

## Program

- 8:30 a.m. Registration and Networking
- 9:00 a.m. Welcome Remarks
- 9:10 a.m. Plenary Session
- 10:10 a.m. Coffee Break and Poster Session
- 10:40 a.m. Panel Sessions
- 12:00 p.m. Lunch and Networking
- 1:00 p.m. Final Panel Session
- 2:10 p.m. Research Lab Tours
- 3:30 p.m. Closing Remarks

## Plenary Session

- ▶ **Plenary Session (UA1350)**  
Keynote remarks on supporting electrification with Indrani Butany.

## Panel Sessions

- ▶ **Industry 4.0 and Sustainability (UA1120)**  
The role of Industry 4.0 and advanced manufacturing in smart, sustainable development.
- ▶ **Energy Supply and Electrification (UA1350)**  
A discussion on how we can meet the rapidly growing demand for electricity across multiple sectors
- ▶ **AI and Mobility Systems (UA1140)**  
How self-learning capabilities enable more efficient transportation, autonomous operations, and situational adaptivity to optimize routes.
- ▶ **Pathways Towards Net-Zero Emissions (UA1350)** *Final Panel Session*  
A variety of our experts will come together to discuss the various pathways towards net-zero emissions.

# Engineering Research Day 2024

Tuesday, February 20, 2024  
9:00 a.m. - 4:00 p.m.  
Science Building (UA)

Research Day brings undergraduate and graduate students, faculty members, representatives from government and funding agencies, and industry professionals together in an event that showcases the innovative research activities conducted by the Faculty of Engineering and Applied Science at Ontario Tech University.

 **OntarioTech**  
Engineering  
& Applied Science

## Opening Plenary Session

**Indrani Butany** *Keynote Speaker*

President and Chief Executive Officer,  
Elexicon Energy Inc.



Indrani Butany leads at the intersectionality of diversity and innovation. Originally from New Delhi, India, Indrani is the President and Chief Executive Officer of Elexicon Energy Inc., the fourth largest municipally owned electricity distribution company in Ontario servicing more than 177,000 customers in parts of the Durham Region and beyond. Indrani is a thoughtful and strategic leader, who has shaped and evolved the regulatory framework in Ontario. Raised in Toronto, she is the first female South-Asian to be appointed as the President and Chief Executive Officer of a utility in Ontario.

Indrani has used her deep industry, regulatory and policy knowledge, diverse perspective, and foresight capabilities to advance the energy industry in Ontario making her a sought-after leader on energy transformation, the transition to a net-zero economy, regulatory innovation, as well as equity, diversity and inclusion.

Prior to joining Elexicon, Indrani served as Vice President, Regulatory Affairs and Privacy Officer at Alectra Utilities, where she successfully led the approval of the largest multi-utility merger and acquisition utility in Canada.

Indrani holds a Master of Business Administration in Finance and an Honours Bachelor of Science in Psychology from McMaster University. In 2019, Indrani was recognized by the OEA as the 2019 Contributor of the Year. Indrani was the 2023 recipient of the McMaster's DeGroot School of Business Wayne C. Fox Distinguished Alumni Award, which recognizes outstanding alumni. Indrani also received a Canada's Clean50 Award, which are presented to forward-looking leaders representing the most effective and progressive organizations taking on climate change from every sector, balancing mitigation with adaptation.

---

Scan the QR code to learn  
more about Research  
within the Faculty of  
Engineering and Applied  
Science at Ontario Tech  
University:



## Panel Session: Industry 4.0 and Sustainability

### Moderators



**Jana Abou-Ziki**

Department of Mechanical and Manufacturing Engineering, Assistant Professor  
*Ontario Tech University*



**Greg Rohrauer**

Department of Automotive and Mechatronics Engineering, Department Chair and Associate Professor  
*Ontario Tech University*

### Panelists



**Dr. Ahmed Barari** *Ontario Tech University*

Dr. Ahmad Barari is a Professor at the Department of Mechanical and Manufacturing Engineering, and director of Advanced Digital Design, Manufacturing, and Metrology (AD2MLabs), at Ontario Tech University. Dr. Barari is an expert in digitalization in

product life cycle including design, manufacturing, inspection, and maintenance. He developed methodologies for various industrial applications in product development, process control, prognostics and health monitoring, and prescriptive and predictive maintenance. His contributions include over 200 publications in highly-ranked journals and conference proceedings. Dr. Barari serves currently as vice-chair academic Technical Committee on Manufacturing Plant Control and the chair of Intelligent Manufacturing Systems Working Group in IFAC.



**Karen Chan** *ADAPTOVATE*

Karen Chan, P.Eng, is a founding member of the ADAPTOVATE Toronto leadership team and advises enterprise clients on business agility, transformation, and new ways of working. An engineer by training, Karen's career spans the

automotive, digital media, financial services, and advisory industries. In all of her roles, with organizations that have included GM, Rogers, Deloitte, TD, and ADAPTOVATE, Karen has been recognized for her expertise in transforming organizations through operational and process optimization, scaling agile ways of working, and technology and digital innovation. Karen volunteers extensively in engineering, technology and leadership, and her roles include the Industry Advisory Committee for Mechanical and Manufacturing Engineering at Ontario Tech U, the Women for STEM Advisory Council at Ontario Tech U, OSPE Past President and Chair, PEO Lake Ontario Chapter Past Chair, and SWE Global Ambassador (Canada).



**Allison Cooperman** *CTC Operations*

Allison Cooperman was appointed to her current role as Director of CTC Operations in 2023. Allison oversees the operations of their engineering center in Canada, which includes managing their labs, garages, and test tracks. Additionally, she facilitates collaboration between the software and services production teams, creating a unified approach within the Canadian ecosystem, both internally and externally. In this role, she reports directly to Sara LeBlanc, Executive Director VMEC – Core Business, and indirectly to Kristian Aquilina, President and Managing Director, GM Canada.



**Dwight Corcoran** *Cormor Inc*

Dwight Corcoran is an experienced executive in the construction, agricultural, land development and manufacturing industries, holding various senior roles in growing organizations, including Sales, Operations and Customer Support.

A proven CEO and experienced board member, Dwight has led each organization he has been with through tremendous revenue and profit growth and successful exiting of businesses. While an Executive with John Deere, Dwight received his MBA focusing on International Business through the Richard Ivey School at Western University. Dwight has successfully completed a variety of business transactions including business exits. Currently, Dwight is a co-founder and CEO of Cormor Inc. a General Contractor utilizing 3D Construction Printing technology in Canada and the US.



**Jens Helbig** *FutureCarbon*

Jens Helbig studied materials science at university in Erlangen with a diploma degree in Ceramics, Polymers and Process Engineering. He received his PhD on the topic "Wet Processing of Nanosized Ceramic Particles" from ETH Zurich under the supervision of Prof. Ludwig Gauckler. The R&D as head of the research group for Ferroelectric Materials at the Fraunhofer-Institute for Silicate Research concerned the development of new piezoelectric materials and sensors/actuator made of these as well as the scale up of production processes for their manufacturing. From the Fraunhofer Society he switched to a spin-off company of the institute, where he was responsible for the development of new polymeric compounds and materials development for smart materials systems. After a few years, he joined the start-up company FutureCarbon and helped to establish the production processes for carbonaceous nanoparticles such as CNT (from synthesis to compounds) and advised customers in the application of CNT containing materials.

## Panel Session: Energy Supply and Electrification

### Moderators



#### Jennifer McKellar

Department of Energy and Nuclear Engineering,  
Department Chair and Associate Professor  
*Ontario Tech University*



#### Sheldon Williamson

NSERC Canada Research Chair in Electric Energy Storage Systems for Transportation Electrification,  
Professor  
*Ontario Tech University*

### Panelists



#### Jerry Hopwood *UNENE*

Mr. Jerry Hopwood was appointed on September 25, 2023, as a permanent, part-time Commission member for a 5-year term. Since 2016, Mr. Hopwood has served as President of the University Network of Excellence in Nuclear Engineering (UNENE), leading

Canada's university-industry partnership in nuclear research and education. Mr. Hopwood was educated at Oxford University, where he studied applied physics, and he has over 4 decades of extensive experience in the nuclear industry. After starting out in the nuclear field in Great Britain, he moved to Canada to join Atomic Energy of Canada Limited as a reactor safety specialist. He has published more than 40 journal articles and conference papers covering all aspects of nuclear technology. Mr. Hopwood is active internationally, consulting with the IAEA and with the Canadian Nuclear Society. He also serves as the chair of the International Nuclear Education Networks Association, covering networks of educators on all continents. In June 2019, he received the CNS/CNA Harold Smith Outstanding Contribution Award for services to the nuclear community.



#### Ivano Labricciosa *Oshawa Power*

Ivano Labricciosa, in his latest assignment as the President and CEO of Oshawa Power and Utilities Corporation (Oshawa Power), was instrumental in supporting the energy and communication service needs of Oshawa, Durham Region, and parts of the

GTA. As CEO of Oshawa Power, Ivano played a pivotal role in the overall strategic planning of the company and its subsidiaries involved in energy distribution, energy generation, and telecom ventures. His background in engineering, business development, and strategic planning combined with his international experience with alternative and renewable energy brings innovative leadership to not only Oshawa Power, but to Ontario's energy sector.



#### Brendan MacDonald *Ekstera Inc.*

Dr. Brendan MacDonald's research at Ontario Tech University centers around solving problems where he believes he can have the highest impact. He is also keen to develop technology that can be applied now, which can include field testing, prototyping, and some entrepreneurship. Currently, He's focused on developing sustainable energy technology that can tackle climate change. The work in his lab features a multidisciplinary integration of fluid mechanics, thermodynamics, physics, and chemistry. A combined theoretical and experimental approach is used. His research has focused on Stirling engine design, biomimicry of human perspiration for efficient cooling, energy transport in evaporating sessile droplets, the development of microfluidic devices for water purification and point-of-care diagnostic devices for the developing world (in partnership with a hospital in Vietnam), paper-based tests for arsenic contamination in tubewells in Bangladesh, and hydrogen storage in metal hydrides. Dr. MacDonald is also the Co-Founder/President of Ekstera Inc., a Renewable Energy Equipment Manufacturing company.



#### Jovica Riznic *Canadian Nuclear Safety Commission*

Jovica Riznic, P.Eng., PhD., FASME, works as a technical specialist with the Canadian Nuclear Safety Commission. Within the International nuclear regulatory community, Dr Jovica Riznic is best known for his contribution to research and application of effective regulation of nuclear power plants, particularly related to steam generators as one of the key safety significant components. Active in professional societies, particularly in ASME, Jovica Riznic has served the engineering profession and community with distinction and exceptional dedication; he is currently the Past Chair of the ASME Nuclear Engineering Division's Executive Committee. One of his most prominent recent ASME activities has been with the International Conference on Nuclear Engineering (ICONE) where he served as a track lead organizer since 1998 and currently is the Conference Steering Committee Chair for the ICONE-31 to be held in Prague, Czech Republic.



### **Rick Szymcyk** Automotive Centre of Excellence

Rick Szymcyk is a Professional Engineer with extensive experience in Automotive and Energy industries. He has a Systems Engineering and Masters of Business degree and has been awarded multiple patents across industries for his innovative work.

Sensing a shift towards Electrified vehicles and renewable energy, Rick established Upstartz in 2007 and incorporated Upstartz Energy in 2017 helping develop and deploy novel EV Charging technologies across Canada while collaborating with partners locally and globally. Rick's current focus under Upstartz Energy is on developing the enormous potential for distributed intelligent solar-based charging systems that are more efficient, effective and provide opportunities, particularly for smaller participants in our power distribution system. In addition, Rick serves as Senior Manager at the Ontario Tech Automotive Centre of Excellence and Software team collaborating with Industry and research partners to advance development and learning at every opportunity.



### **Akira Tokuhiko** Ontario Tech University

Dr. Akira Tokuhiko's contributions to the American Nuclear Society's President's Committee on the 2011 Fukushima Daiichi nuclear power plant accident in Japan led him to co-author a book on the disaster.

With an interest in big data analytics, he has been instrumental in guiding global nuclear energy design, engineering and safety research with U.S. Department of Energy (DOE) support, and at the Japan Atomic Energy Agency, and Switzerland's Paul Scherrer Institute. From 2007 to 2014, he served as Professor of Mechanical and Nuclear Engineering, and Director of the Nuclear Engineering Graduate Program at the University of Idaho in Moscow, Idaho. His research has been published in more than 150 journal and conference papers. He completed his Bachelor of Science in Engineering (Engineering Physics) at Purdue University in West Lafayette, Indiana, then earned his Master of Science in Mechanical Engineering from the University of Rochester in New York State. Dr. Tokuhiko is the interim Graduate Program Director for the Department of Energy and Nuclear Engineering in the Faculty of Engineering and Applied Science.

## Panel Session: AI and Mobility Systems

### Moderators



#### **Khalid Elgazzar**

Department of Electrical, Computer and Software Engineering, Associate Professor  
*Ontario Tech University*



#### **Zeinab El-Sayegh**

Department of Automotive and Mechatronics Engineering, Assistant Professor  
*Ontario Tech University*

### Panelists



#### **Homeira Afshar** OVIN

Homeira is the Research and Insight Analyst at Ontario Vehicle Innovation Network (OVIN), the Government of Ontario's flagship initiative on the future of automotive and mobility. With a background in Mechanical Engineering, she received

her Master of Global Affairs from the Munk School of Public Policy & Global Affairs. With ten years of experience in the mining sector, she has conducted research on decarbonization initiatives in Canadian steel industry and reaching net-zero goals in the mining and Electric Vehicle sectors. Her current focus is on the new initiatives in the Electric and Autonomous vehicles, in Ontario, Canada and globally.



#### **Amanda Kalhous** General Motors

Amanda Kalhous has over 25 years of industry experience from Aerospace to Trucking and Delivery including over 18 years in the Automotive Industry at General Motors of Canada across multiple domains.

Amanda is passionate about encouraging innovation – in people, processes, and products across domains. A leading innovator herself, Amanda has 30 patents including vehicle-to-phone communication and mobility solutions. Amanda was part of the BrightDrop team from late 2019 growing into the Head of Product role, for an integrated suite of products from full-size commercial electric delivery vans to motorized Trace electric carts and the software solutions that connect them. Since late 2022 she has been part of the Software & Services organization as Engineering Manager for Data Recording Software. Since July 2023, Amanda has served in a volunteer capacity as Engineer in Residence for the Department of Automotive & Mechatronics Engineering at Ontario Tech University and is also a Sessional Lecturer in the department.



**Alaa Khamis** General Motors

Dr. Alaa Khamis works as AI & Smart Mobility Technical Leader at General Motors Canada. Additionally, he holds positions as an Adjunct Professor at Ontario Tech University, a Lecturer at the University of Toronto, and an Affiliate Member of the Center of Pattern Analysis and Machine Intelligence (CPAMI) at the University of Waterloo. Dr. Khamis is the Vice-chair of the Connected and Automated Vehicles Advisory Council (CAVAC) at the Canadian Standards Association (CSA). He is also an accomplished author with books such as "Smart Mobility: Exploring Foundational Technologies and Wider Impacts" and "Optimization Algorithms: AI techniques for design, planning, and control problems" to his credit. His research interests include smart mobility, connected and automated vehicles, software-defined vehicles, intelligent data processing and analysis, machine learning and combinatorial optimization. He published 5 books, an IEEE Standard and over 180 scientific papers in refereed journals and international conferences. He also filed 58 US patents, trade secrets and defensive publications. For more detailed information, please visit his website: [www.alaakhamis.org](http://www.alaakhamis.org).



**Masoud Makrehchi** Ontario Tech University

Dr. Masoud Makrehchi holds a BSc degree in electrical engineering from Iran University of Science and Technology, an MSc degree in Computer Engineering from Shiraz University, Iran, and a PhD degree in Electrical and Computer Engineering from the University of Waterloo. Between 2008 and 2012, he served as a senior research scientist at Thomson Reuters R&D. In 2012, he joined the University of Ontario Institute of Technology, where he currently serves as an associate professor. His research focuses on Artificial Intelligence, Machine Learning, Network Science, and Natural Language Processing. Masoud is recognized as a senior member of IEEE and a licensed professional engineer in Ontario. Over the past 12 years, Masoud has secured multiple research grants, including two NSERC-DG grants, one SSHRC grant (as Co-PI), and three NSERC Engage grants in collaboration with industry partners. These grants supported research initiatives in the realms of Machine Learning, Network Science and Complex Systems, and Natural Language Processing. Throughout these research programs, Masoud has mentored four PhD students and six MSc students.



**Shabnam Pejhan** Ontario Tech University

Dr. Shabnam Pejhan is an Assistant Professor in the Department of Automotive and Mechatronics Engineering at Ontario Tech University. Her academic background includes degrees in Mechanical Engineering, with a specialized focus on biomechanical and biomedical applications. Following the completion of her PhD, Dr. Pejhan pursued Postdoctoral Fellowships at the University of Waterloo, where she delved into the biomechanics of human mobility, and at Ontario Tech University, engaging in collaborative research with General Motors on active urban mobility. Her research focuses on initiatives to improve human mobility capacity by developing active, assistive, and augmentative mobility devices. As a member of the Public, Active, Clean, and Equitable (PACE) Mobility Group at Ontario Tech University, Dr. Pejhan contributes to research that offers evidence-based solutions, ensuring healthy, active, age-friendly, sustainable, and barrier-free mobility alternatives. Her primary goal is to drive innovation in safe and inclusive mobility solutions, fostering the integration of human and robotic systems.



**Reza Zarringhalam** General Motors

Dr. Reza Zarringhalam is the Global Technical Lead of Active Safety and Automated Driving control at General Motors. He joined GM Canada in 2015 and is currently leading the development of software and control algorithms for GM's global portfolio of ADAS systems, including the award-winning Super Cruise hands-free driving technology. Reza has over 15 years of research and teaching experience in industrial, R&D, and academic settings. His research interests include advanced controls, vehicle dynamics, autonomous driving, fault-tolerant systems, robotics, and artificial intelligence. He holds a Ph.D. degree in Mechanical and Mechatronics engineering from the University of Waterloo. Reza has published 25 technical papers, holds 75 records of invention and trade secrets, has delivered 10 keynote presentations in global automotive forums, and is a reviewer of multiple international journals and conferences. He is driven by a strong passion for technology to help build a better future, today.

## Panel Session: Pathways Towards Net-Zero Emissions

### Moderators



**Daniel Hoornweg**

Department of Energy and Nuclear Engineering,  
Associate Professor  
Ontario Tech University



**Min Dong**

Department of Electrical, Computer and Software, Professor  
Ontario Tech University



**Mona Eghanian** *OVIN*

Mona Eghanian is Assistant Vice-President for the Ontario Vehicle Innovation Network (OVIN), the Government of Ontario's flagship initiative on the future of automotive and mobility. Mona received her Bachelor of Engineering (Chemical Engineering) from Western University, and her M.B.A. from the Richard Ivey School of Business. Mona has an extensive background in strategy development, technology transformation and data insights, and prior to working at OCI, she worked in the financial services and industrial manufacturing sectors.

### Panelists



**Marko Kroenke** *iMRail*

Marko Kroenke has more than 25 years of experience in the railway business on a global scale. He started at Deutsche Waggonbau, which was later taken over by Bombardier Transportation, leading the independent and certified testing facilities for railways.

Afterwards, he was responsible for global standardization in the headquarter, managing engineering for locomotives and production optimization. In 2012 he was appointed to Product Management of fully automatized and driverless transport systems. He led all research developments, including innovative autonomous People Mover. Finally, he was overall responsible for global technology, innovation, and research. In recent years he founded his own company, KroenkeConsulting, with service and project delivery for airports, battery technology, and autonomous systems. In addition, he is co-founder and CEO of iMRail (Innovative Monorail Technology) developing a new and total turnkey Monorail System.



**John Froats** *Ontario Tech University*

John Froats is a recognized leader in the CANDU Nuclear Industry. With over 41 years of experience in reactor design, start-up and operation, John has an extensive knowledge and experience base in all aspects of Nuclear Generation. He is known for his passion in leading people and for high standards of technical performance. In 2005 John was awarded the OPG "Power Within" Achievement Award for "Leadership". In 2009, he received the Canadian Standards Association Award of Merit for improvements in the Canadian Nuclear Standards Program. As Chief Nuclear Engineer & VP Engineering and Modifications he lead a team of over 1600 people to improve performance in the OPG Engineering program across the fleet, and in delivery of approximately \$500M of services annually. He introduced fundamental changes to enhance the quality and predictability of delivery of plant modifications and was instrumental in establishing a highly respected program for the recruitment and development of between 100 and 200 new engineers annually.



**Karen Chan**

*ADAPTOVATE*



**Ivano Labricciosa**

*Oshawa Power*



**Amanda Kalhous**

*General Motors*

# Lab Tours



## Guided Tours

### ▶ Automotive Centre of Excellence (ACE)

The Automotive Centre of Excellence (ACE) is the first climatic testing and research centre of its kind in Canada, and in many respects, the world. This multi-purpose, 16,300-square-metre facility, is owned and operated by our university as a truly independent, commercial operation.

### ▶ Clean Energy Research Lab (CERL)

Located on Ontario Tech's north Oshawa campus, CERL is a world-class facility where researchers are working on the world's first lab-scale demonstration of a copper-chlorine cycle for thermochemical water splitting and nuclear hydrogen production.

### ▶ Mixed-Field Irradiation Facility

Ontario Tech's mixed-field irradiation facility was purpose-designed and built as part of the university's Energy Research Centre, containing three ionizing radiation sources. The facility is licenced as a Class II nuclear facility by the Canadian Nuclear Safety Commission.

