



2025 UTERC

UNIVERSITY OF TORONTO ENGINEERING RESEARCH CONFERENCE

Myhal Centre for Engineering Innovation and Entrepreneurship

Toronto, ON
August 22, 2025

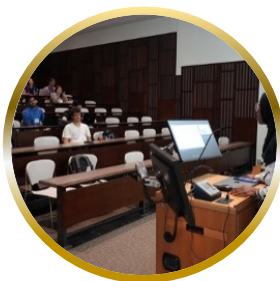


ABOUT US

The U of T Engineering Research Conference (UTERC) is back for its 5th annual edition on **Friday, August 22nd 2025**, showcasing the groundbreaking work of graduate students across the Faculty of Applied Science & Engineering. Through engaging presentations and a poster competition, UTERC not only highlights cutting-edge research in areas like AI, sustainability, biomedical engineering, and more—it also sparks cross-disciplinary dialogue, inspires future innovations, and strengthens the global impact of U of T's research community.

PURPOSE

Our goal is to showcase the groundbreaking research of graduate students within the Faculty of Applied Science & Engineering, while fostering interdisciplinary collaboration, knowledge exchange, and community building.



WELCOME FROM THE TEAM

The U of T Engineering Research Conference (UTERC) is returning this summer for its 5th annual edition! This year's theme celebrates the momentum of transformative ideas and forward-thinking solutions that are shaping our world. **Riding the Wave of Innovation** invites participants to explore how emerging technologies, interdisciplinary collaboration, and bold creativity are driving progress across various fields. Whether you are pushing boundaries in research or reimagining real-world applications, this theme encourages all students to harness the power of innovation to make a meaningful impact.

As a leading research faculty, the Faculty of Applied Science & Engineering is pushing the limits and pioneering initiatives in this increasingly digital world. UTERC embodies this spirit by providing a platform for students to showcase their research, share bold ideas, and contribute to shaping the future of engineering and technology.

Sincerely,
The UTERC 2025 Team

PROGRAM AT A GLANCE

Venue and Logistics

- **All sessions** will be held in the Myhal Centre for Engineering Innovation and Entrepreneurship
- **All workshops, opening and closing ceremony** will be held in the MY150 Auditorium
- **Conference Registration** will take place in the lobby of the building
- **Lunch and coffee** will be served in the lobby area
- **Light refreshments and snacks** will be available throughout the day

FRIDAY, AUGUST 22, 2025

09:00 – 09:30	Registration
09:00 – 10:00	Morning Coffee <i>Sponsored by LALUZ Consulting Inc</i>
09:30 – 10:00	Opening Ceremony
10:00 – 12:00	Podium and Poster Session I
12:00 – 13:00	LUNCH
12:00 – 13:00	Workshop I Engineering Leadership – The Grad Student Perspective
13:00 – 15:00	Podium and Poster Session II
15:00 – 16:00	Workshop II Alumni Industry Panel
16:00 – 17:00	Award Ceremony



SCHEDULE

09:00 – 09:30 Registration

09:30 – 09:40 Opening Remarks from UTERC Team

09:40 – 10:00 Keynote Lecture: Kerolyn Shairsingh, PhD

10:00 – 12:00 Podium and Poster Session I

PODIUM SESSION I: HEALTH AND BIOMEDICAL ENGINEERING (MY150)

Time	Presenter	Title
10:10 – 10:25	Aadam Nanji	Optimizing Exercise Countermeasures for Microgravity-Induced Bone Loss
10:25 – 10:40	Aisha Raji	Integrating Real Objects into Robot-Assisted Therapy for Retraining Reach-and-Grasp Function Post-Stroke
10:40 – 10:55	Doris Adao	Modulating hypertrophy and contractility using microRNAs in an induced pluripotent stem cell cardiomyocyte model of hypertrophic cardiomyopathy
10:55 – 11:10	Farzan Mazaheri	All-Optical Intravascular Frequency-Domain Differential Photoacoustic Imaging Catheter for Detection of Coronary Atherosclerosis Plaques
11:10 – 11:25	Ferdinand Reke Avikpe	A Validated Computational Model for Predicting hPSC Proliferation Dynamics in a Vertical Wheel Bioreactor
11:25 – 11:40	Giulia Di Nardo	Development of a Digital Twin Platform as an Educational Tool for Laparoscopic Cholecystectomy
11:40 – 11:55	Kate Hardman	An Antimicrobial, Low-Stiffness Titanium Alloy with Silver Additions for Reducing Hip Implant Revisions

SCHEDULE

PODIUM SESSION I: ADVANCED MANUFACTURING AND ROBOTICS (MY320)

Time	Presenter	Title
10:10 – 10:25	Zayneb Hussain	Elucidating the Effects of Relative Humidity on Electrochemical CO ₂ Pumping Cells
10:25 – 10:40	Ethan Tang	Haptic Virtual Fixtures for Robotically Assisted Cleft Palate Repair
10:40 – 10:55	Sharini Sam Chee	Modulating the Kinetics of a Fluorescence Anisotropy Immunoassay to Measure the Dynamics of Glucagon Secretion On-chip
10:55 – 11:10	Taeyoung Lee	Magnetic Capsule for Stable Collection of Large GI Tract Microbiome Samples
11:10 – 11:25	Niher Rajan Starker	Leveraging Liquid-Liquid Interfaces in a 3D-Printable Reactor to Form Sub-Micron Freestanding Membrane Selective Layers

PODIUM SESSION I: INTELLIGENT SYSTEMS AND DATA (MY370)

Time	Presenter	Title
10:10 – 10:25	Alexander Vicol	Mobility as a Cyborg Prosthesis for “Being a Ball”
10:25 – 10:40	Arnoosh Golestanian	Air Ambulance Location at Ornge
10:40 – 10:55	Benjamin Kozlowski	High-Performance Functional Electrical Stimulation to Maximize Joint Torque: A Multiple Motor Point Approach
10:55 – 11:10	Koorosh Moslemi	Learning Bilateral Team Formation in Cooperative Multi-Agent Reinforcement Learning
11:10 – 11:25	Lindsay Stern	Evaluating the Feasibility of Early Prediction of Pressure Injury Development

SCHEDULE

11:25 – 11:40	Mazen Baioumy	Hybrid Vector Database-Knowledge Graph Retrieval Augmented Generation (RAG) for Financial Document Understanding and Retrieval Using LLMs
11:40 – 11:55	Rubaina Farin	AI-Driven Contactless Posture Monitoring in Bed Using Load Cell Sensors
11:55 – 12:10	Gavin Hughes	Preoperative Kidney Stone Radiologic Density is Correlated with Mechanical Hardness as measured Ex-Vivo following Percutaneous Nephrolithotomy

PODIUM SESSION I: SUSTAINABLE SOLUTIONS AND EDUCATION (MY380)

Time	Presenter	Title
10:10 – 10:25	Amanuel Goliad	Reducing Microplastic Fiber Shedding From Hand-Washed Polyester
10:25 – 10:40	Angel Badewole	One Resource, Dual impact: Bioenergy with Carbon Capture and Storage
10:40 – 10:55	Cony Qin	PhD Completion Time in Canadian Engineering: A Study of Influencing Factors Among Visible Minority Women
10:55 – 11:10	Diana Zaraza	Spatially explicit assessment of near-term crop residue potential for Bioenergy with Carbon Capture and Storage in the Canadian Prairies
11:10 – 11:25	Frank Shu	Liquefaction assessment in mine tailings using calibration chamber test
11:25 – 11:40	Haoyang (Andre) Li	An Experimental Study on the Microwave Energy Delivery in a Fluidized Bed Reactor
11:40 – 11:55	Minnie Menezes	Mapping Interactions and Critical Points through a Multidisciplinary Surgical Process Analysis Identifies Orthopaedic Team Challenges

SCHEDULE

POSTER SESSION I (Intelligent Systems and Data & Sustainable Solutions and Education)

Presenter	Title
Anusha Iyengar	Utilizing Comorbid Conditions for Depression Prediction: A Multitask Learning Approach with Kolmogorov-Arnold Networks (KAN)
Chun Hung Liu	Multi Fidelity Bayesian Optimisation via Portfolio Allocation
Jerry Li	Unravelling Neural Signatures of Pain in Trigeminal Neuralgia with Ensembles and Structural Brain Imaging
Joseph Ip	An Electrochemical-Machine Learning Aggregate State-of-Health Indicator for Lithium-ion Batteries
Laura Edmonds	Design and Optimization of an Extracellular Matrix-Incorporated Placenta-on-a-Chip for Microfluidic Applications
Wisdom Okoh	Quantification of the Hydrated Cement Paste Content in Recycled Concrete Fines.
Nabeegh Khan	Student Adoption and Perceptions of Generative AI in University Education: Results from a Student Survey
Steven Thériault	Deuterium Retention in Tungsten After Deuterium-Nitrogen Co-bombardment
Thierry Dugas	Development and Validation of a Textile-Based Pressure Sensing System for Lower-Limb Prosthetic Sockets
Sheral Kumar	An Intelligent Multi-Dimensional, Multi-Modal Optical Imaging Platform for Accelerated Biological Research
Lucas Tan	
Akhil Kunjikuttan Nair	Atomically Engineered Two-Dimensional Nanostructured Materials for High-Performance Battery Electrodes
Dipali Nayak	

SCHEDULE

Annalisa Cognigni	A Comparison of Turbulence Models for Simulation of Wind Turbine Wakes in OpenFOAM
Christopher Doerrer	Multi-Length-Scale Thermal Modeling and Characterization of Lithium-Ion Pouch Cells for Battery-Powered Electric Vehicle Fast-Charging Applications
Jimmy Gan	Predicting Nonlinear Dynamics of Wind Turbine Blades Using Physics-Informed Deep Learning and Intrinsic Equations
Keagan Rankin	The climate limits of construction in over 1000 cities
Keanna Yu	Development of Solid Carrier-Based Membranes for Electricity-driven ion separations
Laura Battista	Application of scanning electron microscopy and energy-dispersive x-ray spectroscopy in the study of bronze disease on ancient copper-based artifacts
Manav Shroff	Thermal and Electrochemical Characterization of High-Power Lithium-Ion Pouch Cells for Motorsport Applications
Oscar Alvarez	Experimental-Numerical Thermal Characterization Framework for Enhanced Electric Vehicle Battery Pack Thermal Performance, Fast Charging, and Lifespan
Naayaab Nagree	Microencapsulation and Delivery of Iron into Food Systems
Jiayue Zhu	Co-Spray Dried Iron and Folic Acid Powders for Food Fortification: Detection and Characterization
Samira Mehrabi	MetaCatalysis: Opportunities with Photothermal and Super-Planckian MetaSurfaces
Richard Zhang	
Lauren Altomare	Decoding Epigenetic Traces and Accelerated Aging in Trigeminal Neuralgia Using Machine Learning
Jerry Li	

SCHEDULE

12:00 – 13:00

LUNCH

12:15 – 12:45

Workshop I: Emily Moore, PhD

Title: Engineering Leadership – The Grad Student Perspective

13:00 – 15:00

Podium and Poster Session II

PODIUM SESSION II: HEALTH AND BIOMEDICAL ENGINEERING (MY150)

Time	Presenter	Title
13:10 – 13:25	Luka Zigomanis	Thinking on Your Feet: Cortical Engagement Emerges in Discrete Postural Sway Events
13:25 – 13:40	Mahri Kadyrova	Remote Quantification of Tongue Motion Score in Motor Neuron Disease Using Deep Learning and Optical Flow: Preliminary results
13:40 – 13:55	Rida Hasan	Novel freshwater mussel adhesive protein self-assembles into amyloid fibrils
13:55 – 14:10	Samantha Unger	Quantifying and correcting pulse oximeter error across different skin pigment
14:10 – 14:25	Zi Xuan Zhang	A biomimetic and injectable collagen-based hydrogel for bone repair

PODIUM SESSION II: ADVANCED MANUFACTURING AND ROBOTICS (MY320)

Time	Presenter	Title
13:10 – 13:25	Azadeh Vahedi	Enhanced TiO_2 - Fe_3O_4 -Graphene Oxide Composite Coatings via Aerosol Deposition: Parameter Optimization and Microstructural Analysis
13:25 – 13:40	Zhenying Yang	Serendipitous Deposition of $\text{Al}_2\text{O}_3/\text{ZrO}_2$ Composite Coatings by Aerosol Deposition

SCHEDULE

13:40 – 13:55	Zhiyue Zhu	Characterization Of Melt-electrowritten Engineered Pediatric Pulmonary Valve Tissues For Preclinical Evaluation
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13:55 – 14:10	Yifei Chen	Slip Effect Correction for Propeller Blades on Martian Rotorcraft at Rarefied Atmospheric Conditions
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PODIUM SESSION II: INTELLIGENT SYSTEMS AND DATA (MY370)

Time	Presenter	Title
13:10 – 13:25	Sagnik Som	Monitoring Rest-Activity Rhythm of Long-term Care Residents with Dementia Using Location Data
13:25 – 13:40	Sepehr Hoomani Rad	Surfactant effects on coalescence-induced wetting on a solid substrate
13:40 – 13:55	Tanvi Virappa Patil	Mitigating Quantum Attacks from V2G with Blockchain and Vehicular Trust
13:55 – 14:10	Tony Jiao	Patient Specific Virtual Reality for Spine Surgery Education
14:10 – 14:25	Yasser Karam	Infection Prediction in a Dementia Care Setting using Machine Learning on Real-Time Location Systems-Derived Resident Interaction Data

PODIUM SESSION II: SUSTAINABLE SOLUTIONS AND EDUCATION (MY380)

Time	Presenter	Title
13:10 – 13:25	Harsharaj Parmar	A natural choice for diffusion media in proton exchange membrane fuel cells
13:25 – 13:40	Howard Ho	Improving Wind Turbine Efficiency Using Synthetic Jet Actuators

SCHEDULE

13:40 – 13:55	Mohammad Mahaninia	Catalyst-Free Biodegradable Chitosan-Based Covalent Adaptable Networks with Flame-Retardant Properties
13:55 – 14:10	Narmin Zakizade	Beyond the “Leaky Pipeline”: A Comparative Analysis of Women in Engineering Academia Across Canada, the EU, and the US
14:10 – 14:25	Niher Ranjan Sarker	Advancing Reverse Osmosis Technology: Insights into Polyamide Transport Properties and Ultra High-Pressure Reverse Osmosis Membranes for Hypersaline Brine Desalination
14:25 – 14:40	Sima Zeinali Danalou	Understanding and Overcoming Support Layer Compaction in High-Pressure Reverse Osmosis Membranes

POSTER SESSION II (Advanced Manufacturing and Robotics & Health and Biomedical Engineering)

Presenter	Title
Emily Jiang	Double stranded N1-methyl-pseudo uridine modified RNA triggers stress granules in U2OS cells
Zehua Wu	Topology Optimization of 3D-Printed Material on Composites
Zijing Wan	Hybrid methods for rapid mass estimation of articulated landing gear systems in preliminary design
Jincheng Hong	Engineering of Organic Solar Cells with an Array of Nano-structural Differences of Boron Subphthalocyanines
Alireza Ettefagh	Automated Monitoring of Lower-Limb Rehabilitation Exercises Using Computer Vision
Coulter Montague	DWORF Overexpression Does Not Enhance the Force Generation of Human Pluripotent Stem Cell-Derived Cardiomyocytes
Derrick Lim	High-Performance Functional Electrical Stimulation to Maximize Joint Torque: A Multiple Motor Point Approach

SCHEDULE

Huilin Liu	Development of Field Test Methods for the Determination of Folic Acid in Fortified Salt
Julia Barbat	Probing Loop Attachment of a Copper-based Spin Label for Electron Paramagnetic Resonance Studies
Julia Takimoto	Quantifying the Rotational Stiffness of 3D Printed AFOs
Kaiwen Liu	Dynamic MRI of Collagen Remodeling with a Novel Manganese-Based Contrast Agent
Lu (Kelly) Yin	A Mucoadhesive Surgical Dye for Improved Colorectal Polyps Imaging
Purushoth Thavendran	Development of a CRISPR-based Lateral Flow Test for Semi-Quantitative Detection of N. Gonorrhea in low-resource settings
Sebastian Silva	Development of a Music-Based Wearable Biofeedback System to Improve Lower Limb Amputee Gait Symmetry
Vidhisha Patel	Automatic Foot Slip Detection: An exploratory study
Xichen Zhang	Thermal and Cooking Stability of Microencapsulated Vitamin in Food Matrix
Matthew Melkonyan	Airsense: A Microneedle-Based Transdermal Patch Delivering Continuous Biomarker Monitoring to Transform Asthma Clinical Trials
Aditya Mishra	Mapping Maternal Morbidity: Integrating Demographic Data with Maternal Care Performance to Visualize Disparities Across Birthing Hospitals in Ontario
Jincheng Hong	Engineering of Organic Solar Cells with an Array of Nano-structural Differences of Boron Subphthalocyanines
Gavin Hughes	Comparative Evaluation of Large Language Models in Cardiovascular Medicine: Strengths and Limitations Across Clinical Domains
Raman Abbaspour	



SCHEDULE

15:00 – 16:00

Workshop II:

Title: Engineering Real-World Impact in Industry

16:05 – 16:20

Keynote Lecture: Maged Savi

16:20 – 16:35

Closing Remarks: Craig Steeves, PhD

16:35 – 16:50

Award Ceremony

KEYNOTE SPEAKER

Dr. Kerolyn Shairsingh

Consultant, WHO



Dr. Kerolyn Shairsingh received her PhD from the University of Toronto in 2018. She then joined the Canadian Urban Environmental Health Research Consortium where she strengthened her scientific expertise in air pollution exposure models and urban environmental health. In 2020 she joined the World Health Organization as a technical consultant in the Department of Environment, Climate Change and Health. Her work focuses on monitoring and reporting of air pollution related SDGs, enhancing global exposure assessments and evaluating the effectiveness of pollution reduction interventions. She has led the working group with multiple UN agencies on SDG 11.6.2 (Annual mean levels of fine particulate matter in cities). She also supports the Global Air Pollution and Health-Technical Advisory Group in synthesizing knowledge and translating it into evidence-based guidance for decision-makers. Prior to joining WHO, she worked at the Caribbean Industrial Research Institute where she managed several research & development projects.

KEYNOTE SPEAKER

Maged Sami

*SVP, Engineering and Special
Projects, CarbonFree Group*



Maged is the Senior Vice President of Engineering and Special Projects at CarbonFree Group and Chief Operating Officer of the company's Chilean division. A driving force in the energy transition, Maged leads an international team of engineers, project managers, and contractors in the design, financing, construction, and operation of next-generation solar and energy storage projects that are reshaping how the world is powered.

Maged has been at the forefront of renewable energy deployment, overseeing the successful delivery of over 125 solar power plants across the Americas. These projects represent more than \$3 billion in invested capital and include some of Canada's largest solar installations. His work reflects a deep commitment to integrating emerging technologies, cutting-edge research, and bold thinking to make clean energy more viable and scalable around the world.

Prior to his work at CarbonFree, Maged worked in wind power at Siemens and volunteered on environmental sustainability initiatives across Africa and the Mediterranean region. He is a licensed Professional Engineer and a proud alumnus of UofT's Department of Mechanical and Industrial Engineering, where he completed his undergraduate and graduate studies with a minor in sustainable energy and an emphasis in entrepreneurship, leadership, innovation and technology in engineering.

KEYNOTE SPEAKER

Dr. Craig Steeves

*Acting Vice-Dean, Graduate
Studies, FASE*



Craig A Steeves is an associate professor at the University of Toronto Institute for Aerospace Studies, Associate Director of the Centre for Research in Sustainable Aviation and the Acting Vice-Dean for Graduate Studies at the Faculty of Applied Science and Engineering. His research revolves around combining high-performance materials with complex geometry to enable light, strong and stiff structures that are enhanced with additional functionality. This is made possible by the large design space created by the complex geometry, but because of the increased complexity, computational optimization techniques are critical for successful designs.

Dr Steeves has both a Bachelor of Arts degree in International Relations from Trinity College, University of Toronto and a Bachelor of Applied Science in Civil Engineering from the University of British Columbia. He received his Doctor of Philosophy in 2002 from the Cambridge University Engineering Department, studying composite mechanics and sandwich panel failure modes in Prof Norman Fleck's Micromechanics Group. In particular, this work focused on minimum-weight design of composite structures. Subsequently Dr Steeves joined the Applied Physics Group of the Princeton University Department of Mechanical and Aerospace Engineering where he worked with Prof Richard Miles on the use of multifunctional sandwich structures in the context of magnetohydrodynamic power generation on reentering space vehicles.

Finally, Dr Steeves worked with Prof Tony Evans at the Materials Department of the University of California, Santa Barbara on a variety of topics related to airbreathing hypersonic flight, including morphing structures, low thermal expansion lattices and heat pipe leading edges. Dr Steeves joined UTIAS in January 2009.

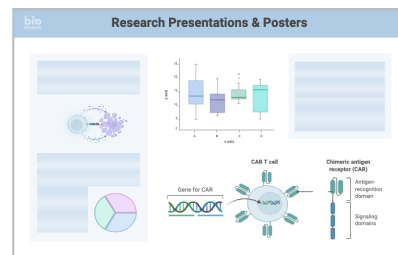
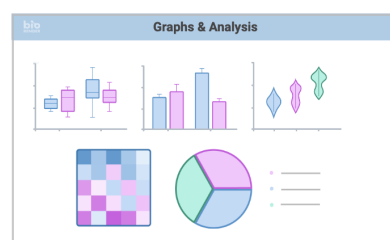
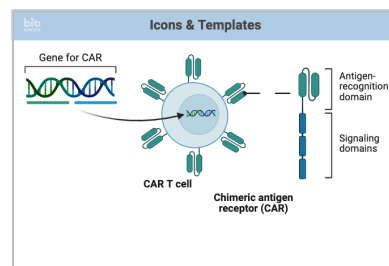
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UTERC 2025 **WORKSHOP HOSTS**

Workshop I



Emily Moore

Workshop II



Dave Yan



Mark Angelo



Jonathan Spraggett



Tobi Edun



Karen Wonders



Takis Zourtos

UTERC 2025 JUDGES

Afshin Marani
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Guangming Cai
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Pakpong Chirarattananon
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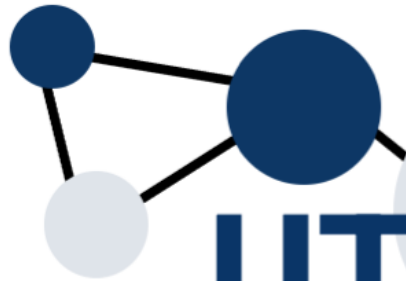
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2025

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