rapid.

Proof of Concept Development and Motion Verification of a Swimming Anguilliform Robot (NEELBOT 1.0)

John Baker Potts, Brandon Taravella and Ryan Thiel

Summary

This article illustrates the development and motion verification of a swimming, anguilliform robot whose goal is to imitate the motion described by the wakeless swimming theory derived in Vorus and Taravella (2011) and to provide a proof of concept and knowledge for the next robotic design revision which will be used for experimental validation (or invalidation) of the theory. The concept design was initially opened with the only constraints being the length, cross section, and the theoretical shape function to be attained. Various component options were researched and decided upon for each aspect of the robot's design such as the waterproofing skin, flexible joint assembly, motion actuators, motion control, power source, wiring, and material properties of the robot's supporting structure. In parallel, a tethered testing apparatus was designed around the robot for it to be attached to a marine testing facility's tow tank carriage. While tethered to the testing mechanism, the NEELBOT-1.0's underwater swimming motion was measured with image processing software. This image processing analysis has been very successful in comparing the robot's motion to that proposed by the theory, and the mathematical method of the image processing program is explained within. The results of the analysis have quantitatively described the slight errors in the motion and what is needed to improve the results. This initial robotic design and motion measuring method have been proven to be very successful up to this stage in the project, and the current measuring method will be continued. Future design improvements for the robot for hydrodynamic testing of the wakeless swimming theory will also be discussed.

Transom Stern Modeling and Validation Through Ventilation Transition Speeds

David Kring, Troy Keipper, Ben Rosenthal, Chris Szlatenyi and Raju Datla

Summary

Transom sterns are a common feature on modern ships and boats. At typical cruising speed the flow cleanly separates, ventilates fully, so that the stern is dry. The proper design of a ship requires predictions over the entire speed range, even at lower speeds where the waves downstream collapse and create a

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Abstract

partially wet transom. This study combines physical model tank testing, a Reynolds Averaged Navier-Stokes solver, and a medium fidelity potential flow solver, AEGIR, to predict the total resistance of slender, semi-displacement ship.

A new method is offered to correct the potential flow solution through the ventilation transition speeds. The use of both high-fidelity RANS and medium-fidelity potential flow solvers are required for practical rapid prototyping of new concepts of for optimal design. The results for the new, corrected potential flow predictions agree well with experiments.

Estimation of Runway Incursion Detection Algorithms (RIDAs) Performance by Means of Close to Reality Simulation

Janis Schoenefeld and Dietmar Moeller

Summary

For the estimation of the impact of runway incursion alerting and prevention systems (RIPAS) on the runway safety in safety critical scenarios, the performance of different approaches for runway incursion detection algorithms (RIDAs) was evaluated in a close-to-reality simulation study that accounted for real world problem connected to individual sensor characteristics, like failure rates, false alarms, or probability of detection. The focus of the study is on the performance of the RIDAs with respect to combinations of the experimental and of the shelf surveillance sensors. This paper gives an comparative overview of the performance of two different RIDAs approaches based on the simulation of different surveillance technology

Ekusim: Realistic Evacuation Simulation with a Fast Hierarchical Algorithm

Alexander Mihm, Andre Drews, Dietmar Moeller and Hamid Vakilzadian

Summary

The evacuation simulation tool Ekusim is presented which implements a Hierarchical pathfinding algorithm. The tile-based pathfinding algorithm allows to preprocess the pathfinding problem to increase the speed. It could also be used for parallel computing. For the evacuation scenarios, entities follow certain rules resulting in a realistic panic behavior. The entities try to find emergency exits by avoiding drawbacks like seats or walls. Using the Graphical User Interface an evacuation scenario can be easily built up and the simulated results can be directly shown. As application example evacuation scenarios in a stadium and in an aircraft are illustrated that utilize realistic layouts. The tile-based hierarchical pathfinding algorithm results in a speed-up of 200 in comparison to the well established algorithms. A simulation example of evacuating an aircraft shows that a equipartioned failing of emergency doors only has a small influence on the evacuation time.

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Abstract

Simulation and Scale Testing to Improve the Next Generation of Wave Adaptive Modular Vessels

Andrew Peterson, Mehdi Ahmadian, Michael Craft and Andrea Shen

Summary

Wave-Adaptive Modular Vessels (WAM-V) are a new and unique class of marine technology. An adaptation of lightweight catamaran design, WAM-Vs incorporate an independent suspension for shock mitigation in rough seas. Determining the WAM-V's critical parameters is highly important for missions of interest to the U.S. Navy. Evaluating the WAM-V's unconventional design requires a mix of simulation tools from both the automotive and marine domains. A Quarter-Car modeling approach was adapted for the marine environment through the testing and simulation of a Quarter-Boat Drop Testing Rig. Testing data was used to create a new hydro-mechanical simulation program, known as the Quarter-Boat Model, using Matlab, Simulink and SimMechanics. The program models the dynamics of a pontoon and suspension using mechanical components to represent the relevant vertical hydrodynamics. To validate the model, an on-water test was conducted where the WAM-V was piloted across the wake of a large freighter ship. The wake launched the WAM-V airborne, creating a similar impact to the drop test rig. Analysis of the on-water test data and Quarter-Boat simulations revealed performance deficiencies in the current suspension. An improved suspension was designed and tested in a rough water environment, showing improved performance, as well as further validating the simulation method.

What More Do We Want in Modeling and Simulation Interoperability and Reuse?

William Tucker and David Gross

Summary

Oceans of ink have been applied to discussions of Modeling and Simulation (M&S) reuse and interoperability over the last twenty plus years. Strong business cases have been built, leading to major investments in development of standards, infrastructure, commercial products, and many successful military simulation systems. M&S interoperability and reuse have matured over the past three decades from cutting edge research, through state of the art, to today's standard practice. In this paper we describe M&S interoperability and reuse, review the state of practice, outline the productive things that can and should be pursued in this field, analyze the barriers to further progress, and propose a path forward.

Application of Multi Tone Approach in Three Phase AC system Impedance Measurement

Bo Zhou, Marko Jaksic, Zhiyu Shen, Paolo Mattavelli, Rolando Burgos and Dushan Boroyevich

Summary

This paper is about how to measure d-q impedance of three phase systems with multi-tone signal injected. There may be some updates on the paper in the coming few weeks if it is allowed.

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Abstract

Modelling and Robust Stability Analysis of Uncertain Systems

Sharmila Sumsurooah, Milijana Odavic and Dushan Boroyevich

Summary

The difference between a physical plant and its design model is the set of uncertainties, which are not accounted for in the model. A plant which is designed around fixed parameters is referred to as the nominal plant. In practice, the parameters of the actual plant may vary within a certain range of the nominal values owing to perturbation effects such as parameter changes, noise, variation in material properties, design errors. The advantage of designing around uncertain systems is that it brings the model closer to the real plant. Two approaches to model uncertain systems, based on the Linear Fractional Transformation techniques (LFT), have been developed in this work namely the interconnection of uncertain parameters and Morton's Method.

Standard techniques would be sufficient to verify the stability of nominal systems with no uncertainties. However to analyze the stability of uncertain systems, which consider not only the nominal values but also the possible range of parameter changes, the principle of structural singular value is used, as will be discussed later in this paper. The aim is to verify that a system remains stable for all conditions that may arise within the defined uncertainty set in which case it is said to be robustly stable. The systems dealt in this work vary with frequency and are linear time invariant with multiple input and multiple output (MIMO).

The modelling approaches as well as the robust stability studies have been illustrated by applying them to the example of an RLC circuit.

Ubiquitous Learning: Teaching M&S with Technology

Dietmar P. F. Moeller, Roland E. Haas and Hamid Vakilzadian

Summary

Education has undergone major changes in recent years in cohesion with development of computers and information and communication technology (ICT) networks. This allows enhancing accessing global information and communication systems. Therefore, the number of resources available to today's students at all levels of education has enhanced. In its early form computer and ICT application in education was implemented as e-learning and has epitomized the transformation in education. The raise of the availability of the Internet elsewhere and the constant transformation occurring in software and telecommunication services led to connect everything with anything. One of the first opportunities that arise was the concept of mobile and ubiquitous computing which allow building up the basis of mobile e-learning (me-learning) and ubiquitous learning (u-learning). U-learning has the potential to alter education in a sustainable manner and remove many of the constraints in education allowing customization in relation to student needs which means embedding modeling and simulation (M&S) on demand. Hence, this paper presents an integrative concept teaching with enhanced technology.

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Abstract

Modeling for Personal Well Being – Time for Paradigm Change

Farzaneh Salamati and Zbigniew Pasek

Summary

The exploding demand for health services and escalating costs are a growing concern for the health care systems, which may not be able to handle growing volume and complexity of cases. Considering that obesity is responsible for over 60% of all leading death causes in developed societies and world-wide spread of that preventable condition, it is critical to understand the mechanisms that may lead to its control. The obesity model presented here was developed using System Dynamics approach and is based on three fractional models that were used to create energy balance equation. The results were verified on weight loss clinic data. Tools for quantified self-tracking may provide an automated source for data collection needed to refine the model and estimated individual characteristics needs as model parameters.

"JaamSim" Open-Source Simulation Software

Harry King and Harvey Harrison

Summary

JaamSim is a free, open-source simulation package written in the Java programming language. A modern graphical user interface is provided that is comparable to commercial software, including drag-and-drop model building, an Input Editor, Output Viewer, and 3D graphics. Users are able to create their own palettes of high-level objects using standard Java and modern programming tools such as Eclipse. If you are writing hundreds or thousands of lines of code in a proprietary programming language provided with your commercial software, you would be far better off to write your code in Java and use JaamSim.

Using Simulation Tool For Verifying AGVS Modeling and Cyclic Scheduling

Grzegorz Bocewicz and Pawel Pawlewski

Summary

The paper presents application of simulation tool Flexsim to verify analytical solution of the cyclic scheduling problem in the Flexible Manufacturing System (FMS) producing multi-type parts where for material handling are used the Automated Guide Vehicles Systems (AGVS). Finding the conditions (initial allocations) guaranteeing the AGVs deadlock-free and collision-free movement policy is the aim of our researches. The AGVs co-sharing the common parts of the transportation route while executing repetitive processes, i.e. being assigned to AGVs passing along machines in a cyclic way, can be modeled in terms of Cyclic Concurrent Process Systems (CCPS). Schedulability analysis for a given CCPS answers the question whether a cyclic schedule exists or not. The paper suggests approach for schedulability analysis employing the declarative modeling and using simulation experiment for verifying it. The simulation of behavior of this kind deterministic systems is necessary to schedule of multimodal processes representing real manufacturing (nondeterministic).

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Abstract

Finite Element Simulation of Composite Ship Structures Under Extreme Wave and Slamming Loads

Md Hafizur Rahman, Siyuan Ma and Hassan Mahfuz

Summary

An investigation of a composite multi-hull ship structure has been performed using finite element analysis (FEA). Hull structure is made of sandwich construction having carbon/epoxy composite face sheets and PVC foam core. Two types of loadings are considered; i) Wave loads and ii) Slamming loads. Both wave and slamming loads are estimated according to American Bureau of Shipping (ABS) rules at sea state 5 with a ship forward velocity of 40 knots. Deformation and stress components for both loading conditions are extracted. In both cases, the maximum deformation and stresses occur at the middle portion of the bottom surface of ship hull. The maximum stress criterion for isotropic material (sandwich core) and Tsai-Wu failure criterion for orthotropic material (sandwich skin) are applied and structural integrity of each components are checked. A comparison is also made between the effects of wave loads and slamming loads concluding that slamming loads have much severe effect on the ship hull.

Multidisciplinary Approach to Building Regional Competitiveness

Jérôme Verny, Mhamed Itmi, Abdelkhalak El Hami, Habib Abdulrab, Alain Cardon and Ludovic Couturier

Summary

We report on a multi-lateral, multi-scale perspective for building cooperative relationships that enhance competitiveness Regionally. The approach mimics a System of Systems methodology whereby entity relationships are captured and defined along several dimensions involving multiple constituents and multiple domain concerns. We have been inspired by simulation business games to build a distributed simulation approach for the prototyping of this crossroads between supply chain management, economic geography, the new discipline of geographical economics and information systems. The paper gives a global sight of the work under development on a regional competitiveness project.

Keywords: Adaptive systems, economic geography, multi agent systems, system of systems, supply chain management.

Synchronous Generator Based Grid Interface Converter for Energy Storage Systems Integration

Igor Cvetkovic, Dushan Boroyevich, Rolando Burgos, Fred C. Lee and Qing-Chang Zhong

Summary

The common, and with some exceptions the only method to interconnect high power renewable energy sources and energy storage systems to the grid has been using power electronics converters that operate as current sources to the grid for the purpose of achieving the maximum primary-source power tracking. When grid is not available, such sources would not be allowed to continue operating and will be shut-down after anti-islanded algorithms recognize the loss of the grid. Although existing standards and requirements still limit grid-interface converters to regulate voltage in the grid, this functionality will inevitably be the part of the power system operation in the future. This paper addresses physical and mathematical equivalency between power electronics converters and synchronous generators, and emphasizes how an inherent synchronization feature of the synchronous generators can be used to improve the performance of the grid-interface converters. It has also been shown that if operated as a voltage source,

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Abstract

grid-interface converter could have significant stabilizing effect on the system dynamics due to the non-delayed power delivery.

Experimental Evaluation of Voltage Source Inverter Switching Model with Embedded C Code Controller

Bo Wen

Summary

This paper develops a switching model of VSI which is been built in Simulink® with C code controller embedded. The procedure of building the model is been present. Hardware of VSI is been built to evaluate the model in frequency domain. Transfer functions from duty cycle to current in dq synchronous rotating frame are been measured, which shows good matching between simulation and experimental results. Then PI controllers for current control loop are been designed based on VSI transfer function. Loop-gains of current and voltage loops are been evaluated by experiments also. The results show good matching with experimental results.

Modelling of Cutting Force on a Viscoelastic Body for Surgical Simulation

Yun Peng and Debao Zhou

Summary

This paper presents the development of a closed form solution of stress distribution in a linear viscoelastic half-space subjected to distributive surface forces. The purpose is to analyze the cutting efficiency based on stress fields under different cutting parameters, such as cutting angle or blade sharpness, and to provide a guideline for practical applications. In developing the model, the body is assumed as a linear viscoelastic, isotropic and homogenous half-space. The interaction between the blade and the body is modeled as distributive forces acting on a rectangular area on the free surface of the half-space. To model the linear viscoelasticity, Burgers model is used to describe the stress relaxation behaviors. A trapezoidal force profile is applied in the intersection of the blade. The solution is developed in two steps: First, by applying the elastic-viscoelastic correspondence principle, we obtain the viscoelastic solution with a point load from the elastic case. Second, a surface-integration of the solution over the contacting area is performed to obtain the stress distribution under distributive forces. The result serves as a mathematical model to simulate the stress distribution during biomaterial cutting and can be used in many practices such as surgical simulations and trainings.

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Abstract

Extensible and Realistic Modeling of Resource Contention in Resource Constrained Nodes

Torsten Meyer, Bernd E. Wolfinger, Stephan Heckmüller and Alireza Abdollahpouri

Summary

In the past, network performance has been strongly determined by the capacity of the wired or wireless links. In future, however, we can expect that with the emergence of resource-constrained nodes (e.g. software routers) and high-speed links (e.g. optical fiber), the network nodes themselves will be the bottleneck. To increase the packet processing of resource-constrained nodes, parallel processing with multi-core processors is required. Intra-node resource contention can have a strong negative impact on the corresponding network node and, therefore, also on the overall performance of the network. However, several commonly used network simulators only offer a rather simplistic node model and do not take into account intra-node resource contention. In particular, latencies and input queueing behavior of resource-constrained nodes are typically not modeled in current simulators. We propose a unified and extensible approach to model intra-node resource contention which enables us to identify and predict performance bottlenecks in current and future networks. We implemented our model as an extension to the network simulator ns-3. The simulation results show that our approach significantly outperforms the original ns-3 in terms of realistic modeling. This claim has been validated successfully by means of real testbed measurements.

An Automated Tool Selection Method Based on Model Transformation: OPNET and NS-3 Case Study

Iyas Alloush, Yvon Kermarrec and Siegfried Rouvrais

Summary

Errors in telecom service (TS) design may be expensive to correct by telecommunication enterprises, especially if they are discovered late and after the equipments and software are deployed. Verifying complex architectures of TS designs is a daunting task and subject to human errors. Thus, we aim to provide supportive tools that helps during the TS creation activity. Network simulators play an important role in detecting design errors and predicting performance quality violations in the TS domain due to the measurements that they can produce. The metrics associated with performance requirements are numerous, and it is difficult to find a unique tool that can handle the prediction of their values. In this paper, we tackle the tool selection challenge for non domain-expert designers taking into consideration the differences between tools and the large number of metrics that they can measure. Thus, by applying model transformation techniques, we propose a method to select the proper tool(s) to obtain the measurements needed during verification activity. Therefore, we present our contributions on the modeling language level, and the tool selection algorithm with its implementation. Reusability, complexity, and customized measurements are taken into account. We illustrate our approach with a video conference and customized measurement example using OPNET and NS-3 simulators.

Broadcast Performance Analysis of IEEE 802.11 Networks Under Fading Channels

Jinsong Zhang and Xiaomin Ma

Summary

With increasing applications of IEEE 802.11 network broadcast service in vehicular safety systems, the ability to analytically model the performance of such services under realistic fading channel conditions plays a key role in the analysis and design of vehicular safety systems. In this paper, we develop an ana-

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lytical model to evaluate the broadcast service performance of two dimensional IEEE 802.11 networks under Rayleigh fading condition and unsaturated data traffic. Expressions on broadcast performance indices such as packet reception rate and per-node throughput are provided. The simulated results validate the proposed model. Based on the proposed model, we also study how network parameters such as node density, packet arrival rate and carrier sensing threshold value affect the broadcast performance.

Performance Evaluation of Telecommunication Systems with Repeated Attempts and Two Servers Classes

Nawel Gharbi and Lynda Mokdad

Summary

Repeated attempts and servers heterogeneity arise in various practical areas as telecommunications, computer systems and cellular mobile networks. In this paper, we propose a numerical approach for evaluating performances of telecommunication systems with finite population, repeated attempts of users whose request was refused due to the lack of available servers (resources) and two servers classes, using the Generalized Stochastic Petri Nets (GSPNs) model as a support. One of the major drawbacks of the use of this high-level formalism in performance evaluation of large systems is the state space explosion problem which increases when considering repeated attempts and several servers classes. Hence, this paper aims to present an approach which allows a direct computing of the infinitesimal generator describing the users behavior and servers allocation, without generating nor storing the reachability set. In addition, we develop the formulas of the main stationary performance indices as a function of the system parameters, the stationary probabilities and independently of the reachability set markings. Through numerical examples, we discuss the effect of retrials and servers heterogeneity on the systems performances.

The Impact of Weights on the Performance of Server Load Balancing Systems

Jörg Zinke and Bettina Schnor

Summary

Server Load Balancing (SLB) is used when a system has to offer high throughput and High Availability (HA). Web services as offered from Amazon or Google rely on SLB with a large number of back end servers. Since these clusters of back end servers tend to be heterogeneous, Load Balancers (LBs) offer balancing algorithms like Weighted Round Robin (WRR) and Weighted Least Connection (WLC) which provide the ability to consider the different capacities of the machines by a configured weight.

This paper presents benchmarks which show the influence of the chosen weight values on the performance of the SLB system and confirm simulation results done earlier in this research field. The measurements are done in a web server environment running a Wikipedia instance based on a dump from 2008 using the associated HTTP access traces. Furthermore, the measurements show that badly determined weights may lead to unpredictable effects in a SLB environment, like WRR outperforming WLC. Therefore, determining good weight values is an important task to achieve a good and stable performance. The presented benchmark results give a hint that traditional benchmarks like the Byte-Unixbench may still be a good choice to determine weights for modern web service scenarios.

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Abstract

Architecture Based Software Reliability with Error Propagation and Recovery

Lance Fiondella and Swapna Gokhale

Summary

Most of the contemporary architecture-based software reliability analysis approaches assume that a component failure leads to system failure. These approaches ignore the positive impact of error recovery methods incorporated in the components, which may allow the components to recover from propagated errors, on system reliability. Thus, the system reliability estimate produced by these approaches is pessimistic. This paper presents an approach to assess the error recovery methods embedded in the system components on system reliability, within the context of the system architecture. The proposed approach enjoys low model complexity and scalability, which fosters its application to systems with a large number of components. The results indicate that the approach identifies the critical components that should be equipped with robust error recovery mechanisms, to improve system reliability efficiently.

NS-3 Module for Routing and Congestion Control Studies in Mobile Opportunistic DTNs

(Work in Progress Track)

Jani Lakkakorpi and Philip Ginzboorg

Summary

We present a delay-tolerant networking (DTN) module for ns-3 simulator that can be used, e.g., in DTN routing and congestion control studies. We have validated the code by replicating our extensive DTN congestion control simulations that we performed last year with ns-2. New simulation results show that our ns-3 DTN code works as intended. However, the results are not identical, due to implementation differences in the two DTN modules.

Dynamic Allocation of Sensor Nodes in Wireless Sensor Networks Hosting Multiple Applications

Navdeep Kapoor, Shikharesh Majumdar and Biswajit Nandy

Summary

Wireless sensor networks (WSNs) hosting multiple applications are gaining popularity over WSNs dedicated to a single application. The applications hosted by the WSN are often characterized by various different characteristics. This research investigates the importance of using information about the characteristics of the applications and the state of the network while allocating the sensor nodes to requests for applications. A number of allocation algorithms are investigated. Results of simulation experiments demonstrate that the minimum energy level at the sensor nodes and lifetime of a WSN are effectively increased when using information about the applications and the state of the WSN and by performing dynamic allocation for every application request.

Performance of Quadratic and Exponential Multiuser Chirp Spread Spectrum Communication Systems.

Muhammad Ajmal Khan, Raveendra Rao and Xianbin Wang

Summary

A novel non-linear chirp spread spectrum modulation (CSSM) is introduced for binary data transmission in a multi-user (MU) environment. Two subclasses of non-linear signals namely quadratic (Q-CSSM) and ex-

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Abstract

ponential (E-CSSM) modulations are described and their properties are given. The chirp rates in these modulations are varied as a function of user in an MU environment using the orthogonal structure inherent in non-linear chirp signals. A generic MU communication system model that employs non-linear chirp signals is presented and its bit error rate (BER) performance is analyzed in additive white Gaussian noise (AWGN) channel, and Rayleigh and Nakagami- m fading environments as a function of the number of users in the system, signal-to-noise ratio (SNR), and multiple access interference (MAI). An investigation of the trade off between bandwidth and the number of users in the system is provided for both Q- and E-CSSM. Numerical results demonstrate that these proposed modulations with proper chirp rate assignment are very effective in reducing MAI.

The main contributions of the paper are: (i) derivation of conditions to achieve unique chirp rate for each user, (ii) comparison of both proposed nonlinear chirp modulations, and (iii) performance analysis of the proposed chirp modulations in multiuser environment through Monte Carlo simulations.

Identity Matching in Social Media Platforms

Reza Soltani and Abdolreza Abhari

Summary

Identity matching is an integral task to many businesses and governments. Because of the diversity of social media sites the concept of identity resolution in social media platforms is not a simple process. This paper proposes a novel framework in which all available profile information including personal attributes such as name and location, social posts such as tweets and video posts, in addition to group memberships and friendship connections are retrieved and supplied to a ranking algorithm. The ranking algorithm utilizes various natural languages processing web APIs, YouTube API, string matching algorithms and other techniques to categorize and compare the profile data. The result of the ranking algorithm leads to discovering matching profiles. By carefully analyzing all available profile data this framework can provide a more precise study of users and thus present better identity matching results.

Performance Analysis of a Discrete Time Queueing System with Customer Deadlines

Herwig Bruneel and Tom Maertens

Summary

This paper studies a discrete-time queueing system where each customer has a maximum allowed sojourn time in the system, referred to as the "deadline" of the customer. Deadlines of consecutive customers are modelled as independent and geometrically distributed random variables. The arrival process of new customers, furthermore, is assumed to be general and independent, while service times of the customers are deterministically equal to one slot each. For this queueing model, we are able to obtain exact formulas for quantities as the mean system content, the mean customer delay, and the deadline-expiration ratio. These formulas, however, contain infinite sums and infinite products, which implies that truncations are required to actually compute numerical values. Therefore, we also derive some easy-to-evaluate approximate results for the main performance measures. These approximate results are quite accurate, as we show in some numerical examples. Possible applications of this type of queueing model are numerous: the (variable) deadlines could model, for instance, the fact that customers may become impatient and leave the queue unserved if they have to wait too long in line, but they could also reflect the fact that the service of a customer is not useful anymore if it cannot be delivered soon enough, etc.

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Abstract

LgDb 2.0 : Using L Guest for Kernel Profiling, Code Coverage and Simulation

Eviatar Khen, Nezer Zaidenberg, Amir Averbuch and Evgeny Fraimovitch

Summary

We present LgDb 2.0. The second generation of LgDb, an innovative framework for kernel code coverage, profiling and simulation. LgDb is built on top of Lguest and allows running an inspected kernel on a virtual environment instead of modifying the running kernel or using an extra target machine. LgDb 2.0 is using the Lguest hypervisor and the KGDB kernel debugger to debug and instrument kernel code. Unlike the standard approaches, LgDb enlist the hypervisor to achieve a better debugging environment for kernel development.

LgDb strives to provide a generic environment for running performance evaluation and checking decision coverage for any inspected kernel. LgDb 2.0 improves over the original LgDb by using a simulated serial port and inspecting the tested code using KGDB. By using KGDB we eliminate the need for code injections making, profiling and code coverage testing easier.

Evaluation of TCP Versions over GEO Satellite Links

Mauro Tropea and Peppino Fazio

Summary

In this paper an attempt to evaluate the performance of different version of TCP over satellite link has been performed. The throughput of the protocols has been graphed and considerations have been done. The considered protocols can be divided in two main categories: terrestrial protocols and satellite protocols. In the first category the classic TCP Sack protocol has been illustrated because it is a good performance protocol, in addition of TCP WestWood and his modified version, TCP WestWood+, while in the second category Satellite Communication Transport Protocol (SCPS-TP), and Satellite Transmission Protocol (STP) have been shown and compared. The considered protocols have been analyzed on well-known satellite link: GEO satellite link. In particular, a classical GEO satellite link and a single connection between two terminals have been considered.

Modelling and Analysis of the Survivability of Telecommunication Networks

Lang Xie, Yuming Jiang and Poul E. Heegaard

Summary

Network survivability is the ability of a network to continuously deliver the required services under undesired events. It has become a fundamental concern for the design and performance evaluation of telecommunication networks. We present survivability models for a telecommunication network subject to disaster propagation. The primary objective is to develop a stochastic modeling framework and associated computational techniques to assess the survivability of the system. By way of a wireless network example, we illustrate the viability of our approach and assess the accuracy and efficiency of the computational methods. The numerical results indicate that the our approach is not only able to accurately estimate the survivability of a network (design) but also is computational efficient.

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Abstract

Underlay Control Channel using Adaptive Hybrid Spread Spectrum Techniques for Dynamic Spectrum

Access

Salvador Perez-Salgado, Enrique Rodriguez-Colina, Michael Pascoe-Chalke and Alfonso Prieto-Guerrero

Summary

Abstract—The exchange of control messages in medium access control protocols for cognitive radio networks is an important issue, due to the need of keeping transmissions of primary (licensed) users free of interferences occasioned by the presence of secondary users. In an underlay access approach, power constraints must be established in order to allow coexistence between primary and secondary users. In this paper, we propose the implementation of two different types of underlying control channels, available to the nodes of a cognitive network. One of these channels is used to coordinate the network, while the other type of channel aims to local coordination of each pair of nodes. To provide multiple access, a code division multiple access based on a direct sequence with adaptive frequency hopping spread spectrum technique is proposed and evaluated through simulation, in order to minimize interferences to primary transmissions, and maximize the bit rate of the control messages for the cognitive radio devices.

Cloud Service Level Planning Under Burstiness

Anas Youssef and Diwakar Krishnamurthy

Summary

Cloud Service Providers (SPs) need tools to help them plan their infrastructure capacity and decide on Service Level Agreements (SLAs) with their customers prior to deploying customer's applications. Existing approaches have not considered several important challenges such as workload burstiness, workload uncertainty, and scalability to large number of applications. This paper proposes a trace-based framework to address these challenges simultaneously. The core of the framework is a novel Resource Allocation Planning (RAP) methodology which allows SPs to take into account workload burstiness in Service Level Planning (SLP). This methodology works in consort with a Monte Carlo simulation technique to systematically consider the impact of workload uncertainty in SLP. Furthermore, we propose a novel burstiness-aware clustering technique that groups applications with similar workload characteristics to improve the scalability of the SLP framework. Results show that our approach can yield near optimal resource allocations and can achieve lower SLO violations with fewer resources than competing approaches, especially for bursty workloads. Furthermore, our proposed clustering technique is able to improve the scalability of our SLP framework without significantly impacting resource allocation accuracy.

Performance of Multiuser MIMO Communication System using Chirp Modulation

Muhammad Ajmal Khan, Raveendra Rao and Xianbin Wang

Summary

Multiple-Input and Multiple-Output (MIMO) system is widely recognized as an effective means to combat the effects of multipath fading in wireless communications. In this paper, we propose the use of chirp modulation technique in a MIMO system, as the modulated signals have inherent interference rejection capability and immunity against Doppler shift and fading due to multipath propagation. The performance of chirp-based MIMO system is examined using Monte Carlo simulations over Rayleigh fading channel. For example, it is shown that a simple 2X2 MIMO system can offer a significant gain in performance relative to maximal ratio combining (MRC) using chirp modulation. Next, a multiuser MIMO (MU-MIMO) system is

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proposed, where each user is assigned a unique orthogonal chirp signal that efficiently modulates each user's incoming data as well as identifies them at the receiver. Numerical results show that chirp modulation is very effective in MU-MIMO system in eliminating the effects of multiple-access interference (MAI). The main contributions of the paper are (i) implementation of chirp modulation in MIMO system, (ii) multi-user MIMO system using chirp spread spectrum, and (iii) performance analysis of the proposed systems using Monte Carlo simulations.

Power Management in Multi Core Processors Using Automatic Dynamic Pipeline Stage Unification

Saravanan Vijayalakshmi, Alagan Anpalagan, Isaac Woungang and D. P. Kothari

Summary

In the recent years, the rapid development of microprocessors has raise up the demand for high-performance and fast processing computing systems capable of performing multiple tasks. Multi-core processors are increasingly advocated as a viable solution to achieve high performance, but under the constraints associated with power bounds. Maintaining the power consumption of processors at an acceptable level is still a challenge. For instance, the size of transistors is set to go down to as small as 22nm. When this size starts to decrease and go below 30nm, the sub-threshold leakage will become an issue since the current technique of dynamic voltage frequency scaling (DVFS) used to conserve energy will become less useful. The reason for this is that the transistor size will decrease and the absolute maximum voltage at which it can be operated will also decrease, but the lower limit voltage will remain the same at $2.3V_{th}$ where V_{th} is threshold voltage. Thereby, there is a clear demand for alternatives for managing the energy consumption in chip multi-processors (CMPs). In this paper, a variable stage pipelining (VSP) or pipeline stage unification (PSU) is investigated as a potential successor to the DVFS technique. Theoretical results are provided, showing that our dynamic pipeline stage unification approach can be efficient in terms of power consumption, chosen as performance metric

A Novel Strategy for Cognitive Radio Networks with Diversity and Non Identical Fading Channels

Sattar Hussain and Xavier Fernando

Summary

This paper presents a novel approach for a relaybased cognitive radio (CR) networks with diversity and nonidentical Nakagami-m fading channels. Using a decode-amplify-and-forward (DAF) strategy, the approach aims to combat channel fading while mitigates the problem of bandwidth requirements of the well known amplify-and-forward (AF)strategy. We also introduce a statistical approach to derive new closed-form expressions for average detection probability and average false alarm probability for the proposed spectrum sensing models. The study clearly reveals that DAF strategy outperforms AF strategy in all suggested scenarios. The study shows that with DAF strategy, refraining the heavily faded relays improves the detection accuracy while reducing the bandwidth requirement of the relaying links.

International Symposium on Performance Evaluation of Computer and Telecommunications Systems (SPECTS)

Abstract

The Influence of the Buffer Size in Packet Loss for Competing Multimedia and Bursty Traffic

Luis Sequeira, Julián Fenández-Navajas, Jose Saldana, José Ruiz-Mas, Idelkys Quintana and Luis Casadesus

Summary

This work presents an analysis of the effect of the access router buffer size on packet loss rate and how it can affect the QoS of multimedia services when bursty traffic is present. VoIP traffic, real traces of video-conferencing and videosurveillance are used in two different scenarios with medium link utilization. The study shows that the bursty nature of some applications may impair the MOS of voice calls especially when a certain number of bursts overlap. When link utilization is above 70% good values of VoIP QoS cannot be obtained.

Network Controlled Cross Layer Fast Handover for MIPv6 over IEEE 802.16m Networks

Youngsong Mun and Kyunghye Lee

Summary

In next-generation mobile networks, handover is one of the key components since the handover performance may greatly impact on the end-user experience. IEEE 802.16m advanced air interface, which competes with LTE-Advanced as a candidate for IMT-Advanced (4G), is designed with strict requirements on the handover latency to support high mobility as well as high bandwidth. The high mobility support requires an efficient IP mobility management protocol incorporated with IEEE 802.16m to be able to handle frequent handovers. Thus, the performance improvement of the IP layer handover by incorporating with IEEE 802.16m is crucial to meet the latency requirement on handover. In this paper, we propose an efficient network-controlled cross-layer fast handover scheme for mobile IPv6 (MIPv6) over IEEE 802.16m networks. The proposed scheme significantly reduces the handover latency and improves the performance of the IP layer handover by incorporating with IEEE 802.16m. Detailed performance analysis in terms of the important performance metrics, such as the handover latency, the signaling cost, and the packet delivery cost, confirms that the proposed scheme can provide a better end-user experience over IEEE 802.16m networks.

Power Aware Load Balancing in Heterogeneous Clusters

George Terzopoulos and Helen Karatza

Summary

Minimizing energy consumption of computing systems is a complex problem with many parameters. Clusters have been studied from a performance perspective and more recently from a power consumption angle. Since clusters are usually composed of different hardware with different performance and energy consumption, we propose load balancing policies that take into account servers' computational power and power consumption. These policies are applied on a heterogeneous power-aware DVFS cluster running hard real-time CPU intensive tasks. Proposed policies are compared to the Earliest Deadline First policy. Simulation results show that these policies achieve higher energy savings and less task transfers at the same time.

International Symposium on Performance Evaluation of Computer and Telecommunications Systems (SPECTS)

Abstract

Characterization of the Buffers in Real Internet Paths

Luis Sequeira, Julián Fernández-Navajas and Jose Saldana

Summary

The behaviour of the routers' buffer is of primary importance when studying network traffic, since it may modify some characteristics, as delay or jitter, and may also drop packets affecting the QoS of different services. As a consequence, the characterization of this buffer is interesting, especially when real-time flows are being transmitted.

This work presents a preliminary study of how to determine the technical and functional characteristics of buffers (as e.g. behaviour, size, limits, input and output rate) of a network path. Two different methodologies are considered on two test scenarios; real measurements permit the estimation of some parameters of the intermediate buffers as size, input and output rates, in a network path with different devices across the Internet.

Performance Comparison of a Probabilistic Fingerprint Based Indoor Positioning System over Different Smartphones

Igor Bisio, Fabio Lavagetto, Mario Marchese and Andrea Sciarrone

Summary

In this paper a performance comparison of a probabilistic Gaussian-Kernel fingerprint-based indoor positioning method over different smartphones, is presented. The work aims at highlighting the positioning accuracy, the robustness and the consistency of the method by testing it over two different smartphone platforms (i.e., Nokia N95 and Samsung Galaxy S II), within a given area. In more detail, three different variants of the probabilistic approach have been tested: Nearest Neighbor (NN), K-Nearest Neighbor (K-NN) and K Weighted-Nearest Neighbor (KW-NN). Numerical experiments, carried out in an area of around 80 [m²], have shown that the probabilistic fingerprint provides good position accuracy (less than 1.20 [m] of error) for both devices and also robustness when the signal strength acquisitions are reduced. Finally, the similarity of results provided by the two smartphones leads to assert that the probabilistic approach is also consistent with respect to the device employed in the experiments.

Performance Evaluation of Scalable and Energy Efficient N-Epidemic Routing in Delay Tolerant Networks

Floriano De Rango and Salvatore Amelio

Summary

In this paper a variant to epidemic propagation scheme applied to Delay Tolerant Networks (DTNs) is proposed. It extends the approach proposed in the basic epidemic routing and adopts the forwarding scheme of the n-Epidemic routing. However, differently from n-Epidemic, it applies a dynamic forwarding scheme based on nodes density that is able to reduce energy consumption and increase message delivery probability. The performance of our idea have been evaluated through a deep campaign of simulations, verifying that the proposed extended epidemic approach leads the system to an overall enhancement. Simulation campaigns have been led out evaluating the message delivery ratio, the average hop count, the average end-to-end delay and the average residual energy.

International Symposium on Performance Evaluation of Computer and Telecommunications Systems (SPECTS)

Abstract

Simulative Performance Comparison of Network Selection Algorithms in the Framework of the 802.21 Standard.

Igor Bisio, Stefano Delucchi, Fabio Lavagetto and Mario Marchese

Summary

The diffusion of mobile devices equipped by many different network interfaces, offers great benefits in the mobile communications, in particular an applicative field is represented by the so called Intelligent Transportation System (ITS). At the same time the diffusion of the 802.21 standard, that facilitates the interoperability between different access networks, assures further improvements. In this scenario the network selection, that consists in determining the best Radio Access Network (RAN) among a set of available heterogeneous links, plays a fundamental role. The main contribution of this paper is a performance comparison among different network selection algorithms, inside the framework proposed by the 802.21 standard. This performance comparison is obtained through a simulated scenario developed by using Network Simulator 2 (ns-2).

Decision Aided Detection and Performance of Continuous Phase Chirp Keying

Mohammed Zourob and Raveendra Rao

Summary

A Decision Aided Receiver (DAR) for coherent detection of Continuous Phase Chirp Keying (CPCK) in AWGN is presented. The structure of DAR is generic and applies to arbitrary Continuous Phase Modulation (CPM). The receiver complexity is a linear function of number of observed symbol intervals and uses repeated processing of received waveform at the receiver. Performance analysis of DAR is presented and easy-to-compute closed-form analytical expressions for Bit Error Rate (BER) have been obtained for CPCK. The DAR is attractive by virtue of its superior error performance and low-complexity relative to the Average Matched Filter (AMF) receiver for CPCK, especially for a wide range of CPCK modulation parameters and decision observation lengths. For example, it is shown that 2-bit DAR can outperform 2-bit AMF receiver for CPCK with modulation parameters $(q, w) = (0.98, 4.15)$. The performance of DAR is highly dependent on the operating value of SNR and also is sensitive to the modulation parameters (q, w) . It is noted that at most values of SNR, DAR outperforms the corresponding AMF receiver, except for a small range of q and w for which AMF receiver outperforms DAR, and that range is dependent on n .

Failure Impact on Coverage in Linear Wireless Sensor Networks

Nader Mohamed and Jameela Al-Jaroodi

Summary

Wireless Sensor networks (WSN) are used to monitor long linear structures such as pipelines, rivers, railroads, international borders, and high power transmission cables. In this case a special type of WSN called linear wireless sensor network (LSN) is used. One of the main challenges of using LSN is the reliability of the connections across the nodes. Faults in a few contiguous nodes may cause the creation of holes (segments where nodes on either end of them cannot reach each other) which will result in dividing the network into multiple disconnected segments. As a result, sensor nodes that are located between holes may not be able to deliver their sensed information which negatively affects the network's sensing coverage. In this paper, we provide an analysis of the different types of node faults in LSN and study their negative impact on the sensing coverage. We develop an analytical model to estimate the sensing cover-

International Symposium on Performance Evaluation of Computer and Telecommunications Systems (SPECTS)

Abstract

age in LSNs in the presence of node faults. We verify the correctness of the developed model by conducting a number of simulation experiments to compare both calculated and simulated results under different network configurations and fault scenarios.

Decentralized Routing Algorithm for Wireless Mesh Network Based on Multi Objective Optimization

Carlos Lozano Garzon, Miguel Camelo, Pere Vila and Yezid Donoso

Summary

Wireless Mesh Networks (WMN) is one of the technologic infrastructures that provide the technical characteristics that could fulfill the requirements proposed by the Smart Cities. One of the most important challenges is designing of optimal routing protocols in this kind of networks, especially for the smart cities environment. These protocols must be efficient in the allocation and use of resources in the network and to meet the requirements of the new services in terms of Quality of Service (QoS). In this paper we propose a routing algorithm based on the Strength Pareto Evolutionary Algorithm (SPEA) which intend to build the most efficient routes taking into account the shortest path, energy consumption and QoS restrictions (delay and bandwidth). As result, the routing protocol designed could be used in unicast or multicast schemes, with or without restrictions and into centralized or decentralized environments.

Work in Progress (WIP)

Abstract

An Adaptive Pitch Control Strategy for a Doubly FedWind Generation System

Syed Ahmed Raza and Abu Hameed Mohamed Abdur Rahim

Summary

A smart pitch control strategy for a variable speed doubly fed wind generation system is presented in this article. Nonlinear as well as linearized dynamic models of the wind system pitch controller and the doubly fed induction generator including the drive train are developed. A PI controller is employed to generate the appropriate pitch angle for varying wind speed conditions. An adaptive artificial neural network (ANN) is trained to produce PI gain settings for various wind speed conditions. The training data, on the other hand, was generated through differential evolution (DE). Simulation studies show that the DE based adaptive ANN can generate the appropriate control to deliver the wind power to the generator efficiently with minimum transients. The data used was collected from the wind generator located at the King Fahd University beach front.

Simulation Validation Using the Compatibility Between Simulation Model and Experimental Frame

Damien Foures, Vincent Albert and Alexandre Nketsa

Summary

This work illustrates the possibilities associated with the concept of experimental frame in the domain of simulation. The experimental frame noted "EF" is used to define the environment in which model will evolve. This environment model, as well as the system model are extracted from specifications of the system studied. The EF and the model are expressed through a formal language to allow the use of model-checking tools. We chose to use for this study an "I/O automata", applying the framework to the model implies incompatibilities with parts of the model. In this contribution we detect these incompatibilities to measure it. Our method allows to establish a set of metrics to evaluate the validity of a simulation towards the goals of simulation user-defined.

Dynamic Network Analyzer - Building a Framework for the Graph Theoretic Analysis of Dynamic Networks

Benjamin Schiller and Thorsten Strufe

Summary

With the rise of online social networks and other highly dynamic system, the need for the analysis of their structural properties has grown in the last years. While the re-computation of graph-theoretic metrics is feasible for investigating a small set of static system snapshots, this approach is unfit for the application in highly dynamic systems where we aim at frequent property updates. Based on the concept of data streams, new algorithms have been developed that update the computed properties based on changes instead of re-computing them regularly.

While there exists a plethora of frameworks and libraries for the analysis of static networks, there is currently no framework for the graph-theoretic analysis and development of new algorithms for dynamic networks.

In this paper, we discuss a set of requirements a framework must meet to implement the general workflow for analyzing dynamic networks. We then introduce the architecture of a first prototype for such a framework, the Dynamic Network Analyzer (DNA).

Work in Progress (WIP)

Abstract

A Model of An Open Exponential Queuing Network with Losses Due To Finite Shared Buffers in Multi-Queue Nodes.

Miron Vinarskiy

Summary

We consider a model of an open exponential queuing network where each node (service center) comprises several M/M/1 queues that share a common buffer of limited capacity. A customer arriving to a node with fully occupied buffer is lost. An assumption was made that a superposition of the external Poisson flow and the flows coming from other nodes is a Poisson process. Under this assumption a method of an approximate analysis is presented. It is based on solving iteratively a system of non-linear equations for the unknown nodal flow rates. Existence and uniqueness of the solution, obtained by the iterative algorithm, is rigorously proven. Required network and node performance characteristics are provided.

Social Network Modeling Using the DAWN (Dynamic Adjustable Weighted Network) Algorithm

Nakisa Nassersharif

Summary

The DAWN (Dynamic Adjustable Weighted Network) Algorithm randomly generates realistic, dynamic, and weighted artificial social networks. Resulting networks demonstrate scale-free degree distributions as well as realistic clustering coefficients and average path lengths. Additionally, networks are dynamic, allowing nodes to leave and enter the networks, and edges to be created, removed, or re-weighted in each iteration. Edges are asymmetrically weighted in terms of frenergy, a metric that measures the effort put in to maintaining a friendship. Networks under the DAWN algorithm approach a steady state where overall metrics, including size, clustering coefficient, path length, and degree distribution, remain generally stable. However, nodes and edges follow agent-based rules, and therefore networks continue to change locally. The DAWN algorithm provides realistic social networks over which rumor propagation, reliability testing, sensitivity analysis, and other areas of research may be performed. Results were found using Monte Carlo simulation techniques.

Image Segmentation on GPGPUs: A Cellular Automata Based Approach

Irving Olmedo, Yessika Guerra Perez, James Johnson, Lakshman Raut and David Hoe

Summary

Image segmentation is one of the most difficult tasks in image processing and plays a critical role in the analysis of medical images used for diagnosis and treatment. With the decreased hardware costs and improvements in computing power of many-core architectures, there is an opportunity to both improve upon image segmentation algorithms and to make this technology more accessible. This paper describes our on-going research efforts to implement efficient image segmentation algorithms on graphical processing units (GPUs). A focused case study was performed with a suitable algorithm based on Cellular Automata, a parallel computational technique. Preliminary segmentation results are shown to validate our approach. Plans to improve the algorithm by making it more robust to noise and more efficient on GPU architectures are discussed. Our use of graph theoretic techniques and their implementation on GPUs will have broad application to other areas requiring computationally intensive calculations, as found in many problems involving modeling and simulation.

Work in Progress (WIP)

Abstract

Adapting a Natural System Simulation Model to a General Purpose Metaheuristic: Toward Engineering Emergent Distributed Decision-Making

Alexander Mentis and Levent Yilmaz

Summary

In this paper we propose the design of a metaheuristic for achieving consensus among distributed autonomous agents based on the honey-bee colony nest site selection process. We derive the model for our metaheuristic from two agent-based models of honey bee behavior and explain how this natural process can be adapted to develop a general-purpose solution. The solution strategy is presented in terms of the composition of multiple agent-based design patterns to facilitate systematic engineering of the desired emergent behavior observed in natural systems.

Designing an Agent Based Model for the Efficient Removal of Red Imported Fire Ant Colonies

James Johnson and David Hoe

Summary

Red imported fire ants have proven to be a bane of the existence of many individuals in the southern United States. Defining methodologies for prevention, removal, and destruction of these invasive insects continues to be difficult due to their highly developed survival instincts. Multiple methods and processes exist to force the destruction of red imported fire ants yet their sheer numbers and ability to return to previously cleared spaces defines a need for greater understanding of the ant-to-ant interaction within these beds. The primary purpose of this research is to design a working model of a red imported fire ant bed that can be improved upon by interactions with the University of Texas at Tyler biology department. To meet this goal an understanding of agent-based models is first needed. Agent-based models (ABM) have the ability to generate complex behavior using easily understandable rules that can be altered by an individual with less knowledge of the computing process and more involvement in the system process. Another benefit of these models is their highly parallelized nature leading to other technological research routes to speed up the processes and create more cross discipline projects. Based on the ABM's highly parallelized nature, implementing this model on a system that can harness the low cost parallel processing environments of general purpose graphics processors and multicore CPUs is our ultimate goal. This paper outlines our initial steps in defining the model and designing a system that works effectively at a small scale on a sequential environment. Our future plans to port this model to a parallel processing environment are also detailed.

A Multi-Objective Optimization Approach to Selecting Sets of Training Devices

Stuart Grant and Slawo Wesolkowski

Summary

A variety of training devices are available for preparing soldiers to employ small arms in combat. This variety exists because each type of device is better suited to some training tasks than others. All have their particular strengths and weaknesses that must be managed to deliver a comprehensive training system (Frank et al., 2000). Fielding an efficient set of training devices requires selection of the right types and quantities of training devices. In this paper, a methodology for identifying an efficient set of devices for infantry small arms training is developed. A template for describing the training requirements is created that identifies the tasks to be trained, numbers of trained personnel required, and when they are needed.

Work in Progress (WIP)

Abstract

The Stochastic Fleet Estimation (SaFE) model (Willick et al. 2010) is adapted to the small arms training problem and subsequently used within a multi-objective optimization risk assessment framework to select promising combinations and quantities of devices. This approach provides those acquiring and operating training devices with an analytic basis for selecting parsimonious sets of training devices while understanding the limitations of various training system options.

Real Time Simulations to Support Operational Decision Making in Healthcare

Sepideh Bahrani, Renaud Bougueng Tchemeube, Alain Mouttham and Daniel Amyot

Summary

Long wait times lead to many important issues in the Canadian healthcare system. Emerging technologies now enable real-time measurement of wait times, leading to new opportunities for operational decision making in healthcare. This paper investigates a real-time simulation approach that exploits this information, combined with patient care process models, in order to support short-term predictions targeting the allocation of resources having an impact on wait times. A special style of modeling is used to enable real-time simulations with the Arena tool. The approach's feasibility is assessed on a realistic clinical process for cardiac patients of an Ontario hospital, with encouraging results.

Simulation of Two Phase Flow in a Complex Porous Medium

Bahram Nassersharif

Summary

Lattice Boltzmann (LB) method is a novel approach for simulating fluid flow in complex systems. It has advantages including simplicity of extension to three dimensions and inherent treatment of complex phenomena. In this work we apply the method to simulate two-component fluid flow inside porous media. A novel technique to generate porous media has been developed using fractals. The two-component model correctly simulates different stages of the Rayleigh-Taylor (RT) instability, such as linear growth of the interface, developing of spikes and bubbles, and the Kelvin Helmholtz (KH) instability. The RT instability suffers from diffusion during the late stages of the simulation. The RT instability is simulated inside a porous medium where heavy and light fluids are displaced.

Discrete Event Simulation Optimization: A Review of Past Approaches and Propositions for Future

Direction

Linda Riley

Summary

Over the past twenty years, a significant body of work has been undertaken on the topic of methods and approaches to optimizing discrete-event simulation models. Then, as is now, one of the greatest challenges in optimizing discrete-event simulations is the inability to precisely identify "the" optimal solution to a given system model. This is especially the case as the feasible solution space expands.

Also over the past twenty years, computational speed has increased, computing and modeling costs have decreased and theoretical developments in the field of simulation optimization have emerged. Yet a divide appears to be widening. Recent literature indicates a lack of new, innovative approaches to optimiz-

Work in Progress (WIP)

Abstract

ing large scale discrete-event simulation models as well as an absence in addressing the growing chasm between the simulation modeling, optimization and outcome improvement processes. Many of the studies and advances undertaken in the early to mid-90's are those still cited today when discussing simulation optimization.

This paper discusses and provides an overview of theoretical and methodological directions in discrete-event simulation optimization. In addition, it suggests areas of study for advancing the field. It is proposed that advances should move the field of study and application in the direction of blurring the boundaries between simulation modeling, optimization and change implementation communities instead of widening the gaps.

Towards a Predictive Model Architecture for Current or Emergent Pandemic Situations

Fortune S. Mhlanga, E. L. Perry, Ching-Song Don Wei and Peter A. Ng

Summary

This paper presents ideas towards building predictive models of the socio-economic interactions of autonomous population units (APUs). APU interaction models (AIM) can then be used to predict current or emergent pandemic situations. Our envisaged AIM system will comprise two fundamental components: (i) an existing generic discrete event simulator (DES) which will be adapted to socio-economic interactions of an APU, and (ii) a new data mining toolset (DMT) which will be integrated to the simulation toolset. In a part of our early work, we will identify and filter the data that flows into the AIM system. The DMT will consolidate digitized data (e.g., satellite imagery) with data from public and private news sources including human observation. The DES together with historical data generated from the DMT will form an initial model of the socio-economic interactions of an APU relative to a pandemic, which is used to get a prediction of the existing conditions. The DMT is then employed to explore the data and discover previously unknown, valid patterns and relationships pertaining to the spread of infectious disease. The model will iteratively compare the predicted data to the real-world DMT data until an accurate predictive model of the pandemic is obtained.

Identification of Radio Disturbances of Wireless Sensor Networks

Marina Eskola, Tapio Heikkilä and Tero Peippola

Summary

We propose a novel method to identify the sources for transmission disturbances related to radio propagation in wireless sensor networks. Especially in industrial environments there are challenges for reliability and performance. For example, dead spots indicate destructive interference caused by the signal multipath propagation. The recognition of this phenomenon during the network installation and operation, and systematic methods for network optimization, will significantly improve the data transmission quality and reliability even in difficult conditions. By computing the amplitude histograms of the received signal strength and characteristics of the histograms, we can deduce what kind of interference causes the signal degradation in radio link, i.e. interfering radio traffic or signal multipath propagation. We use software defined radio (SDR) as the receiver to capture the transmitted signal and analyze the statistical properties of the captured signal with Matlab/Simulink tools. The results show that the shape of the histograms reveals the nature of the radio channel interferences and in that way can help to choose the right actions in order to overcome the communication problems.

Work in Progress (WIP)

Abstract

Dot Matrices and Genetics Algorithms for MSA

John Tsiligaridis and Fabian Ochoa

Summary

Multiple Sequence Alignment (MSA) is among the most important tasks in computational biology. Genetic Algorithms are stochastic approaches for efficient and robust search. With the increasing rate of determination of sequences, the emphasis in biological sequence comparison has turned to the simultaneous alignment of several sequences. The consistency of alignable sequence fragments for a set of sequences can be implemented by using dot matrices. A set of algorithms has been developed (a) to discover the consistency and have MSA using dot matrices (CDM), (b) to construct the MSA algorithm (CSAA) based on an extension of CDM, (c) to create a MSA algorithm based on the divide and conquer method and the use of a Genetic Algorithm (DCGA). CDM with its internal phase can minimize the number of pairwise comparisons in MSA giving better performance. CDM is also efficient in finding conserved motifs (short sequence segments that are important in protein structure) among very distantly related sequences and using also CSAA that can be used for the MSA. Finally, the DCGA framework that contains CDM or CSAA and Genetic Algorithm (GA) provides better performance than the GA. Simulation experiments are produced.

Integrated Hybrid Systems Modeling and Simulation Methodology Based on HDEVS Formalism

Se Jung Kwon, Changho Sung, Hae Sang Song and Tag Gon Kim

Summary

A hybrid system is a combination of subsystems that have different types of state and time: A typical example is a combination of discrete event and continuous system. A Hybrid Discrete Event Systems specification (HDEVS) formalism approach was proposed for modeling and analyzing these hybrid systems. HDEVS formalism allows modelers to construct a hierarchical and modular model based on the appropriate mathematical set theory. Because HDEVS formalism was applied to distributed and interoperated simulators, it was inconvenient for modelers to make several different models dividing a target system. Hence, this paper proposes a revised HDEVS formalism that includes an extended hybrid coupled model for integrated hybrid systems modeling. With this revised formalism, integrated hybrid model development becomes feasible in contrast to the existing simulation framework. By applying the proposed modeling concept, a target system can be translated into a hybrid model that is in a similar form as the target hybrid system. This paper also explains the algorithms of a related simulation engine. This engine contains a numerical analysis algorithm and a DEVS execution algorithm with time and data management algorithms. This design is applied to water-level control systems as in past research.

SummerSim'13 Survey

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Upcoming SCS Conferences

2014 Spring Simulation Multi-Conference (Spring Sim '14)

April 13–April 16, 2014

Grand Hyatt Tampa Bay, Tampa, Florida, USA

The Spring Simulation Multi-Conference 2014 (SpringSim '14) brings leading experts in various domains of Modeling and Simulation together. The conference includes keynote speeches presented by technology and industry leaders, technical sessions, professional development courses and seminars, as well as vendor exhibits. Scientist, engineers, managers, educators, and business professionals who develop or use simulation tools are invited to participate and present original papers.

Proposals are solicited for papers, panels, tutorials, workshops, seminars, exhibits, social activities and for other presentation, discussion and sponsorship formats. People are always welcome to benefit by taking an organizing role. SpringSim '14 offers many ways to promote simulation products and to enhance corporate images. You are invited to use the Spring Simulation Multi-conference in ways that best serve your interests.

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- Agent-Directed Simulation
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Upcoming SCS Conferences

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Jan. 20 - 23, 2014

Astor Crowne Plaza, New Orleans, LA, USA

- Ever wonder if there is a better way to startup from a major DCS upgrade?
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