SYSCON 2025

The 19th Annual IEEE International Systems Conference

April 7-10, 2025

Delta Hotels Montreal

Montreal, QC, Canada

IEEE SYSCON 2025

2025 ANNUAL IEEE INTERNATIONAL SYSTEMS CONFERENCE

CONFERENCE PROGRAM

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Welcome Message

On behalf of IEEE and the IEEE Systems Council, it is my pleasure to extend a warm welcome to all attendees of the 19th Annual IEEE International Systems Conference (SysCon) in the beautiful and historic city of Montreal, Canada. We are delighted to bring together professionals from industry, government, and academia from around the world to engage in insightful discussions on systems engineering and complex systems.

This year's technical program is designed to address key challenges and innovations in complex systems, systems of systems, and the advanced engineering methodologies that support them. Our Technical Program Chair, Dr. Amir Aghdam of Concordia University, has dedicated significant effort to curating an outstanding selection of presentations. Please join me in expressing our gratitude for his invaluable contributions. I also extend my sincere thanks to our keynote speakers for their insightful talks and for traveling to Montreal to share their expertise.

As systems continue to grow in complexity—whether they are physical systems like transportation networks and aerospace structures, or cyber-physical systems that integrate computing and networking—the importance of robust systems engineering has never been greater. In an era where cybersecurity threats are increasingly sophisticated and economic pressures demand cost-effective solutions, strong systems engineering practices are crucial for ensuring security, reliability, and efficiency.

We hope you find this conference intellectually stimulating and professionally rewarding. Beyond the sessions, we encourage you to explore the rich culture and history of Montreal during your stay. If there is anything we can do to enhance your experience, please do not hesitate to reach out to our team.

Looking ahead, we are excited to announce that the 20th Annual IEEE International Systems Conference will be held in April 2026 in Halifax, Nova Scotia—stay tuned for further details. Once again, welcome to SysCon 2025, and enjoy both the conference and your time in Montreal!

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SysCon 2025 General Chair

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David Malone, Maynooth University
Theodore Manikas, Southern Methodist University
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Manju Nanda, Principal Scientist
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Keynote Speakers

Xiaobo Tan
Michigan State University

Stalking vampires of the Great Lakes: A systems engineering solution for monitoring invasive sea lamprey with e-skins

Sea lamprey, a “vampire fish”, is a parasitic invasive species in the Great Lakes region that threatens its ecosystems and billion-dollar fishery industry. The lamprey uses its suctorial mouth to attach to a host fish and drain the fish’s body fluids. In this talk we describe an end-to-end systems approach to the development of electronic skins (e-skins) for detecting the suctorial attachment by adult sea lampreys during their upstream migration for spawning. Such e-skins can be mounted at strategically chosen places, such as selective fishways, to facilitate measures (e.g., capture and population assessment) for sea lamprey control. We discuss the formulation of system design requirements via characterization of lamprey suction pressure dynamics, followed by the integration of sensor hardware development, signal processing, and machine learning to accomplish automated detection of lamprey attachment. Results from animal experiments demonstrate the promise of the developed e-skin technology in supporting sea lamprey control efforts and sustainable ecosystem management strategies in the Great Lakes region.

Amir Rahmani
NASA

Shaping Space Exploration with Autonomy: A Systems-Level Perspective

The future of space exploration heavily depends on autonomous systems that operate both independently and as collaborative teams in harsh, unknown environments. This presentation highlights NASA’s autonomy software solutions for single- and multi-robot systems, focusing on their role in enabling autonomous decision-making and teamwork in planetary and space exploration.

Through the lens of several NASA JPL missions, such as the Cooperative Autonomous Distributed Robotic Exploration (CADRE) lunar mission, we will explore the challenges and advancements in deploying resilient autonomous robots for exploration and resource excavation. The talk will cover autonomous day-and-night navigation, real-time coordination, and mission-specific autonomy strategies.

Additionally, we will discuss the systems-level considerations essential for success in extreme environments, including robustness, fault tolerance, and adaptability to unforeseen hazards. Attendees will gain insights into how autonomous systems are shaping the future of space exploration, from lunar missions to asteroid exploration.

Tutorials

All tutorials will be held on Monday, April 7.

7:00 – 8:00: Tutorial Breakfast (Room: Ravel)
8:00 – 10:00: Morning Tutorials
10:00 – 10:15: Break
10:15 – 12:00: Morning Tutorials (Continued)
12:00 – 13:00: Tutorial Lunch (Room: Ravel)
13:00 – 15:00: Afternoon Tutorials
15:00 – 15:15: Break
15:15 – 17:00: Afternoon Tutorials (Continued)

1. **MORNING: The Engineering of Simulations: from Simulation Specification to Simulation Validation (Room: Mozart)**
   Henri Sohier, IRT SystemX
   Romain Barbedienne, IRT SystemX

A simulation can be a complex product in its own right, with its own architecture of models, tools, and hardware. It has a distinct development cycle, from specification to validation, and involves its own critical decisions. However, we've all been there: simulation development can rely on informal practices. The good news: applying systems engineering principles can of course help. In this tutorial, we'll explore how.

After a refresher on key systems engineering concepts (requirements quality, functional and non-functional requirements, Operational Design Domain, or MBSE languages and tools), we'll dive into defining simulation needs and writing simulation specifications. We'll discuss the application of different good practices, such as defining the system to be represented or the simulation's purpose, while accounting for factors like the system's development phase and decision criticality. The tutorial will also address strategies to build credibility, with a focus on verification and validation. We'll cover relevant standards like NASA-STD-7009 and the Predictive Capability Maturity Model.

Throughout the tutorial, traceability will be emphasized as a cornerstone for quality management and automation. Real-world automotive use cases, contributed by leading companies, will be used as practical examples throughout. Attendees will be encouraged to share their own experiences, challenges, and best practices. The discussions we'll have during the tutorial could be compiled into a report to benefit the wider community. This tutorial builds on the success of sessions at IEEE RASSE 2021 and IEEE SysCon 2023.

2. **MORNING: Complex Adaptive Systems Trade Studies for Sustainable Design (Room: Debussy)**
   William Brooks, Boeing
   Eileen Arnold

After initial development, Complex Systems are updated and changed to address new requirements and conditions. Designing for Adaptability requires evaluating trade-offs between the current requirements and potential future requirements. This tutorial will provide training on basic concepts and theory of system adaptability, and its application in trade studies to minimize costs from later changes.

3. **MORNING: How to Set Up Academic Equivalency for SE Coursework with INCOSE (Room: Listz)**
   Courtney Wright, INCOSE

This tutorial will lead participants through the steps in applying for and executing an Academic Equivalency (AcEq) agreement between a university and the International Council on Systems Engineering (INCOSE). AcEq is a means for a university to have its course(s) recognized as equivalent to the INCOSE knowledge exam in qualifying students for INCOSE Certification. Universities who apply for AcEq must prove to INCOSE reviewers that their course assesses against the same topics as the knowledge exam. This tutorial will review the requirements and include tips from the AcEq creator and program manager on how to be most efficient in applying. The conversation will be best-suited for faculty who teach systems engineering, though there is no requirement that their course be in an SE department. Industry partners are also welcome to come to learn about AcEq in hopes to convince their local universities to apply.

4. **AFTERNOON: Data-Driven Simulation of Wheel Motor E-Bus as a Step Towards Digital Twining (Room: Mozart)**
   Hussein Hussein, National Research Council of Canada (NRC)

With the growing adoption of electric transportation, it is becoming increasingly crucial to understand and address performance degradation to maintain reliability and efficiency. This tutorial focuses on the data-driven modeling of a wheel motor Electric Bus (E-Bus). A model-based data-driven method is explored to estimate the traction energy and reliability performance of a battery-powered E-Bus. The modeling process takes into account various factors such as loading operations, and driving behavior, which are critical for accurate energy and reliability predictions. This comprehensive model aims to predict the energy and reliability and improve operational efficiency by leveraging onboard sensor data. The tutorial demonstrates how data-driven modeling can be effectively used to enhance the performance and efficiency of electric transportation systems. This approach not only contributes to the sustainability of transient operations but also sets a precedent for the broader application of data-driven methods in the electric transportation industry. Furthermore, the tutorial highlights the importance of continuous monitoring and adaptive control strategies. This proactive approach ensures that the E-bus can operate at peak efficiency, reducing downtime and maintenance costs.

5. **AFTERNOON: Stochastic Systems, Control and Game Theory with Rosenblatt Noise (Room: Debussy)**

Tyrone E. Duncan, University of Kansas
Bozenna Pasik-Duncan, University of Kansas
Hamidou Tembine, Timadie and UQTR

The field of Stochastic Systems, Control, and Games is inherently interdisciplinary and multidisciplinary, playing a critical role in numerous applications. These include brain disorders and broader biomedical fields, financial markets and actuarial sciences, networks and autonomous vehicles, climate change, and sustainable co-development in small villages. Understanding randomness in systems, whether in the human brain or stock markets, is a research area that demands advanced knowledge of probability and stochastic process theory. Core disciplines such as probability, stochastic processes, stochastic modeling, and mathematical statistics form the foundation for these applications. This minitutorial provides a concise yet thorough introduction to advanced stochastic optimal control and mean-field-type game theory, focusing on systems driven by the Rosenblatt process - a type of noise that is non-Gaussian, non-Poissonian, and non-Markovian. Applications discussed include smart energy systems and blockchain token economics. The speakers are experienced in preparing students and postdocs at all levels for successful professional careers in these fields.

Social Events

Welcome Reception

When: Tuesday, April 8, 18:00 – 19:30

Where: Opus Foyer at the Delta Hotel

Hors d'oeuvres and drinks will be served.

Young Professionals Panel

When: Tuesday, April 8, 19:30 – 21:00

Where: Vivaldi Room at the Delta Hotel

Pre-registration is FREE but required.

WiSE Networking Reception

When: Wednesday, April 9, 18:00 – 19:30

Where: Mozart Room at the Delta Hotel

WiSE is an affinity group of the IEEE Women in Engineering (WIE), a global network of IEEE members and volunteers dedicated to promoting women engineers and scientists, and inspiring girls around the world to follow their academic interests in a career in engineering and science. Come and meet our WiSE women in person!

Pre-registration is FREE but required.

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International Council on Systems Engineering

The International Council on Systems Engineering (INCOSE) is a not-for-profit membership organization founded to develop and disseminate the transdisciplinary principles and practices that enable the realization of successful systems. INCOSE is designed to connect systems engineering professionals with educational, networking, and career advancement opportunities in the interest of developing the global community of systems engineers and systems approaches to problems. It is also focused on producing state-of-the-art work products that support and enhance this discipline's visibility worldwide. INCOSE has over 23,000 members & corporate advisory board (CAB) associates, 60+ chapters around the globe, 40+ working groups, and 4,000+ certified systems engineering professionals. INCOSE's mission centers around tackling complex technical and societal challenges through the use of systems engineering principles. This is achieved by:

• Promoting collaboration and knowledge sharing: They organize conferences, publish materials, and maintain local chapters to foster connections and exchange ideas among systems engineers.

• Developing best practices: Through working groups, INCOSE establishes and disseminates best practices and methodologies for successful systems engineering.

• Offering certifications: INCOSE provides professional certifications to recognize qualified systems engineers.

• Raising awareness: Their efforts aim to increase global recognition of the importance of systems engineering approaches in problem-solving. INCOSE aspires to cultivate a skilled and interconnected global community of systems engineers who can effectively address the world's intricate challenges through a structured, holistic approach.

PROGRAM SCHEDULE - Monday, April 7, 2025			
7:00 – 15:15	**REGISTRATION**		
Room	**Mozart**	**Debussy**	**Listz**
7:00 – 8:00	**BREAKFAST - Ravel**		
8:00 – 10:00	T1: The Engineering of Simulations: from Simulation Specification to Simulation Validation (Part 1)	T2: Complex Adaptive Systems Trade Studies for Sustainable Design (Part 1)	T3: How to Set Up Academic Equivalency for SE Coursework with INCOSE (Part 1)
10:00 – 10:15	**BREAK**		
10:15 – 12:00	T1: The Engineering of Simulations: from Simulation Specification to Simulation Validation (Part 2)	T2: Complex Adaptive Systems Trade Studies for Sustainable Design (Part 2)	T3: How to Set Up Academic Equivalency for SE Coursework with INCOSE (Part 2)
12:00 – 13:00	**LUNCH - Ravel**		
13:00 – 15:00	T4: Data-Driven Simulation of Wheel Motor E-Bus as a Step Towards Energy Twining (Part 1)	T5: Stochastic Systems, Control and Game Theory with Rosenblatt Noise (Part 1)	
15:00 – 15:15			
15:15 – 17:00	T4: Data-Driven Simulation of Wheel Motor E-Bus as a Step Towards Energy Twining (Part 2)	T5: Stochastic Systems, Control and Game Theory with Rosenblatt Noise (Part 2)	

PROGRAM GRID - Tuesday, April 8, 2025				
7:15 – 18:00	**REGISTRATION**			
7:15 – 8:15	**BREAKFAST – Opus 1**			
8:15 – 8:30	Conference Welcome Opus 2			
8:30 – 9:30 **9:30 – 10:30**	**Keynote Speaker 1:** Xiaobo Tan **Keynote Speaker 2**: Amir Rahmani Opus 2			
10:30 – 11:00	**BREAK - Opus Foyer**			
Room	**Opus 2**	**Vivaldi**	**Tchaikovsky**	**Beethoven**
11:00 – 12:30	T1A: Systems Engineering Applications I	T1B: Decision-Making for Complex Systems I	T1C: Green Transportation Systems I (Special Session)	
12:30 – 13:30	**LUNCH - Opus 1**			
13:30 – 15:30	T2A: Model-based Systems Engineering I	T2B: Medical Systems	T2C: Transportation Systems	T2D: Aerospace Systems Engineering I (Special Session)
15:30 – 16:00	**BREAK - Opus Foyer**			
16:00 – 17:30	T3A: Systems Engineering Applications II	T3B: Decision-Making for Complex Systems II	T3C: Green Transportation Systems II (Special Session)	T3D: Sensors Integration and Applications I
18:00 – 19:30	**Welcome Reception – Opus Foyer**			
19:30 – 20:30	**Young Professionals Networking Event – Vivaldi**			

PROGRAM GRID - Wednesday, April 9, 2025				
7:00 – 17:30	**REGISTRATION**			
7:00 – 8:00	**BREAKFAST – Opus 1**			
Room	**Opus 2**	**Vivaldi**	**Tchaikovsky**	**Beethoven**
8:00 – 10:00	W1A: Model-Based Systems Engineering II	W1B: Decision-Making for Complex Systems III	W1C: Systems Engineering Education & Theory	W1D: Aerospace Systems Engineering II (Special Session)
10:00 – 10:30	**BREAK - Opus Foyer**			
10:30 – 12:30	W2A: Model-Based Systems Engineering III	W2B: Autonomous Systems	W2C: System Architecture	W2D: Aerospace Systems Engineering III (Special Session)
12:30 – 13:30	**LUNCH AND AWARDS - Opus 1**			
13:30 – 15:30	W3A: Model-Based Systems Engineering IV	W3B: Systems Integration and Verification	W3C: Socio-Technical Systems I	W3D: Sensors Integration and Applications II
15:30 – 16:00	**BREAK - Opus Foyer**			
16:00 – 17:30	W4A: Machine Learning in Systems Engineering	W4B: System of Systems Foundations for Robotics Swarms (Special Session)	W4C: Socio-Technical Systems II	W4D: Cyber Security I
18:00 – 19:30	**Women in Systems Engineering (WiSE) Reception – Mozart Room**			

PROGRAM GRID - Thursday, April 10, 2025				
7:00 – 12:30	**REGISTRATION**			
7:00 – 8:00	**BREAKFAST – Opus 1**			
Room	**Opus 2**	**Vivaldi**	**Tchaikovsky**	**Beethoven**
8:00 – 10:00	R1A: Modeling and Simulations I	R1B: Robotic Systems I	R1C: Defense Systems	R1D: Sensors Integration and Applications III
10:00 – 10:30	**BREAK - Opus Foyer**			
10:30 – 12:30	R2A: Modeling and Simulation II	R2B: Robotic Systems II	R2C: Energy Management and Sustainability, including Renewable Energy	R2D: Cyber Security II

Tuesday, April 8

7:15 - 8:15
Tuesday Breakfast
Room: Opus 1

8:15 - 10:30
Opening & Keynote Speakers
Keynote 1: Xiaobo Tan
Keynote 2: Amir Rahmani
Room: Opus 2

10:30 - 11:00
Morning Break
Room: Foyer

11:00 - 12:30
T1A: Systems Engineering Applications I
Room: Opus 2
Chair: Blad Mondina (University of Alaska Anchorage, USA)

11:00 Exploring Leading Indicators of Satellite Maneuvers in Geosynchronous Orbit
Phillip Schmedeman (United States Military Academy & US Space Command, USA)
Elliot Lim (United States Military Academy, USA)
Timothy Larson (United States Military Academy, USA)
Luke Johnston (United States Military Academy, USA)
Kate Johnston (United States Military Academy, USA)
Adam Garton (United States Military Academy, USA)
Leo Langou (United States Military Academy, USA)
Karoline Hood (United States Military Academy, USA)
William Koch (United States Military Academy, USA)

11:30 Predicting UAV Class and Operating Mode using Machine Learning
Grant Puharic (United States Military Academy, USA)
Andrew Frattini (United States Military Academy, USA)
Morgan Haynes (United States Military Academy, USA)
Samuel Adesagba (United States Military Academy, USA)
Phillip Schmedeman (United States Military Academy & US Space Command, USA)

12:00 A Performance Study on Low Earth Orbit Satellite Networks with Inter Satellite Links
Mya Schroder (University of Alaska Anchorage, USA)
Benjamin Brown (University of Alaska Anchorage, USA)
Blad Mondina (University of Alaska Anchorage, USA)
Pradeeban Kathiravelu (University of Alaska Anchorage, USA)

11:00 - 12:30
T1B: Decision-Making for Complex Systems I
Room: Vivaldi
Chair: Kleber Cabral (Queen's University, Canada)

11:00 AREF - Argumentative Rule-based Explanatory Framework
Hugo E Sanches (*Universidade Estadual de Maringa, Brazil*)
Ayslan Possebom (*Instituto Federal Do Paraná - IFPR, Brazil*)
Linnyer Beatrys Ruiz (*State University of Maringá & INCT NAMITEC, Brazil*)

11:30 Navigating Complexity: Automating Maritime Decision-Making with Temporal Transformer-Based Embeddings and Scalable Clustering
Pavly Saleh (*University of Ottawa, Canada*)
John Armitage (*Larus Technologies Corporation, Canada*)
Phillip Curtis (*Larus Technologies Corporation, Canada*)
Rami Abielmona (*Larus Technologies Corporation, Canada*)
Emil M. Petriu (*University of Ottawa, Canada*)

12:00 Exploring RAG Solutions to Reduce Hallucinations in LLMs
Samar G AboulEla (*Toronto Metropolitan University, Canada & Alexandria University, Egypt*)
Paria Zabihitari (*Toronto Metropolitan University, Canada*)
Nourhan Ibrahim (*Toronto Metropolitan University, Canada*)
Majid Afshar (*Indiana State University, USA*)
Rasha Kashef (*Toronto Metropolitan University, Canada*)

11:00 - 12:30
T1C: Green Transportation Systems I (Special Session)
Room: Tchaikovsky
Chair: Ching-Ming Lai (National Chung Hsing University, Taiwan)

11:00 Modeling, Degradation Characteristics, and Economic Analysis of Lithium-ion Battery Energy Storage Systems for Electric Vehicles
Tianhua Song (*Universiti Sains Malaysia, Malaysia*)
Jiashen Teh (*Universiti Sains Malaysia, Malaysia*)
Lai Ching-Ming (*National Chung Hsing University, Taiwan*)

11:30 Data-Driven Modeling and Simulation Approach for Energy Demand Prediction of Off-road Electric Truck
Hussein A. Taha (*National Research Council. Canada, Canada*)
David Holt (*National Research Council, Canada*)
Abdelhamid Mammeri (*National Research Council Canada, Canada*)
Wei Huang (*National Research Council, Canada*)

12:00 Estimating the Effects of Emission Charges on Moped Choice Switching
Yen-Jong Chen (*National Cheng Kung University, Taiwan*)
Chiang Fu (*National Cheng Kung University, Taiwan*)
Yung-Hsi Chiu (*Taipei City Government, Taiwan*)
Hsin-Tung Tu (*National Chung Hsing University, Taiwan*)

12:30 - 13:30
Tuesday Lunch
Room: Opus 1

Tuesday, April 8

13:30 - 15:30
T2A: Model-based Systems Engineering I
Room: Opus 2
Chair: Kavitha Chandra (University of Massachusetts Lowell, USA)

13:30 Modeling Digital Threads as Executable Workflows using SysMLv2
Aaron Greenhouse (*Carnegie Mellon University Software Engineering Institute, USA*)
Joseph R. Seibel (*Carnegie Mellon University Software Engineering Institute, USA*)
Jerome Hugues (*Carnegie Mellon University Software Engineering Institute, USA*)

14:00 Digital Engineering Framework for Promoting Health and Human Performance with Immersive Technology
Gayathri Boopathy (*University of Massachusetts Lowell, USA*)
Emi Aoki (*University of Massachusetts Lowell, USA*)
Flore Stécie Norcéide (*University of Massachusetts Lowell, USA*)
Kavitha Chandra (*University of Massachusetts Lowell, USA*)
Erika Lewis (*University of Massachusetts Lowell, USA*)
Charles Thompson (*University of Massachusetts Lowell*)

14:30 Model-Based Systems Engineering Design For A Counter-UAS System for Infantry Platoons
Calliott Scheuermann (*United States Military Academy, USA*)
Jacob P Schuck (*United States Military Academy, USA & B2, USA*)
Hunter Howell (*United States Military Academy, USA*)
Devan Pathak (*United States Military Academy, USA*)
Robert Kite (*United States Military Academy, USA*)
Vikram Mittal (*United States Military Academy, USA*)

13:30 - 15:30
T2B: Medical Systems
Room: Vivaldi
Chair: Ashok Kumar (The Center for Advanced Computer Studies University of Louisiana at Lafayette, USA)

13:30 AI-Driven Document Intelligence for Integrating EHR and RCM Systems During Hospital System Outages: A Case Study
James J Mulcahy (*Florida Atlantic University & North American Partners in Anesthesia, USA*)

14:00 User-Independent Freezing of Gait Detection in Parkinson's Patients Using Machine Learning on Edge Devices
Aditya Somasundaram Chidambaram (*Nanyang Technological University, Singapore*)
Adithya Narasimhan (*Petavue, India*)
Prem Kaushik Sankarasubramanian (*SRM Institute of Science and Technology, India*)
Ashwinkumar Venkatnarayanan (*University of Southern California, USA*)
Shiva A Chandar (*Jawaharlal Institute of Postgraduate Medical Education and Research (JIPMER), India*)
Vineeth Vijayaraghavan (*Solarillion Foundation, India*)

14:30 Speech Emotion Recognition Using ML Models and Audio Features
Tytiana M James (*University of Louisiana at Lafayette, USA*)
Thirumala Maheswara Reddy Yenumula (*University of Louisiana at Lafayette, USA*)
Tanner A Mergist (*University of Louisiana at Lafayette, USA*)
Rafeeq N Muhammad (*University of Louisiana at Lafayette, USA*)
Ali Harimi (*University of Louisiana at Lafayette, USA*)
Kasem Khalil (*University of Mississippi, USA*)
Ashok Kumar (*The Center for Advanced Computer Studies University of Louisiana at Lafayette, USA*)

15:00 Machine Learning Analysis of Heartbeat Sounds Using Weka for Classification
Rafeeq N Muhammad (*University of Louisiana at Lafayette, USA*)
Thirumala Maheswara Reddy Yenumula (*University of Louisiana at Lafayette, USA*)
Tytiana M James (*University of Louisiana at Lafayette, USA*)
Tanner A Mergist (*University of Louisiana at Lafayette, USA*)
Ali Harimi (*University of Louisiana at Lafayette, USA*)
Kasem Khalil (*University of Mississippi, USA*)
Ashok Kumar (*The Center for Advanced Computer Studies University of Louisiana at Lafayette, USA*)

13:30 - 15:30
T2C: Transportation Systems
Room: Tchaikovsky
Chair: TBA

13:30 Formally Constrained Reinforcement Learning for Traffic Signal Control at Intersections
Oumaima Barhoumi (*Concordia University, Canada*)
Mohamed H. Zaki (*Western University, Canada*)
Sofiene Tahar (*Concordia University, Canada*)

14:00 Feature Extraction and AI Model-Based Detection of Driving Distraction Utilizing a Motion Platform
Arian Shajari (*Deakin University, Australia*)
Houshyar Asadi (*Deakin University, Australia*)
Farhad Nazari (*Deakin University, Australia*)
Saeid Nahavandi (*Swinburne University of Technology, Australia*)

14:30 Analysing Prospects for Expansion in Bangladesh's Domestic Aviation Industry using Machine Learning and Prediction Intervals
Nazmus Sakib (*Deakin University, Australia*)
Mohammad Anwar Hosen (*Institute for Intelligent Systems Research and Innovation (IISRI), Deakin University, Australia*)
Nirjhar Gope (*BRAC University, Bangladesh*)
Burhan Khan (*Deakin University, Australia*)
Bruce M Gunn (*Deakin University, Australia*)

Tuesday, April 8

13:30 - 15:30
T2D: Aerospace Systems Engineering I (Special Session)
Room: Beethoven
Chair: Hen-Geul Yeh (California State University Long Beach, USA)

13:30 Data-Driven Adaptive Modulation Classification Systems
Hen-Geul Yeh (*California State University Long Beach, USA*)
Alexander Corona (*California State University, Long Beach, USA*)
Tristan Giovanni Ramirez (*California State University, Long Beach, USA*)

14:00 Runway vs. Taxiway: Challenges in Automated Line Identification and Notation Approaches
Parth Ganeriwala (*Florida Institute of Technology, USA*)
Amy Alvarez (*Florida Institute of Technology, USA*)
Abdullah Alqahtani (*Florida Institute of Technology, USA*)
Siddhartha Bhattacharyya (*Florida Institute of Technology, USA*)
Mohammed Abdul Hafeez Khan (*Florida Institute of Technology, USA*)
Natasha Neogi (*NASA LaRC, USA*)

14:30 Adaptive Model Selection for Electrical Fault Detection using Reinforcement Learning
Hen-Geul Yeh (*California State University Long Beach, USA*)
Yu Yang (*California State University Long Beach, USA*)
Jesse Rorabaugh (*Southern California Edison, USA*)
Sai Nikhila Varma Chittari Vyacharouthu (*California State University Long Beach, USA*)

15:00 Overcoming challenges in scaling interoperable modeling practices in the aerospace industry
Lise Kim (*Capgemini Engineering, France & AIRBUS, France*)
Armand Huet (*Capgemini Engineering & AIRBUS, France*)
Yann Chapelle (*CIMPA, France*)
Thomas Barre (*AIRBUS, France*)
Vincent Philippe (*AIRBUS, France*)
Matthieu Tonneau (*AIRBUS, France*)

15:30 - 16:00
Tuesday Afternoon Break
Room: Foyer

16:00 - 17:30
T3A: Systems Engineering Applications II
Room: Opus 2
Chair: Konstantinos Tsiounis (University of Western Ontario, Canada)

16:00 FCS: A Fault-Tolerance Asynchronous Federated Learning System with Model Checkpoint Storage
Norwich Mungkalaton (*The University of Sydney, Australia*)
Songpon Srisawai (*King Mongkut's University of Technology North Bangkok, Thailand*)
Yodsawalai Chodpathumwan (*King Mongkut's University of Technology North Bangkok, Thailand*)
Wei Li (*The University of Sydney, Australia*)
Albert Zomaya (*The University of Sydney, Australia*)

16:30 Design-Driven Framework for the Complexity Quantification of Mechanical Components
Lilly Etzenbach (*Massachusetts Institute of Technology, USA*)
Heekun Roh (*Massachusetts Institute of Technology, USA*)
Alexia Oltramare (*Massachusetts Institute of Technology, USA*)
Johannes Norheim (*University of Strathclyde, United Kingdom (Great Britain)*)
Olivier de Weck (*Massachusetts Institute of Technology, USA*)

17:00 Distributed Policy Enforcement Framework for System Transactions
Kostas Kontogiannis (*York University, Canada*)
Kostantinos Tsiounis (*University of Western Ontario, Canada*)
John Mylopoulos (*University of Toronto, Canada*)
Dimitris Lyras (*Ulysses Systems, Canada*)

16:00 - 17:30
T3B: Decision-Making for Complex Systems II
Room: Vivaldi
Chair: Amir Aghdam (Concordia University, Canada)

16:00 Calibrated Unsupervised Anomaly Detection in Time-series using Reinforcement Learning
Saba Sanami (*Concordia University, Canada*)
Amir Aghdam (*Concordia University, Canada*)

16:30 Interpretive Structural Modeling and MICMAC Analysis of Public Investment System in India
Mukti Sri Narain (*Dayalbagh Educational Institute & Tata Consultancy Services, India*)
Santi Swarup K (*Dayalbagh Educational Institute, India*)
Davinder Banwet (*University of Engineering and Management, UEM, India*)

17:00 Anomaly Detection in Iron Ore Conveyor Belts
Frederico L M Sousa (*Federal University of Ouro Preto, Brazil & Lakehead University, Canada*)
Thiago Eustaquio Alves de Oliveira (*Lakehead University, Canada*)
Bruno Nazário Coelho (*Universidade federal de Ouro Preto, Brazil*)
Saul Emanuel Delabrida Silva (*Univerisdade Federal de Ouro Preto, Brazil*)

16:00 - 17:30
T3C: Green Transportation Systems II (Special Session)
Room: Tchaikovsky
Chair: Ching-Ming Lai (National Chung Hsing University, Taiwan)

16:00 Optimizing Wind Power Integration in Microgrids via Dynamic Line Rating and EV Scheduling: A Coordinated Approach
Tianhua Song (*Universiti Sains Malaysia, Malaysia*)
Jiashen Teh (*Universiti Sains Malaysia, Malaysia*)
Lai Ching-Ming (*National Chung Hsing University, Taiwan*)

16:30 Exploring Bus Service Providers' Preferences for Zero-emission Bus Fleets
Chiang Fu (*National Cheng Kung University, Taiwan*)
Lai Ching-Ming (*National Chung Hsing University, Taiwan*)
Hsin-Tung Tu (*National Chung Hsing University, Taiwan*)
Pai-Chu Lee (*National Cheng Kung University, Taiwan*)

17:00 Dynamic Load Balancing for EV Charging Stations Using Reinforcement Learning and Demand Prediction
Hesam Mosalli (*Concordia University, Canada*)
Saba Sanami (*Concordia University, Canada*)
Yu Yang (*California State University Long Beach, USA*)
Hen-Geul Yeh (*California State University Long Beach, USA*)
Amir Aghdam (*Concordia University, Canada*)

16:00 - 17:30
T3D: Sensors Integration and Applications I
Room: Beethoven
Chair: Stephane Blouin (DRDC, Canada)

16:00 Semi-Permanent Real-Time Oceanic Sensing Platform for Innovation Challenges
Stephane Blouin (*DRDC, Canada*)
Manuel Morgan (*COVE, Canada*)

16:30 Solid-State vs. Mechanical LiDAR for Land Vehicle Navigation: A Comparative Study Using LiDAR Odometry
Eslam Mounier (*Queen's University, Canada*)
Mohamed M A H Elsayed (*Queen's University, Canada*)
Michael Korenberg (*Queen's University, Canada*)
Aboelmagd Noureldin (*Royal Military College of Canada & School of Computing, Queen's University, Canada*)

17:00 Design of Indoor Occupancy Estimation System with Wireless Brain-Inspired Computing Platform
Ryuji Nagazawa (*Chiba University, Japan*)
Haruto Ota (*Chiba University, Japan*)
Kien Nguyen (*Chiba University, Japan*)
Won-Joo Hwang (*Pusan National University, Korea (South)*)
Hiroyuki Torikai (*Hosei University, Japan*)
Mikio Hasegawa (*Tokyo University of Science, Japan*)
Hiroo Sekiya (*Chiba University, Japan*)

18:00 - 19:30
Welcome Reception
Room: Foyer

19:30 - 20:30
Young Professional's Event
Room: Vivaldi

Wednesday, April 9

7:00 - 8:00
Wednesday Breakfast
Room: Opus 1

8:00 - 10:00
W1A: Model-Based Systems Engineering II
Room: Opus 2
Chair: TBA

8:00 Model-in-the-Loop Tests Bench as an efficient means for digital transition: from descriptive to simulated Model-Based Systems Engineering and Model-Based Safety Assessment
Jacques Martinez (SAFRAN Tech, France)
Imane Bouhali (SAFRAN, France)
Younouss Sylla (Safran, France)
Luca Palladino (SAFRAN SA, France)

8:30 Automating Physics-Based Reasoning for SysML Model Validation
Candice Chambers (Florida Institute of Technology, USA)
Summer Mueller (Florida Institute of Technology, USA)
Parth Ganeriwala (Florida Institute of Technology, USA)
Chiradeep Sen (Florida Institute of Technology, USA)
Siddhartha Bhattacharyya (Florida Institute of Technology, USA)

9:00 Advancing Connected Engineering: Insights from the Space Station Design Workshop 2024
Tharshan Maheswaran (University of Stuttgart, Germany)
Claas Olthoff (University of Stuttgart, Germany)
Gisela Detrell (Technical University of Munich, Germany)

8:00 - 10:00
W1B: Decision-Making for Complex Systems III
Room: Vivaldi
Chair: Cansu Yalim (Old Dominion University, USA)

8:00 Optimizing Ticket Assignment through Group Role Assignment with Agents' Busyness Degree
Evan D Wells (Nipissing University, Canada)
Haibin Zhu (Nipissing University, Canada)

8:30 Leveraging Centrality Measures in Healthcare Provider Networks to Provide a Decision Framework that Enhances Product Outreach
Ahmed Bahabry (USMA at West Point, USA)
Andreas Worpel (United States Military Academy at West Point, USA)
Ian Cavana (United States Military Academy at West Point, USA)
Eric Rollins (United States Military Academy at West Point, USA)
Omar Shawarby (United States Military Academy at West Point, USA)

9:00 Execution of the Information Model for Synergistic Decision Support Using IMPRINT Simulation
Cansu Yalim (Old Dominion University, USA)
Holly Handley (Old Dominion University, USA)

Wednesday, April 9

8:00 - 10:00
W1C: Systems Engineering Education & Theory
Room: Tchaikovsky
Chair: Pierre de Saqui - Sannes (ISAE SUPAERO, France)

8:00 Unlocking the Power of Digital Transformation: The Role of Ontologies
Oskar Wintercorn (Luleå University of Technology, Sweden)
Jan van Deventer (Luleå University of Technology, Sweden)
Cristina Paniagua (LTU, Sweden)

8:30 Some Lessons Learned from Teaching SE and MBSE
Pierre de Saqui - Sannes (ISAE SUPAERO, France)
Rob Vingerhoeds (ISAE-SUPAERO, France)

9:00 Identifying Vagueness in Model-Based Systems Engineering Theory through a Materialist Ontology
Arturo Jose Davila-Andino (George Mason University, USA)
Edward Huang (Auburn University, USA)
Abbas K Zaidi (System Architectures Laboratory, George Mason University, USA)

8:00 - 10:00
W1D: Aerospace Systems Engineering II (Special Session)
Room: Beethoven
Chair: Paul C. Hershey (RTX, USA)

8:00 Enabling automated fault tree assessment to support aircraft systems architecting in early design phases
Andrew K Jeyaraj (Concordia University, Canada)
Pierre Olivier Paquette (Concordia University, Canada)
Henry Wing (Concordia University, Canada)
Santiago Valencia-Ibáñez (Concordia University, Canada)
Yumna Zaheer (Concordia University, Canada)
Susan Liscouet-Hanke (Concordia University, Canada)

8:30 Mission Engineering Approach for Gate Reduction at Distributed Edge (GRaDE)
Paul C. Hershey (RTX, USA)
Marcus Teter (Raytheon, USA)
Vikram Prasad (Raytheon, USA)

9:00 Size Constrained K-means Clustering for Controlled Design Structure Matrix Partitioning
Heekun Roh (Massachusetts Institute of Technology, USA)
Lilly Etzenbach (Massachusetts Institute of Technology, USA)
Alexia Oltramare (Massachusetts Institute of Technology, USA)
Johannes Norheim (University of Strathclyde, United Kingdom (Great Britain))
Olivier de Weck (Massachusetts Institute of Technology, USA)

9:30 The Road Ahead: Present and Future Trends in Global Civil Aircraft Regulations
Lilly Etzenbach (Massachusetts Institute of Technology, USA)
Heekun Roh (Massachusetts Institute of Technology, USA)
Alexia Oltramare (Massachusetts Institute of Technology, USA)
Johannes Norheim (University of Strathclyde, United Kingdom (Great Britain))
Olivier de Weck (Massachusetts Institute of Technology, USA)

Wednesday, April 9

10:00 - 10:30
Wednesday Morning Break
Room: Foyer

10:30 - 12:30
W2A: Model-Based Systems Engineering III
Room: Opus 2
Chair: Carl-Philipp Grunenwald (Technische Universität Berlin, Germany)

10:30 Leveraging Models to Support Stakeholder Communication
Valentin Tikhonenko (*Skolkovo Institute of Science and Technology, Russia*)
Mikhail Belov (*SKOLTECH, Russia*)

11:00 Leveraging SysML v2 to Enhance System Architecture Decision Making based on Process Information
Carl-Philipp Grunenwald (*Technische Universität Berlin, Germany*)
Anton Dybov (*Technische Universität Berlin, Germany*)
Rainer Stark (*Technische Universität Berlin, Germany*)

11:30 A MBSE-enhanced Semantically Integration Method for populating MDAO design processes
Tianxiao Xu (*Université Lumière Lyon 2, France*)
IVECO France (*France*)
Nejib Moalla (*Université Lumière Lyon 2, France*)
Mohand-Lounes Bentaha (*Université Lumière Lyon 2, France*)
Hazal Aktekin (*IVECO France, France*)
Claudia Agostinelli (*IVECO SPA, Italy*)

10:30 - 12:30
W2B: Autonomous Systems
Room: Vivaldi
Chair: Howard Schwartz (Carleton University, Canada)

10:30 PIDNet-SLAM: A Multi-Resolution Semantic SLAM Algorithm for Dynamic Scenes
Siddharth Rajan (*Dalhousie University, Canada*)
Jason Gu (*Dalhousie University, Canada*)
Wei Liu (*Southern University of Science and Technology, China*)

11:00 Enhancing Quadrotor Altitude Control: PID Tuning with Reinforcement Learning and Genetic Algorithms
Mahrokh Hosseinkhani Hezaveh (*Carleton University, Canada*)
Howard Schwartz (*Carleton University, Canada*)
Mohammad Tayefe Ramezanlou (*Carleton University, Canada*)

11:30 Data Extraction, Transformation, and Loading (ETL) Process Automation and Data Warehouse Implementation for Algorithmic Trading Machine Learning Modelling
Kristina Cormier (*Okanagan College, Canada*)
Keona Kohorst (*Okanagan College, Canada*)
Joshua Padron-Uy (*Okanagan College, Canada*)
Dolcy Sareen (*Okanagan College, Canada*)
Ajitesh Parihar (*Okanagan College, Canada*)
Youry Khmelevsky (*Okanagan College, Canada*)
Gaétan J. D. R. Hains (*Université Paris-Est Créteil (UPEC), France*)
Albert Wong (*Langara College, Canada*)

12:00 Application of Deep Learning in Autonomous Mobile Robot Control: An Overview
Minh Do Cao Nguyen (*University of New Brunswick, Canada*)
Rickey Dubay (*University of New Brunswick, Canada)*

10:30 - 12:30
W2C: System Architecture
Room: Tchaikovsky
Chair: Hyeyon Bastian (United States Military Academy, USA)

10:30 Data Curation as a Stepwise Service to Data Sustainability: The Grey Area between Small-Scale Applications and Large-Scale Data Repositories
Hagen Peukert (*University of Hamburg, Germany*)
Thomas Asselborn (*University of Hamburg, Germany*)
Ralf Möller (*University of Hamburg, Germany*)
Sylvia Melzer (*University of Hamburg, Germany*)

11:00 Structured Requirements for DomainKey Identified Mail (DKIM) Standard Verification
Brian Mooney (*Colorado State University, USA*)
Sarah C Rudder (*Colorado State University & Enola Technologies, USA*)
Jeremy Daily (*Colorado State University, USA*)

11:30 A Systems Approach to the Digital Transformation of Military Installation Planning
Hyeyon Bastian (*United States Military Academy, USA*)
Mary M Mitchell (*USACE ERDC, USA*)
Randy Buchanan (*ERDC, USA*)
Susan R Wolters (*Engineer Research and Development Center, USA*)
John P. Richards (*Engineer Research and Development Center, USA*)
Patrick R Ables (*Engineer Research and Development Center, USA*)

12:00 Isolated Third-Party Applications in Existing SOME/IP-Networks
Marius Kreutzer (*FZI Research Center for Information Technology, Germany*)
Austin Shinkle (*Daimler Truck AG, Germany*)
Victor Pazmino Betancourt (*FZI Research Center for Information Technology, Germany*)
Jürgen Becker (*FZI Research Center for Information Technology, Germany*)

Wednesday, April 9

10:30 - 12:30
W2D: Aerospace Systems Engineering III (Special Session)
Room: Beethoven
Chair: Paul C. Hershey (RTX, USA)

10:30 Design and Validation of Learning Aware HMI For Learning-Enabled Increasingly Autonomous Systems
Parth Ganeriwala (*Florida Institute of Technology, USA*)
Michael Matessa (*Rockwell Collins, USA*)
Siddhartha Bhattacharyya (*Florida Institute of Technology, USA*)
Randolph M Jones (*Soar Technology, USA*)
Jennifer Davis (*Collins Aerospace, USA*)
Parneet Kaur (*Florida Institute of Technology, USA*)
Simone Fulvio Rollini (*Collins Aerospace, USA*)
Natasha Neogi (*NASA LaRC, USA*)

11:00 Electric Over Water - Safety Considerations for an All-Electric Floatplane for Commercial Passenger Service
Ehsan Ghahremani (*Critical Systems Labs Inc., Canada*)
Jonathan Groves (*Critical Systems Labs Inc., Canada*)
Jeffrey Joyce (*Critical Systems Labs Inc., Canada*)
Erika J Holtz (*Harbour Air Group, Canada*)
Karl M Lepik (*Harbour Air Group, Canada*)
Darren Jang (*National Research Council Canada, Canada*)
Patrick Zdunich (*National Research Council Canada, Canada*)

12:30 - 13:30
Wednesday Lunch & Awards
Room: Opus 1

13:30 - 15:30
W3A: Model-Based Systems Engineering IV
Room: Opus 2
Chair: Mai Cox (The George Washington University, USA)

13:30 Systematic Mapping of Systems Thinking Skills, MBSE Practices, and MOSA Tenets
Mai Cox (*The George Washington University, USA*)
Timothy J Eveleigh (*The George Washington University & CACI International, USA*)

14:00 Optimized Spiking Neural Network for Chaotic System Prediction in FPGA
Zongyao Liu (*University of Regina, Canada*)
Lei Zhang (*University of Regina, Canada*)
Jin Zhang (*AlphawaveSemi, Canada*)
Qixuan Li (*University of Regina, Canada*)

14:30 Addressing Data Engineering Challenges in Diverse Digital Engineering Environments
Thomas Llanso (*Johns Hopkins University & Applied Physics Laboratory, USA*)
Martha McNeil (*Johns Hopkins APL, USA*)
Jason Balmuth (*Johns Hopkins University Applied Physics Laboratory, USA*)
Stephen Remington (*Johns Hopkins University Applied Physics Laboratory, USA*)

13:30 - 15:30
W3B: Systems Integration and Verification
Room: Vivaldi
Chair: Katherine Desmet (Microsoft, USA)

13:30 Hyperscaler Perspective on Platform Debug Capabilities for AI GPU Hardware
Anna Mary Mathew (*Microsoft, USA*)
Katherine Desmet (*Microsoft, USA*)
Wenxi Yan (*Company & Microsoft, USA*)
Pavan Kumar Popuri (*Microsoft, Canada*)

14:00 Formal Analysis of Electrical Circuit Network Topologies using Theorem Proving
Kubra Aksoy (*Concordia University, Canada*)
Adnan Rashid (*National University of Sciences and Technology, Pakistan*)
Osman Hasan (*National University of Sciences and Technology, Pakistan*)
Sofiene Tahar (*Concordia University, Canada*)

14:30 Collaborative Continuous Testing of Automotive Services (CoCo Test)
Ann-Therese Tabea Nägele (*Karlsruhe Institute of Technology, Germany*)
Marc Schindewolf (*KIT, Germany*)
Eric Sax (*Karlsruhe Institute of Technology, Germany*)

15:00 UAS Traffic Management: Integrating Weather Information using System Adaptability
William M Brooks (*The Boeing Company, USA*)
Colorado State University (*USA*)
V. Chandrasekar (*Colorado State University, USA*)
Rob Cifelli (*NOAA Physical Sciences Laboratory, USA*)

Wednesday, April 9

13:30 - 15:30
W3C: Socio-Technical Systems I
Room: Tchaikovsky
Chair: TBA

13:30 The Engineering of AI Evaluation and Scoring: Overview and Insights
Henri Sohier (*IRT SystemX, France*)
Jean-Philippe Faure (*Progilon, USA*)
Sebastian Hallensleben (*VDE, Germany*)
Philippe Streiff (*Positive AI, France*)
Stephen Creff (*IRT SystemX, France*)
Emilie Sirvent Hien (*Orange Fr, France*)
Juliette Mattioli (*Thales, France*)
Serkan Odabas (*Valeo.ai, France*)
Romane Vernhes (*Sopra Steria, France*)

14:00 Creating a Framework for Non-Profit Impact Reporting
Parker Langa (*Worcester Polytechnic Institute, USA*)
Sarah Fenton (*Worcester Polytechnic Institute, USA*)
Mona Blake (*Worcester Polytechnic Institute, USA*)
Michael Nixdorf (*Worcester Polytechnic Institute, USA*)
Shamsnaz V Bhada (*Worcester Polytechnic Institute, USA*)

14:30 The Role of Human-Centered Design in Enhancing Trust and Satisfaction in E-Commerce within Industry 5.0
Parisa Jourabchi Aamirkhizi (*Tabriz Islamic Art University, Iran*)
Mohaddeseh Gilani (*Tabriz Islamic Art University, Iran*)
Siamak Pedrammehr (*Tabriz Islamic Art University, Iran & IISRI, Deakin University, Iran*)
Sajjad Pakzad (*Tabriz Islamic Art University, Iran*)
Ghazal Rahimzadeh (*Deakin University of Australia, Australia*)
Hirash Moradi (*Building Controls, Germany*)
Saeid Nahavandi (*Swinburne University of Technology, Australia*)
Houshyar Asadi (*Deakin University, Australia*)

13:30 - 15:30
W3D: Sensors Integration and Applications II
Room: Beethoven
Chair: Christopher L Peters (Southern Methodist University, USA & Azure Summit Technologies, USA)

13:30 Model Predictive Control of Tethered Underwater Sensor Payload
Mark J O'Connor (*University of New Brunswick, Canada*)
Andy Simoneau (*University of New Brunswick, Canada*)
Rickey Dubay (*University of New Brunswick, Canada*)

14:00 Reducing Emitter Localization Error in Urban Environments with Geometry Adaptive UAS Arrays
Christopher L Peters (*Southern Methodist University, USA & Azure Summit Technologies, USA*)
Mitchell A Thornton (*Southern Methodist University, USA*)

14:30 Near-optimal Sensor Placement for Detecting Stochastic Target Trajectories in Barrier Coverage Systems
Mingyu Kim (*Virginia Tech, USA*)
Daniel Stilwell (*Virginia Tech, USA*)
Harun Yetkin (*Bartın Üniversitesi, USA*)
Jorge Jimenez (*Johns Hopkins University Applied Physics Laboratory, USA*)

15:30 - 16:00
Wednesday Afternoon Break
Room: Foyer

16:00 - 17:30
W4A: Machine Learning in Systems Engineering
Room: Opus 2
Chair: Sidney Givigi (Queen's University, Canada)

16:00 Algorithmic Trading Machine Learning Modelling and Forecasting Subsystems Integration and Data Transformation Process Automation for a Data Warehouse
Ajitesh Parihar (*Okanagan College, Canada*)
Dolcy Sareen (*Okanagan College, Canada*)
Dylan Huitema (*Okanagan College, Canada*)
Kristina Cormier and *Youry Khmelevsky* (*Okanagan College, Canada*)
Gaétan J. D. R. Hains (*Université Paris-Est Créteil (UPEC), France*)
Albert Wong (*Langara College, Canada*)

16:30 Lightweight Low-light Image Enhancement Model Training and Design Considerations
Hajira Saleem (*Malmo University, Sweden*)
Reza Malekian (*Malmö University, Sweden*)
Hussan Munir (*Malmo University, Sweden*)

17:00 Dense Point Cloud Mapping by Leveraging Neural-based Monocular Depth Estimation
Luiz E. Santos Araújo, Filho (*Instituto Tecnológico de Aeronáutica, Brazil*)
Kleber Cabral (*Queen's University, Canada*)
Sidney Givigi (*Queen's University, Canada*)
Cairo L. Nascimento, Jr. (*Instituto Tecnológico de Aeronáutica, Brazil*)

16:00 - 17:30
W4B: System of Systems Foundations for Robotics Swarms (Special Session)
Room: Vivaldi
Chair: Omar Hammami (ENSTA, France)

16:00 A Topological Approach to Design Problems for Distributed Systems using Category Theory: A Focus on Robotic Swarms
Philipp Ahrendt (*ISAE-Supméca & ESTACA Paris, France*)
Mehdi Mcharek (*ESTACA, France*)
Stéphane Dugowson (*ISAE-Supméca, France*)
Moncef Hammadi (*ISAE-SUPMECA & Quartz Laboratory EA7393, France*)

Wednesday, April 9

16:30 System of Systems Architecture and Autonomous Robot Swarms: A Long Awaited Junction
Thomas Rigaut (*ENSTA Paris, France & Institut Polytechnique de Paris, France*)
Omar Hammami (*ENSTA Paris, France*)

17:00 Scalable Swarm Control Using Deep Reinforcement Learning
Dimitria P Silveria (*Queen's University of Canada, Canada*)
Kleber Cabral and *Sidney Givigi* (*Queen's University, Canada*)

16:00 - 17:30
W4C: Socio-Technical Systems II
Room: Tchaikovsky
Chair: Davis C Loose (University of Virginia, USA)

16:00 Order Disruption and Resilience of Cyber-Physical Systems of a Metropolitan Region
Davis C Loose (*University of Virginia, USA*)
Megan C. Marcellin (*University of Virginia, USA*)
Igor Linkov (*USA*)
Gigi Pavur (*University of Virginia, USA*)
Maksim Kitsak (*Delft University of Technology, The Netherlands*)
Michael A. Deegan (*US Army Corps of Engineers, USA*)
James H. Lambert (*University of Virginia, USA*)

16:30 "Tuning Minds": How Music Drives Nationalistic Propaganda Across Countries
Bryan Z Frost (*United States Military Academy, USA*)
Minh Donnell (*United States Military Academy, USA*)
Tyler Johnson (*United States Military Academy, USA*)
Jeremy Schlegel and *Katie Matthew* (*United States Military Academy, USA*)
Thomas W. Jackson, Jr (*United States Military Academy & West Point Band, USA*)

17:00 Adaptability: Transdisciplinary Solutions and A System Science
Haifeng Zhu (*BAE Systems, USA*)

Wednesday, April 9

16:00 - 17:30
W4D: Cyber Security I
Room: Beethoven
Chair: Nujitha Wickramasurendra (Brock University, Canada)

16:00 Lessons from the Field: Practical Frameworks for CTF Competition Success
Dylan M Middendorf (*Miami University, USA*)
Suman Bhunia (*Miami University, Ohio, USA*)
Arthur Carvalho (*Miami University, Farmer School of Business, USA*)

16:30 RF Jamming BERT Intrusion Detection Systems for Vehicular Networks
Nujitha Wickramasurendra (*Brock University, Canada*)
Robson E. De Grande (*Brock University, Canada*)
Glaucio Carvalho (*Brock University, Canada*)

17:00 Supporting Cyber Analytic Validation via Cyber Reference Engineering Data Sets (CREDS)
Thomas Llanso (*Johns Hopkins University & Applied Physics Laboratory, USA*)
Martha McNeil (*Johns Hopkins APL, USA*)
Caprice Stanley (*Johns Hopkins University Applied Physics Laboratory, USA*)

18:00 - 19:00
WiSE Reception
Room: Mozart

Thursday, April 10

7:00 - 8:00
Thursday Breakfast
Room: Opus 1

8:00 - 10:00
R1A: Modeling and Simulations I
Room: Opus 2
Chair: Sidney Givigi (Queen's University, Canada)

8:00 Digital Twin Application to Ocean Monitoring Equipment
Jarrett Brewer (University of New Brunswick, Canada)
Rickey Dubay (University of New Brunswick, Canada)
Andy Simoneau (University of New Brunswick, Canada)

8:30 A Simulation Pipeline to Facilitate Real-World Robotic Reinforcement Learning Applications
Jefferson Silveira (Queen's University, Canada)
Joshua Marshall (Queen's University & Ingenuity Labs Research Institute, Canada)
Sidney Givigi (Queen's University, Canada)

9:00 A Solution to the Response of a Single Degree of Freedom System to Swept Sine Inputs
Roy F McIntosh (University of New Brunswick, Canada)
Rickey Dubay (University of New Brunswick, Canada)
Phil Garland (University of New Brunswick, Canada)

9:30 Enhancing Robot Navigation in Crowded Spaces through Systematic Strategy Selection **MOVED TO THIS SESSION*
Kleber Cabral (Queen's University, Canada)
Jean-Alexis Delamer (St. Francis Xavier University, Canada)
Jefferson Silveira (Queen's University, Canada)
Sidney Givigi (Queen's University, Canada)

8:00 - 10:00
R1B: Robotic Systems I
Room: Vivaldi
Chair: George Smith (Canada)

8:00 Systems Engineering and Robotics: A Survey
Thomas Rigaut (ENSTA Paris, France & Institut Polytechnique de Paris, France)
Omar Hammami (ENSTA Paris, France)

8:30 2D Behavior Models for Adjusting Quadratic-Cost Weightings and Directly Tuning Gains
George Smith (Canada)

9:00 Design and Construction of a Cost-Effective Dexterous Robotic Hand for Research and Development
Shahram Mohsini (University of Ontario Institute of Technology, Canada)
Meaghan Charest-Finn (Ontario Tech University, Canada)
Rickey Dubay (University of New Brunswick, Canada)

Thursday, April 10

8:00 - 10:00
R1C: Defense Systems
Room: Tchaikovsky
Chair: TBA

8:00 A Red/Blue Video Game for Hide&Seek Analysis for Hardware Trojans and the Seeker's Dilemma
Peter A Jamieson (Miami University, USA)
Obed Amaning-Yeboah (Miami University, USA)
Jared Butler (Miami University, USA)
Deniz Misirlioglu (Miami University, USA)
Riley Taylor (Miami University, USA)
Suman Bhunia (Miami University, Ohio, USA)

8:30 Operationalizing Common Crawl News: AI-enabled Data Pipeline for Large-Scale News Analysis
David Beskow (United States Military Academy, USA)
William Knowlton (United States Military Academy, USA)
Ameir El Ouadi (United States Military Academy, USA)
Adrian J Pimentel (United States Military Academy, USA & USMA, USA)

9:00 Optimizing a High-Variability, Low-Quantity Technology Refresh Vehicle Repair Line
Samuel Butler (United States Military Academy, USA)
Brandon Bryant (United States Military Academy, USA)
Charles S Latimer (United States Military Academy, USA)
Hunter McCoy (United States Military Academy, USA)
Zachary Winton (United States Military Academy, USA)

8:00 - 10:00
R1D: Sensors Integration and Applications III
Room: Beethoven
Chair: TBA

8:00 A Fuzzy Set-Theoretic Approach to Occupancy Grid Mapping
Ehsan Adel Rastkhiz (Carleton University, Canada)
Howard Schwartz (Carleton University, Canada)
Ioannis Lambadaris (Carleton University, Canada)

8:30 Performance Analysis of Different Graphs in Graph-based Remaining Useful Life Prediction Model
Abrar Mahi Al Rashid (Intelligent Systems Research and Innovation, Australia & Deakin University, Australia)
Mohammad Anwar Hosen (Institute for Intelligent Systems Research and Innovation (IISRI), Deakin University, Australia)
Burhan Khan (Deakin University, Australia)

9:00 Practical Guidelines for Nonlinear Kalman Filters in Industrial Processes From Experimental Implementations
Mario Alejandro Giraldo Vasquez (Universidad EIA, Colombia & Universidad Nacional de Colombia, Colombia)
Julián Cossio Flórez (Universidad EIA, Colombia)
Santiago Montoya Hernández (Universidad EIA, Colombia)

Thursday, April 10

10:00 - 10:30
Thursday Morning Break
Room: Foyer

10:30 - 12:30
R2A: Modeling and Simulation II
Room: Opus 2
Chair: TBA

10:30 Canadian NPR Decreasing Policy Making: A Computational Simulation Method Using E-CARGO
Ke Gong (Nipissing University, Canada)
Haibin Zhu (Nipissing University, Canada)
Tianshuo Yang (Nipissing University, Canada)

11:00 Checking Model Consistency in Service-Oriented Systems
Hao Jiang (University of Western Ontario, Canada)
Kostas Kontogiannis (York University, Canada)

11:30 An Optimized FPGA Based Canny Edge Detection System Using High-Level Synthesis
Shahnam Mirzaei (California State University, Northridge, USA)
Shahbaz Hassan Khan Malik (California State University, Northridge, USA)

10:30 - 12:30
R2B: Robotic Systems II
Room: Vivaldi
Chair: Omar Hammami (ENSTA, France)

10:30 Extraction of Non-regular Pegs Using Tactile Sensing and Reinforcement Learning from Demonstrations
Viral Galaiya (Memorial University of Newfoundland, Canada)
Ruslan Masinjila (Memorial University of Newfoundland, Canada)
Soheil Khatibi (Lakehead University, Canada)
Thiago Eustaquio Alves de Oliveira (Lakehead University, Canada)
Vinicius Prado da Fonseca (Memorial University of Newfoundland, Canada)
Xianta Jiang (Memorial University of Newfoundland, Canada)

11:00 Vision-based Motion Control for an 8-DOF Robotic Mobile Manipulator
Yunze Li (Ontario Tech University, Canada)
Haoxiang Lang (Ontario Tech University, Canada)
Ying Wang (Kennesaw State University, USA)

11:30 Comparative Study of Traditional and Deep Learning Feature Detectors and Matchers for Land Vehicle Monocular Visual Odometry
Ola Elmaghraby (Queen's University, Canada)
Paulo Ricardo Marques de Araujo (Queen's University, Canada)
Shaza I. Kaoud Abdelaziz (Queen's University, Canada)
Aboelmagd Noureldin (Queen's University, Canada)

12:00 Enhancing Robot Navigation in Crowded Spaces through Systematic Strategy Selection **MOVED TO R1A*
Kleber Cabral (Queen's University, Canada)
Jean-Alexis Delamer (St. Francis Xavier University, Canada)
Jefferson Silveira (Queen's University, Canada)
Sidney Givigi (Queen's University, Canada)

Thursday, April 10

10:30 - 12:30
R2C: Energy Management and Sustainability, including Renewable Energy
Room: Tchaikovsky
Chair: Jinsoo Han (ETRI, Korea (South))

10:30 Enhancing Biogas Energy Production Forecasting with Box-Cox Transformation and Prediction Interval Methods
Nazmus Sakib (Deakin University, Australia)
Mohammad Anwar Hosen (Institute for Intelligent Systems Research and Innovation (IISRI), Deakin University, Australia)
Burhan Khan (Deakin University, Australia)
Bruce M Gunn (Deakin University, Australia)
Michael Johnstone (Deakin University, Australia)

11:00 Collaborative Meter Data Collection for Smart Community with Active Energy Balancing
Jinsoo Han (ETRI, Korea (South))
Wan-Ki Park (ETRI, Korea (South))

11:30 DITHER: Digital Twin for Energy Estimation of Heterogeneous Swarm of Robots
Chunyu Zhang (ENSTA PARIS, France)
Omar Hammami (ENSTA Paris, France)

12:00 TYPHOON HIL Modeling and Control Grid Connected Hybrid Renewable Energy System
Sanjeevikumar Padmanaban (University of South-Eastern Norway, Norway)
Mahad Sudi (University of South-Eastern Norway, Norway)
Emre Ozoy (Danfoss Silicon Power GmbH, USA)

Thursday, April 10

10:30 - 12:30
R2D: Cyber Security II
Room: Beethoven
Chair: Antoine Lemay (Hitachi Energy, Canada)

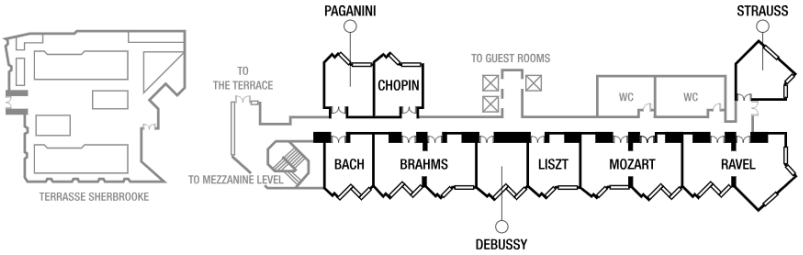
10:30 Supply Chain Risk Analysis via SBOM Data Enrichment
Antoine Lemay (Hitachi Energy, Canada)
Neeraj Katiyar (Hitachi Energy, Canada)

11:00 System Engineering-Based Threat Modeling for Heavy-Duty Vehicles
Narges Rahimi (University of Windsor, Canada & SHIELD Automotive Cybersecurity Centre of Excellence, Canada)
Beth-Anne Schuelke-Leech (University of Windsor, Canada)
Mitra Mirhassani (University of Windsor, Canada)

11:30 *Enhancing IoT Intrusion Detection with Transformer-Based Network Traffic Classification*
Samar G AboulEla (Toronto Metropolitan University, Canada & Alexandria University, Egypt)
Rasha Kashef (Toronto Metropolitan University, Canada)

Venue Floorplan

PLAZA LEVEL



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