OntarioTech
Engineering
& Applied Science

2024 - 2025

ANNUAL RESEARCH REPORT

Ontario Tech University delivers a leading-edge learning environment that combines the pursuit of academic excellence, research opportunities, hands-on skills and vibrant student life.

Innovative programs within the Faculty of Engineering and Applied Science (FEAS) provide high-quality engineering education through teaching and research excellence. Each program is accredited by the Canadian Engineering Accreditation Board, the highest possible affirmation of a Canadian University's engineering programs.

Ontario Tech's undergraduate and graduate programs are responsive to students' educational needs and the market-driven requirements of employers, putting graduates one step ahead upon graduation. Groundbreaking research at the university allows students to participate in the newest technological advances and gain the valuable, hands-on experience needed by employers. Our expansive program options provide our engineering graduates with the skills required to succeed in a variety of industries.

Ontario Tech's professors are internationally renowned experts in their fields. They collaborate with students in the classroom, lab and field to turn innovative ideas into realities. Our researchers explore new solutions to local and global problems and take pride in educating our future leaders, who will turn engineers into a brighter world.

engineering.ontariotechu.ca

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Dean's Message

Our Research

Welcome to the Faculty of Engineering and Applied Science (FEAS), a beacon of engineering education and groundbreaking research that has garnered international acclaim. The Faculty is home to three Canada Research Chairs, specializing in fields as diverse as Adaptive Aerodynamics, Electric Energy Storage Systems for Transportation Electrification, and the Internet of Things (IoT). We are also privileged to house an NSERC-UNENE Industrial Research Chair (IRC) dedicated to Health Physics and Environmental Safety, as well as two university Research Chairs, one of which is at the forefront of renewable energy research and one on the structural integrity of nuclear components.

Our state-of-the-art research facilities provide a breeding ground for innovation and a conducive environment for faculty members and students to explore innovative and sustainable solutions for challenging issues.

Several faculty members have been recognized for their impactful research contributions by national and international organizations, such as the Canadian Society for Mechanical Engineering (CSME), the American Society of Mechanical Engineers (ASME), the Institute of Electrical and Electronics Engineers (IEEE), the Engineering Institute of Canada (EIC), and the Royal Society of Canada (RSC).

This report provides a window into our faculty's remarkable accomplishments, activities, and scholarly contributions, offering a glimpse into how the Faculty is constantly challenging the status quo and redefining the boundaries of thinking and learning. I invite you to explore our Faculty, visit the campus and tour research laboratories, and meet our professors, staff, and students.

Sincerely,

H. A. Kishawy

Dr. Hossam Kishawy
Dean, Faculty of Engineering and Applied Science

FACULTY ADMINISTRATION

Dean
Dr. Hossam Kishawy, BSc, MSc, PhD (McMaster University), PEng, FASME, FCSME, FEIC, Professor

Associate Dean, Academic
Dr. Scott Nokleby, BEng, MASc, PhD (University of Victoria), PEng, FCSME, FASME, Professor

Assistant Dean, Engineering Outreach
Dr. Qusay Mahmoud, BSc, MCS, PhD (Middlesex, UK), PEng, Professor

Assistant Dean, Engineering Laboratories
Shahid Hidayat, BEng, MASc, PEng, Associate Teaching Professor

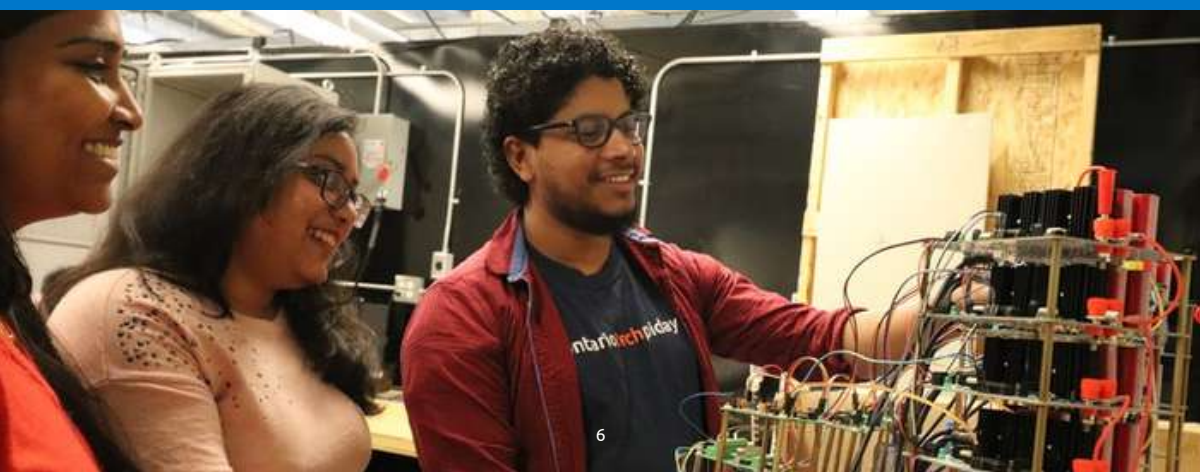
Assistant Dean, Graduate Studies
Dr. Atef Mohany, BSc, MSc, PhD (McMaster University), PEng, FCSME, FASME, Professor

Chair, Department of Automotive and Mechatronics Engineering
Dr. Haoxiang Lang, BSc, MASc, PhD (University of British Columbia), PEng, Associate Professor

Chair, Department of Electrical, Computer and Software Engineering (Acting)
Dr. Ying Wang, BEng, MASc, PhD (University of Waterloo), PEng, Professor

Chair, Department of Energy and Nuclear Engineering
Dr. Jennifer McKellar, BASc, MASc, PhD (University of Toronto), PEng, Associate Professor

Chair, Department of Mechanical and Manufacturing Engineering
Dr. Martin Agelin-Chaab, BSc, MEng, MSc, PhD (University of Manitoba), PEng, Professor



AUTOMOTIVE AND MECHATRONICS ENGINEERING

FACULTY, AUTOMOTIVE

Dr. Moustafa El-Gindy, BSc, MSc, PhD (Technical University of Budapest), PEng, Professor

Dr. Zeinab El-Sayegh, BEng, MSc, PhD (Ontario Tech University), PEng, Assistant Professor

Dr. Yuping He, BASc, MASc, PhD (University of Waterloo), PEng, Professor

Dr. Xianke Lin, BEng, MSc, PhD (University of Michigan-Ann Arbor), PEng, Associate Professor

Dr. Greg Rohrauer, DEC, BEng, PhD (Concordia University), PEng, Associate Professor

TEACHING FOCUS FACULTY, AUTOMOTIVE

Dr. Murat Aydin, BSc, MSc, MRes, DIC, PhD (University of London, UK), PEng, Associate Teaching Professor

FACULTY, MECHATRONICS

Dr. Meaghan Charest-Finn, BSc, MSc, PhD (University of New Brunswick), Assistant Professor

Dr. Haoxiang Lang, BSc, MASc, PhD (University of British Columbia), PEng, Associate Professor

Dr. Scott Nokleby, BEng, MASc, PhD (University of Victoria), PEng, FCSME, FASME, Professor

Dr. Shabnam Pejhan, BSc, MSc, PhD (University of Manitoba), Assistant Professor

Dr. Mitchell Rushton, BASC, MASc, Certificate in University Teaching, PhD (University of Waterloo), Assistant Professor

Dr. Jaho Seo, BSc, MIng(MSc), PhD (University of Waterloo), PEng, Associate Professor

Dr. Aaron Yurkewich, BESc, MESc, PhD (University of Toronto), Assistant Professor

TEACHING FOCUS FACULTY, MECHATRONICS

Dr. Nasim Moallemi, BEng, MSc, PhD (Ontario Tech University), PEng, Associate Teaching Professor

ELECTRICAL, COMPUTER AND SOFTWARE ENGINEERING

FACULTY, SOFTWARE

Dr. Sanaa Alwidian, BSc, MSc, PhD (University of Ottawa), Assistant Professor

Dr. Akramul Azim, BSc, MSc, PhD (University of Waterloo), PEng, SMIEEE, Associate Professor

Dr. Mohamed El-Darieby, BSc, MSc, PhD (Carleton University), PEng, Associate Professor

Dr. Khalid Elgazzar, BSc, MSc. PhD (Queen's University), PEng, Canada Research Chair, Associate Professor

Dr. Ramiro Liscano, BScEng, MScEng, PhD (University of Waterloo), PEng, SMIEEE, Professor Emeritus

Dr. Qusay Mahmoud, BSc, MCS, PhD (Middlesex University, UK), PEng, Professor

Dr. Masoud Makrehchi, BSc, MSc, PhD (University of Waterloo), PEng, Associate Professor

TEACHING FOCUS FACULTY, SOFTWARE

Dr. Anwar Abdalbari, BEng, MSc. PhD (Ontario Tech University), PEng, Associate Teaching Professor

Dr. Khalid Hafeez, BEng, MASc, PhD (Ryerson University), PEng, IEEE Senior Member, VC of IEEE-VT, Associate Teaching Professor

FACULTY, ELECTRICAL

Dr. Min Dong, BEng, PhD (Cornell University, NY, USA), PEng, SMIEEE, Professor

Dr. Mikael Eklund, BSc, MSc, PhD (Queen's University), PEng, Professor

Dr. Ali Grami, BSc, MEng, PhD (University of Toronto), PEng, SMIEEE, Associate Professor

Dr. Walid Morsi Ibrahim, BSc, MSc, PhD (Dalhousie University), PEng, SMIEEE, Professor

Dr. Ruth Milman, BASc, MASc, PhD (University of Toronto), PEng, Associate Professor

Dr. Jing Ren, BSc, MBA, PhD (Western University), PEng, Professor

Dr. Langis Roy, BASc, MEng, PhD (Carleton University), PEng, Professor

Dr. Shahram ShahbazPanahi, BSc, MSc, PhD (Sharif University of Technology, Tehran, Iran), PEng, Professor

Dr. Tarlochan Sidhu, BE, MSc, PhD (University of Saskatchewan), PEng, Ceng, FIEEE, FEIC, FCAE, Professor

Dr. Vijay Sood, BSc, MASc, PhD (Bradford University, UK), PEng, FIEEE, FEIC, Professor Emeritus

Dr. Ying Wang, BEng, MASc, PhD (University of Waterloo), PEng, Professor

Dr. Sheldon Williamson, BE, MSc, PhD (Illinois Institute of Technology, Chicago, Il, USA), PEng, NSERC Canada Research Chair, Professor

Dr. Mohamed Youssef, BASc, MASc, PhD (Queen's University), PEng, SMIEEE, Professor

TEACHING FOCUS FACULTY, ELECTRICAL

Dr. Namdar Saniei, BSc, MSc, PhD (University of Toronto), PEng, SMIEEE, Associate Teaching Professor

ENERGY AND NUCLEAR ENGINEERING

FACULTY, ENERGY & NUCLEAR

Dr. Kirk Atkinson, BSc, MSc, MRes, PhD (University of London, UK), Associate Industrial Research Chair, Associate Professor

Dr. George Bereznai, BEng, MEng, PhD (McMaster University), PEng, Professor Emeritus

Dr. Hossam Gaber, BSc, MSc, PhD, PEng (Okayama University, Japan), Professor

Dr. Glenn Harvel, BEng, MEng, PhD (McMaster University), PEng, Professor

Dr. Daniel Hoornweg, BSc, MSc, PhD (University of Toronto), PEng, Associate Professor

Dr. Brian Ikeda, BSc, MSc, PhD (University of Newcastle upon Tyne, UK), Associate Professor

Dr. Matthew Kaye, BASc, MSc, PhD (Queen's University), PEng, Associate Professor

Dr. Lixuan Lu, BES, MES, PhD (University of Western Ontario), PEng, Professor

Dr. Rachid Machrafi, BSc, MASc, PhD (Joint Institute for Nuclear Research, Dubna, Russia), Professor

Dr. Jennifer McKellar, BASc, MASc, PhD (University of Toronto), PEng, Associate Professor

Dr. Eleodor Nichita, BS, MS, PhD (Georgia Institute of Technology, USA), PEng, Associate Professor

Dr. Igor Pioro, BS, MASc. PhD (National Academy of Sciences, Kiev, Ukraine), PEng, Fellow of ASME, CSME and EIC, Foreign Fellow of the National Academy of Sciences of Ukraine, Professor

Dr. Akira Tokuhiro, BS, MS, PhD (Purdue University, IN, USA), Professor

Dr. Anthony Waker, BS, PhD (London South Bank University, UK & European Joint Research Centre, Ispra, Italy), Professor Emeritus

Dr. Edward Waller, BS, MScE, PhD (Rensselaer Polytechnique Institute, Troy, New York, USA), Industrial Research Chair, PEng, NSERC/UNENE IRC, Professor

TEACHING FOCUS FACULTY, ENERGY & NUCLEAR

Dr. Filippo Genco, BS, MS, MSNE, PhD (Purdue University, IN, USA), Director of Industry Training, Associate Teaching Professor

MECHANICAL AND MANUFACTURING ENGINEERING

FACULTY, MECHANICAL

Dr. Martin Agelin-Chaab, BSc, MEng, MSc, PhD (University of Manitoba), PEng, Professor

Dr. Ibrahim Dincer, BSc, MSc, PhD (Istanbul Technical University, Turkey), PEng, Professor

Dr. Ebrahim Esmailzadeh, BSc, MPhil, PhD (University of London, UK), CEng, PEng, FCAE, FEIC, FASME, FCSME, FIMechE, SMIEEE, Professor Emeritus

Dr. Horia Hangan, Diplomate Engineer, PhD (Western University), PEng, FCSME, Professor

Dr. Tao Liu, BSc, MSc, PhD (University of Alberta), PEng, Assistant Professor

Dr. Brendan MacDonald, BASc, MASc, PhD (University of Toronto), PEng, Associate Professor

Dr. Atef Mohany, BSc, MSc, PhD (McMaster University), PEng, FCSME, FASME, Professor

Dr. Bale Reddy, BTech, MTech, PhD (Indian Institute of Technology), PEng, Professor

Dr. Marc Rosen, BASc, MASc, PhD (University of Toronto), PEng, FASME, FCSME, FEIC, FIEF, FCAE, FCSSE, Professor

Dr. Zia Saadatnia, BSc, MSc, PhD (University of Toronto), PEng, Assistant Professor

TEACHING FOCUS FACULTY, MECHANICAL

Dr. Eda Aydin, BEng, MSc, PhD (Ontario Tech University), Assistant Teaching Professor

Dr. Naglaa Elagamy, BSc, MASc, PhD (Carleton University), PEng, Associate Teaching Professor

FACULTY, MANUFACTURING

Dr. Jana Abou-Ziki, BSc, PhD (Concordia University), PEng, Associate Professor

Dr. Ahmad Barari, BSc, MSc, PhD (Western University), PEng, Professor

Dr. Ramona (Haniyeh) Fayazfar, BSc, MSc, PhD (Sharif University of Technology, Iran), PEng, Assistant Professor

Dr. Ali Hosseini, BSc, MSc, PhD (Ontario Tech University), PEng, Associate Professor

Dr. Amirkianoosh Kiani, BSc, MSc, PhD (Toronto Metropolitan University), PEng, Associate Professor

Dr. Hossam Kishawy, BSc, MSc, PhD (McMaster University), PEng, FASME, FCSME, Professor

Dr. Remon Pop-Iliev, BASc, MASc, PhD (University of Toronto), PEng, FCSME, Professor

Dr. Ghaus Rizvi, BE, MS, MASc, PhD (University of Toronto), PEng, Professor

TEACHING FOCUS FACULTY, MANUFACTURING

Dr. Dima Jawad, BEng, MSUP, PMP, PhD (Rutgers University, New Jersey, USA), Senior Teaching Professor

ADJUNCT FACULTY

Marianna Braza

John de Brosbois

Fereydoon Diba

Rickey Dubay

Kamiel Gabriel

Ismail Gultepe

Alaa Khamis

Greg Naterer

Dipal Patel

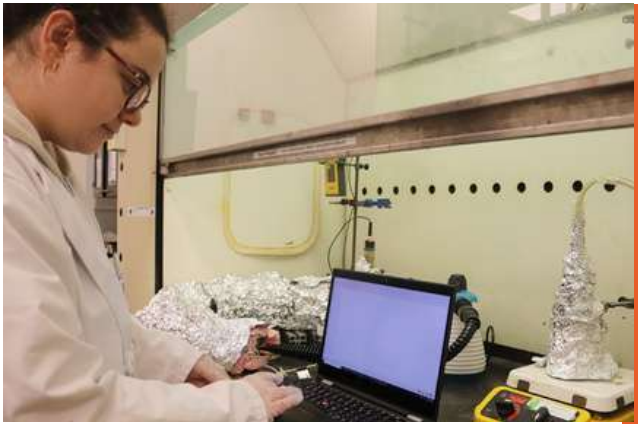
Markus Piro

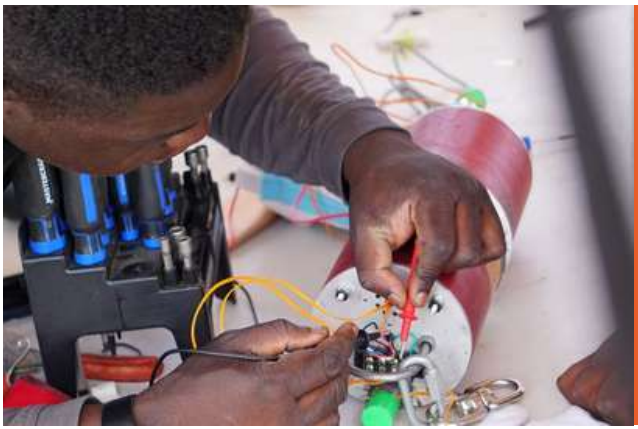
Shahryar Rahnamayan

Benjamin Rouben

Bekir Yibas

Ming Yu





ACADEMIC PROGRAMS

The Faculty of Engineering and Applied Science strives to provide the highest quality of undergraduate and graduate education.

UNDERGRADUATE PROGRAMS

Designed to meet the needs of industry and society, we offer undergraduate degree programs leading to a Bachelor of Engineering (BEng) or Bachelor of Science (BSc) in the following areas:

- Automotive Engineering (BEng)
- Electrical Engineering (BEng)
- Energy Engineering (BEng)
- Health Physics and Radiation Science (BSc)
- Industrial Engineering (BEng)
- Manufacturing Engineering (BEng)
- Mechanical Engineering (BEng)
- Mechatronics Engineering (BEng)
- Nuclear Engineering (BEng)
- Software Engineering (BEng)

Our innovative undergraduate programs include:

- The only accredited Automotive Engineering, Nuclear Engineering and Manufacturing Engineering programs of their kind in Canada;
- Broad programs in Mechanical, Software and Electrical Engineering;
- Unique Internet of Things, Smart Grid, Railway Engineering, and Artificial Intelligence Specializations;
- Engineering Management programs to meet the rapidly increasing need for engineers with leadership skills to succeed in business and management;
- A comprehensive co-op education program that provides experiential learning and integrates academic studies with paid work experience; and
- Canada's only English undergraduate specialization in Railway Engineering.

GRADUATE PROGRAMS

We offer graduate programs leading to a graduate diploma, as well as the degrees of Master of Applied Science (MASc), Master of Engineering (MEng), Master of Engineering Management (MEngM), and Doctor of Philosophy (PhD) in the following areas:

- Automotive Engineering (MASc, MEng)
- Electrical and Computer Engineering (MASc, MEng)
- Electrical and Computer Engineering (PhD)
- Engineering Management (Graduate Diploma)
- Engineering Management (MEngM)
- Mechanical Engineering (MASc, MEng)
- Mechanical Engineering (PhD)
- Nuclear Design Engineering (Graduate Diploma)
- Nuclear Technology (Graduate Diploma)
- Nuclear Engineering (MASc, MEng)
- Nuclear Engineering (PhD)
- Software Engineering (MASc, MEng)
- UNENE in Nuclear Engineering (Graduate Diploma)
- UNENE Nuclear Engineering (MEng)

The MASc Program is research-oriented and entails a combination of course-based learning and a thesis that involves original research. The MEng program is a professional master's program for upgrading technical skills and knowledge, with an emphasis on course-based learning that can be accompanied by a major project. The PhD program leads to the highest academic degree. It involves a combination of academic coursework and a dissertation, which requires a significant and detailed body of original research that leads to new and innovative research outcomes.

RESEARCH FUNDING

$6,915,000

Secured in research funding for 2024-2025

The Faculty of Engineering and Applied Science conducts leading-edge, value-added research in focused, strategic areas. Faculty members are internationally renowned and award-winning professors in their respective fields of study. They have a wide range of expertise and experience in teaching, research and graduate supervision. Their research activities attract funding through grants and other support from various sources, including industry, government agencies and other organizations. These include the Natural Sciences and Engineering Research Council of Canada (NSERC), the Canada Foundation for Innovation (CFI), and the Canada Research Chairs (CRC) program. These programs award funds on a competitive basis to university researchers across Canada.

The Faculty of Engineering and Applied Science has numerous research programs and activities that secured $6,915,000 of research funding for 2024-25. When ranked by criteria such as research impact and productivity of journal and conference articles published, Ontario Tech University has one of the top engineering faculties in Canada. In various specific areas, we are an international leader, with developments that have led to patents and prestigious recognitions worldwide. The research activities are conducted in state-of-the-art research centres and buildings.

PARTNERS

An extensive number of research projects in our faculty involve industrial partners. There are over 40 industrial and funding institutions that are part of research projects with our faculty members. The Faculty of Engineering and Applied Science gratefully acknowledge the support given to its research programs by its partners:

- Admira Dhes Inc.
- Age-Well
- Canada Research Chair (CRC) Program
- Canadian Foundation for Innovation (CFI)
- Cilimont Inc.
- City of Surrey
- Customachinery
- eCamion
- Eigen Innovations
- Ekstera Inc.
- Ericsson Canada Inc.
- Gerdau Ameristeel
- GlassHouse Systems
- GreenH2wave
- IBM Center of Advanced Studies
- Imperial Oil of Canada Ltd.
- IntellectuLogy
- KIMM
- LeddarTech Inc.
- Magna Exteriors, Inc.
- Martinrea International
- Ministry of Transportation Ontario (MTO)
- Mitacs
- Natural Sciences and Engineering Research Council (NSERC)
- Nidus3D
- Nova Graphene
- Ontario Centre of Innovation (OCI)
- Ontario Power Generation
- Ontario Vehicle Innovation Network (OVIN)
- PoolPal Inc.
- Pro-Flange Lmt.
- QED Battery Corp
- Quwa Smart Services Inc.
- Sunnybrook Health Sciences Centre
- SurroMind
- Team Eagle Ltd.
- Toronto Metropolitan University
- University Network of Excellence in Nuclear Engineering (UNENE)
- University of Western Ontario (UWO)
- Viona Consulting Inc.
- Volvo Group North America
- Wireless PNC

RESEARCH AREAS

AUTOMOTIVE AND MECHATRONICS ENGINEERING

AUTOMOTIVE ENGINEERING

Our Faculty is a leader in automotive research and engineering. With innovative research programs, we find new solutions to automotive problems and educate future engineers who will turn great new ideas into commercial products in the automotive and other industries.

Specific areas of current faculty research include:

- Vehicle dynamics, control and driver-vehicle-environment interactions;
- Active vehicle safety;
- Hybrid electric vehicle design and control;
- Vehicle structure and chassis design;
- Vehicle thermal aerodynamics and thermal management;
- Battery charge and storage;
- Autonomous and semiautonomous driving and autonomous e-mobility;
- Vehicle modelling, simulation and optimization;
- Tire mechanics;
- Driver behaviour modelling and simulation;
- Transportation electrification and intelligent transportation;
- Acoustics and aeroacoustics;
- Advanced thermofluids;
- Aerodynamic optimization, climatic aerodynamics, development of aerodynamic devices and active vehicle aerodynamic control; and
- Wind engineering, defrosting, and sensor cleaning in adverse weather.

MECHATRONICS ENGINEERING

Ontario Tech University is one of only a handful of universities in Canada that offers a dedicated program in Mechatronics Engineering, which integrates mechanical and electrical systems with real-time control, combining hardware with software to produce new devices such as consumer products, medical devices, high- tech automobile systems and robots.

Specific areas of current faculty research include:

- Mobile manipulator systems;
- Crewless ground/aerial vehicles;
- Inverse problems in mechatronics, robotics and automation engineering;
- Amphibious robots;
- Machine vision, monitoring and fault diagnosis;
- Interactive autonomous robotic manipulation;
- Automated mechatronic design;
- Automated construction equipment;
- Predictive safety control;
- Haptic devices for robotic surgery; and
- Autonomous medical robotic devices.

ELECTRICAL, COMPUTER AND SOFTWARE ENGINEERING

SOFTWARE ENGINEERING

Software systems engineering is the core component of the growing software sector, and the Internet of Things (IoT) will be the foundation of our critical infrastructure and the basis for emerging and future smart services. FEAS researchers are addressing many of the unique challenges in engineering resilient software systems that enable the vision of IoT.

Specific areas of current faculty research include:

- Cyber-physical systems;
- E-Health and medical image processing;
- Embedded and real-time systems;
- Security, privacy and trust;
- Smart cities;
- Emerging technologies;
- Software analytics;
- Software quality and testing; and
- Model-based software engineering.

ELECTRICAL ENGINEERING

Our faculty conducts innovative research in the study, design and application of equipment, devices, and systems which use electricity. This research addresses various technological challenges, such as providing more capable telecommunications networks (wireless and the Internet), intelligent control systems (with higher speed, better precision and lower cost), and power smart grids.

Specific areas of current faculty research include:

- Automatic/intelligent sensing and control;
- Biomedical engineering;
- Networked and distributed control systems;
- Network security;
- Power systems and smart grid engineering;
- Satellite communications;
- Sensor networks;
- Telecommunications networks; and
- Wireless communications and signal processing.

ENERGY AND NUCLEAR ENGINEERING

The energy sector is evolving at a rapid pace, and our researchers work to understand the safe, reliable and efficient generation of environmentally-conscious energy. Our researchers study different forms of energy, including fossil fuels, hydro, geothermal, nuclear, solar and wind, as well as emerging technologies, such as energy storage, and they seek to develop and improve environmentally responsible energy technologies.

Specific areas of current faculty research include:

- Advanced safety and control systems for nuclear power plants;
- Renewable energy systems;
- Sustainable energy systems and communities;
- District energy systems;
- Energy storage systems;
- Hydrogen energy and fuel cells;
- Net-zero buildings;
- Fluid-structure interaction;
- Nuclear instrumentation and control;
- Fluid mechanics;
- Advanced nuclear reactor systems;
- Advanced nuclear fuels/materials;
- Decommissioning nuclear facilities;
- Environmental protection and health physics;
- Maintenance and refurbishment;
- Small modular reactors;
- Nuclear security;
- Nuclear modelling and simulation;
- Radiation detection and visualization;
- Radioactive waste management; and
- Plasma systems for energy and nuclear applications.

MECHANICAL AND MANUFACTURING ENGINEERING

MANUFACTURING ENGINEERING

Manufacturing has a vital role in the Ontario economy, and active research is conducted in the development of advanced processes and methodologies for manufacturing in areas such as materials and composites, robotics, automation and intelligent controls.

Specific areas of current faculty research include:

- Additive manufacturing and 3D printing;
- Dynamics, vibration and noise;
- Engineering design;
- Advanced manufacturing;
- Digital and precision manufacturing;
- High-speed machining;
- Biomaterials;
- Energy materials;
- Ceramics and hybrid materials;
- Smart materials;
- Nano-materials;
- Non-linear dynamics;
- Green and nanocomposite;
- Functional coating;
- Modelling, simulation and optimization;
- Nano/Micro-manufacturing and microfluid devices;
- Subtractive manufacturing and high-speed machining;
- Surface functionalization and surface integrity;
- Mechanics of solids and structures; and
- Robotics, automation and controls.

MECHANICAL ENGINEERING

Mechanical engineering is a focus area of active faculty research. Our researchers design mechanical, thermal and fluid systems and components that are environmentally sustainable. They also research and design effective, efficient and competitive energy technologies, as well as robotics and automation solutions.

Specific areas of current faculty research include:

- Vehicle aerodynamics;
- Energy conversion and management;
- Heat and mass transfer;
- Fuel cell systems;
- Vibrations;
- Structural dynamics;
- Modelling and simulation;
- Risk management;
- Sustainable energy;
- Microfluids;
- Fluid mechanics;
- Thermodynamics;
- Acoustics and aeroacoustics;
- Thermal design and optimization; and
- Renewable energy.

FACULTY RESEARCH AREAS

AUTOMOTIVE AND MECHATRONICS ENGINEERING

AUTOMOTIVE ENGINEERING

Dr. Moustafa El-Gindy
Aircraft landing dynamics; Articulated heavy vehicles; Bus testing and simulation; Crash testing and simulations; High-velocity impact and ballistics simulation; Multi wheels military vehicles dynamics; Self-steering axles simulation; Tire mechanics; Tire-soft and hard soils interaction; Vehicle dynamics; and Virtual human modelling.

Dr. Zeinab El-Sayegh
Vehicle system dynamics; Autonomous vehicles; Ride comfort; Stability control; Modelling and simulation; Tire mechanics; Soil dynamics; and Off-road vehicle design.

Dr. Yuping He
Autonomous driving; Vehicle system dynamics; Vehicle chassis design; Vehicle active safety systems; Automated design synthesis; Modelling and simulation; Driver-hardware-in-the-loop real-time simulations; Application of multidisciplinary design optimization; and mechatronic systems.

Dr. Xianke Lin
Energy storage systems; Renewable energies; Hybrid electric vehicle design and control; Multiscale/multiphysics modelling and optimization; Power electronics control and AC motor optimal control; and Vehicle active safety/automated driving.

Dr. Greg Rohrauer
Advanced composite materials; Analysis and design of composite pressure vessels; Materials testing; Alternate fuelled and hybrid vehicles development; Vehicle dynamics; and manufacturing technology and application.

MECHATRONICS ENGINEERING

Dr. Meaghan Charest-Finn
Advanced automation of complex systems; Model Predictive Control algorithms; Intelligent architectures to automate multi-physics processes; and Applied artificial learning methodologies.

Dr. Haoxiang Lang
Mechatronics; Autonomous robotics; Visual servoing and advanced controls; and Machine learning.

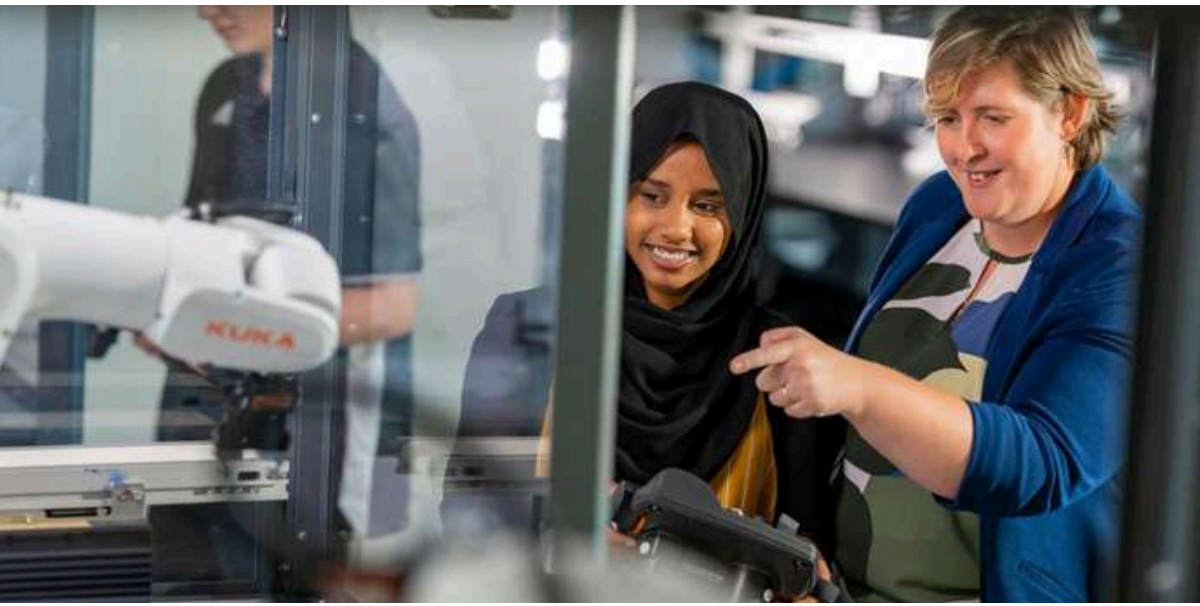
Dr. Scott Nokleby
Robotics; Mechatronics; Mechanisms; Automation; Advanced kinematics of robots and mechanisms; Redundant manipulator systems; Mobile-manipulator systems; Mechanism and robot design; and Optimal design.

Dr. Shabnam Pejhan
Design and evaluation of biomechatronic mobility assistive devices; Design of smart wearables for rehabilitation or prevention of musculoskeletal disorders; Evaluation and integration of advanced and intelligent active urban mobility alternatives; Human mobility and motion analysis; and Biomedical technologies.

Dr. Mitchell Rushton
Robotics; Vibration Control; Cable-Driven Parallel Robots; and Continuum Robots.

Dr. Jaho Seo
Mechatronics; Autonomous mobile machine; Intelligent construction equipment; Intelligent agriculture machinery; Safety-control; Electro-hydraulic systems; Hardware-in-the-loop simulation; and System reliability.

Dr. Aaron Yurkewich
Design and Control of Wearable Robots and Exoskeletons; Biomedical Engineering for Rehabilitation and Surgery; Engineering Entrepreneurship; Human-Robot Interaction; and AI and Robotics.



ELECTRICAL, COMPUTER AND SOFTWARE ENGINEERING

SOFTWARE ENGINEERING

Dr. Sanaa Alwidian
Software engineering; Goal-oriented requirements engineering; Model-based system engineering; Software evolution and analysis; AI and its application to software engineering; Mobile ad hoc networks; and Natural language processing.

Dr. Akramul Azim
Real-time systems; Embedded software; Safety-critical systems; Internet of things; Software verification and validation; Software quality and testing; and Applied machine learning.

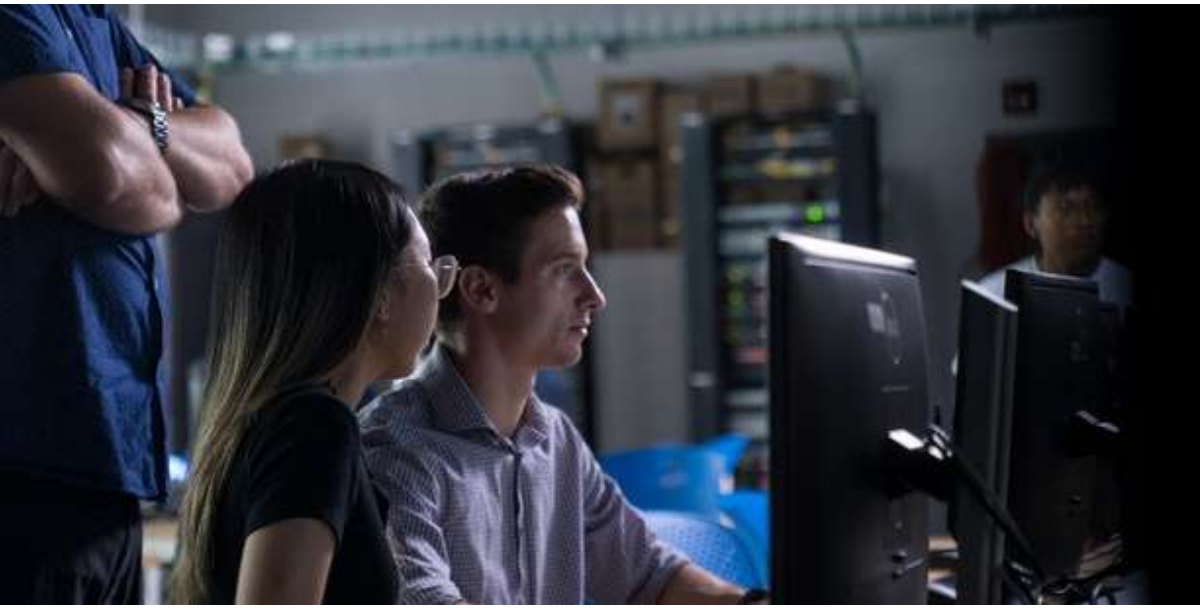
Dr. Mohamed El-Darieby
Software systems engineering; Software process management; Software analysis; Design; Computer systems; Cloud computing; Internet of things; Pervasive computing; Data engineering; Big data; Artificial intelligence; Applications areas; Connected and autonomous vehicles; Smart agriculture; Intelligent transportation systems; and Smart city and infrastructure.

Dr. Khalid Elgazzar
Internet of things; Ubiquitous computing; Real-time data analytics; Distributed systems; Intelligent software systems; Mobile computing; and Cloud and edge computing.

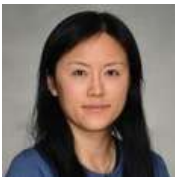
Dr. Ramiro Liscano (Professor Emeritus)
Pervasive and mobile computing (service discovery and security management); Distributed computing (peer-to-peer, web services, service-oriented architectures, GRID services); and Sensor networks (interoperability between wireless and Internet-based sensing).

Dr. Qusay Mahmoud
Software systems; Web engineering; Mobile computing; and Engineering education.

Dr. Masoud Makrehchi
Natural language processing; Artificial intelligence; Machine learning; Text and data mining; Social computing; Mining social networks and complex systems; Network science; and Moral AI.



ELECTRICAL ENGINEERING



Dr. Min Dong
Statistical signal processing for communications; Communication systems and networks; and Learning, optimization, and control applications in cyber-physical systems.

Dr. Mikael Eklund
Autonomous systems (robotic vehicles, smart sensors for assisted living); Nonlinear system identification and control; Health informatics; and Pervasive and mobile computing.

Dr. Walid Morsi Ibrahim
Smart grid: Design, analysis, operation management and control; Signal processing and data analytics of power systems; and Automation, protection and management of power systems.

Dr. Ruth Milman
Systems control theory; Model predictive control systems; Optimization; Nonlinear control; Constrained systems; and Control systems.

Dr. Jing Ren
Haptics and virtual reality; Robotics and control; Image processing; and Soft computing.

Dr. Langis Roy
International wireless sensor technology; Biotechnology; Electrical Engineering; Higher education; Semiconductors; and Wireless Technology.

Dr. Shahram ShahbazPanahi
Array processing; Co-operative communications; Detection and estimation; Dynamic spectrum access; Smart antennas; Statistical signal processing; and Wireless communications.

Dr. Tarlochan Sidhu
Smart grid; Power system protection and automation; and Renewable energy systems.

Dr. Vijay Sood (Professor Emeritus)
HVDC and FACTS controllers for power transmission systems; Modelling of power electronics converters; and Control and protection of power systems.

Dr. Ying Wang
RF/Microwave circuits and Systems; Millimeter-wave technology; Antennas and antenna arrays; Microwave filters and multiplexers; and Computer-aided design of RF circuits.

Dr. Sheldon Williamson
Autonomous mobility/transportation; Batteries; Charging electric energy storage systems; Electric machines; Motor drives; Power electronics; Renewable energy systems; and Transportation electrification.

Dr. Mohamed Youssef
Propulsion Systems for the automotive and innovative technologies like hyperloop; Power train for new drives like water pumps; Railway electromagnetic compatibility (EMC); Railways traction substation design planning, and commissioning; Power electronics applications for the information technology (IoT); Power electronics applications in the innovative renewable energy resources; Power supply design for the oil/gas; and Power systems operation and stability.

ENERGY AND NUCLEAR ENGINEERING

Dr. Kirk Atkinson
Nuclear engineering; Reactor physics; Small modular reactors (SMRs); Radiation science; Radiation biophysics; Radiation risk assessment; Microfocus x-ray spectroscopy; and High-performance computing.

Dr. George Bereznai (Professor Emeritus)
Computer control of nuclear power plants; Educational technology; and Real-time simulation.

Dr. Hossam Gaber
Resilient smart energy grids and micro energy grids planning, control, and protection; Advanced plasma generation and application on fusion energy; Advanced safety and control systems for nuclear power plants; Safety engineering, fault diagnosis & real time simulation; Risk-based energy conservation, smart green buildings; Process systems; and Engineering of energy and nuclear facilities, and oil & gas production plants.

Dr. Glenn Harvel
Diagnostic techniques; Energy systems; Instrumentation and multiphase flow; Nuclear plant aging and design; Small reactor technology; Neutron radiography, ultrasonics, capacitance-based techniques; ElectroHydroDynamics (EHD) techniques; and Radiography.

Dr. Daniel Hoornweg
Natural gas as a transportation fuel; Energy systems; and Sustainable cities.

Dr. Brian Ikeda
Corrosion of materials in molten fluoride salts; Corrosion of nuclear waste container materials; Electrochemical and physical degradation of fluorine anodes; Localized corrosion of metals at elevated temperatures; Stress-assisted corrosion cracking of metals; Long-term performance assessment of materials; and Radioactive waste management.

Dr. Matthew Kaye
Applied thermodynamics; Nuclear materials; High-temperature materials chemistry; Aqueous chemistry; and Physical metallurgy and welding issues.

Dr. Lixuan Lu
Nuclear power plant instrumentation and control; Reliability and safety assessment; Networked control systems; Risk-informed applications; and Safety systems.

Dr. Rachid Machrafi
Applied radiation science; Radiation detection for nuclear security and non proliferation; ADS systems for energy production and nuclear waste transmutation; Monte Carlo simulation and modelling; Space radiation (radiation environment aboard space crafts); and Educational technology.

Dr. Jennifer McKellar
Life cycle assessment; Life cycle costing; Real options analysis; and Expert elicitation.

Dr. Eleodor Nichita
Mathematical modelling and numerical methods; Neutron and radiation transport; Neutronic design and analysis methods for advanced nuclear reactors; Nuclear reactor kinetics and control; and Production of radionuclides.

Dr. Igor Pioro
Nuclear engineering (thermalhydraulics of nuclear reactors and Generation IV nuclear-reactor concepts); Thermal sciences (boiling, forced convection including supercritical pressures, etc.); and Heat engineering (heat exchangers, two-phase thermosyphons, heat-recovery systems, etc.).

Dr. Akira Tokuhiro
Nuclear systems design; nuclear engineering; Nuclear reactor safety; Energy and resource issues; Big data analytics; Computational fluid dynamics; Convective heat transfer; Experiments and measurement; Modelling of complex systems; Thermal hydraulics; and Ultrasonic and particle velocimetry.

Dr. Anthony Waker (Professor Emeritus)
Nuclear instruments and methods; Experimental microdosimetry and its applications; Neutron monitoring, spectrometry and dosimetry; Low energy X-ray and beta particle dosimetry and microdosimetry; and Radiation effects on cellular, subcellular and organized tissue.

Dr. Edward Waller
Applied health physics; Environmental impact of radionuclides; Internal and external dosimetry; Non-intrusive investigation; Nuclear security and CBRN counter-terrorism; Radiation detection; Risk analysis; and Threat detection.

MECHANICAL AND MANUFACTURING ENGINEERING

MECHANICAL ENGINEERING

Dr. Martin Agelin-Chaab
Bluff body/ground vehicle aerodynamics; Turbulent flows and jets; Vehicle and battery thermal analyses; and Sustainable energy systems.

Dr. Ibrahim Dincer
Drying; Energy and exergy analyses; Energy conversion and management; Heat and mass transfer; Hydrogen and fuel cell systems; Refrigeration; Renewable energies; Thermal energy storage; and Thermodynamics.

Dr. Ebrahim Esmailzadeh (Professor Emeritus)
Mechanical vibration; Active vibration control; Nonlinear vibrations; Vehicle dynamics; Structural dynamics; Nonlinear and discrete control systems; and Dynamics and vibration of MEMS and NEMS.

Dr. Horia Hangan
Fluid mechanics; and Turbulence with applications in wind engineering, automotive and aerospace.

Dr. Tao Liu
Computational biomechanics; Footwear Science; Wearable Technology; and Assistive Devices.

Dr. Brendan MacDonald
Fluid mechanics; Thermodynamics; Sustainable energy; Stirling engines; External heat engines; Microfluidics; and Capillary-driven Flows.

Dr. Atef Mohany
Aeroacoustics; Fluid-structure interaction; Flow-induced vibration and noise; Turbulent flows; Vibration and structural dynamics; and Acoustics and noise control.

Dr. Bale Reddy
Biomass combustion and gasification; Fluidized bed combustors; Combined cycle power generation; Exergy analysis; Thermal design and optimization; Cogeneration; Waste heat recovery; Heat transfer; Advanced energy systems; Advanced power plant cycles; Gas-solid flows in advanced combustors; Energy conservation; and Solar energy.

Dr. Marc Rosen
Polygeneration (cogeneration, trigeneration, etc.); District energy; Efficiency improvement; Electricity generation; Energy; Environmental impact assessment and reduction; Exergy analysis; Geothermal energy; Heat transfer; Hydrogen energy and fuel cells; Integrated energy systems; Modelling and simulation of energy systems; Renewable energy; Solar energy; Sustainable energy and sustainability; Wind energy; Thermal energy storage; and Thermodynamics.

Dr. Zia Saadnatnia
Smart Structures and Materials; Nonlinear Vibration and Structural Dynamics; Energy Harvesting; Sensors and Actuators; and Biomedical Devices.

MANUFACTURING ENGINEERING

Dr. Jana Abou-Ziki
Spark assisted chemical engraving (SACE); Hybrid additive-subtractive micro-manufacturing; Surface functionalization; Microfluidic devices; Advanced manufacturing; and Electroplating and electroforming of 3D printed parts.

Dr. Ahmad Barari
Advanced manufacturing technologies; Digital Manufacturing; Precision manufacturing; Measurement uncertainty; 3D coordinate metrology; Additive manufacturing and rapid prototyping of sculptured surfaces; Manufacturing surface integrity; Surface quality; Surface tribology; Reverse engineering; Surface reconstruction; Structural design optimization; Topology optimization; and FEA-Based design optimization.

Dr. Ramona (Haniyeh) Fayazfar
Advanced manufacturing (additive manufacturing, micro and nano fabrication); Smart materials (Nanostructured composites/hybrid materials, multifunctional composites); Advanced coatings and surface engineering; Electrochemical synthesis of nanostructured materials; Electro catalysts and energy storage devices (batteries, supercapacitors); and Biosensors and wearables for point-of-care diagnostics and health monitoring.

Dr. Ali Hosseini
Manufacturing and metal cutting; Design and optimization; Modelling and simulation of machining operations; Machining difficult-to-cut materials; Surface integrity; and Material behavior.

Dr. Amirkianoosh Kiani
Laser materials processing; Micro/nano manufacturing; Nano energy materials; Nano opto-electronic materials; and Nano sensing materials.

Dr. Hossam Kishawy
Manufacturing; High-speed machining; Modelling and optimization; Finite element modelling; and Residual stresses and stress analysis.

Dr. Remon Pop-Iliev
Processing functionally graded polymeric composites and nanocomposites; Fabrication of biodegradable nanocomposites for bone tissue regeneration; Manufacturing multifunctional nanocomposite fibers; Rapid rotational foam molding; and Innovative design engineering education.

Dr. Ghaus Rizvi
Polymers and composites processing and characterization; Smart and advanced materials; Compounding of colours in plastics; Wood-plastic composites; "Green" composites; Nano-composites; Processes and materials for tissue scaffolds and skeletal structures; and Corrosion of ceramic coatings.

FACULTY NEWS HIGHLIGHTS

NUCLEAR DESIGN AND DECOMMISSIONING LAB

The Nuclear Design and Decommissioning lab studies the development of designs, methods, and techniques for building better nuclear reactors and reducing their risks at the end of their life. A key element in the development of new designs is the simplification of the design to allow for easier disassembly. This includes choosing better materials and creating designs that are easier to manage. Currently, several test facilities are used to study the behaviour of systems including airlocks and flow loops and using machine learning tools to simplify the systems.

A second major area of development is decommissioning. At the end of the reactor life, the disassembly process can create loose radioactive particles. Studies using advanced gels and electrostatic techniques are finding that these particles can be captured reducing the risk to workers and the risks to the environment. The gels in particular have also been found to allow for very large reductions in waste volumes reducing the overall cost of some decommissioning processes.

By combining the two fields, the lessons learned from the decommissioning studies can be applied to improvements in future design. Concrete studies are demonstrating possible ways to reduce activation of the concrete such that disassembly would be a lower cost. With our international partners, we are expanding the capabilities of the nuclear industry to ensure safe and reliable designs.

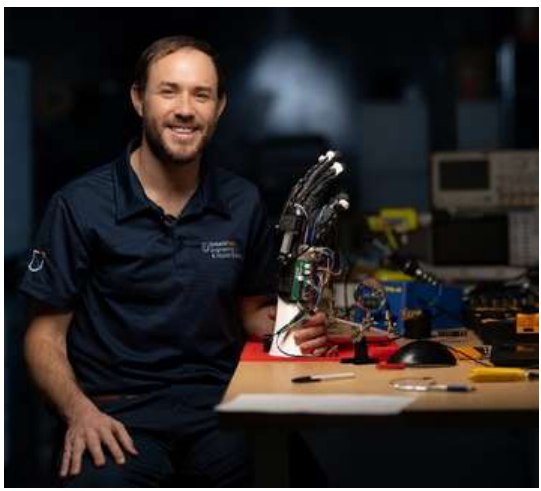
CLEAN ENERGY RESEARCH LABORATORY (CERL)

The Clean Energy Research Laboratory (CERL), situated on Ontario Tech University's north Oshawa campus, is a world-leading facility for clean energy research, innovation and technology development, driven by exergetic passion and commitment. The works conducted in the CERL are diverse and cover numerous subjects, including hydrogen and ammonia energy technologies (from production to utilization), alternative and sustainable fuels, renewable energy technologies, decarbonization and climate change, carbon capturing and utilization technologies, energy storage technologies, fuel cells and electrolysers, district energy solutions specifically for Indigenous Communities, integrated energy systems, waste to energy and hydrogen technologies, clean power generation technologies, and thermal management of electric vehicles. Such leading works in the CERL are considered a significant contributor to international efforts to combat climate change, enhance energy security and foster sustainable economic development. At the centre of CERL's strategic direction, clean hydrogen appears to be a main focus with cutting -edge innovation and technologies, and clean hydrogen production through various newly introduced technologies where they are driven by electricity, heat, light, microwave, ultrasound, plasma, biomass, etc., is considered a prime focus and positioning the lab as one of the world-leading centers. Some of their recent projects include:

- Innovative Waste to Hydrogen Energy Systems
- Innovative Thermochemical Cycles
- Innovative Solar Hydrogen Production
- Clean Methane and Methanol Production

BIOMEDICAL ROBOTICS LABORATORY

The BioRobotics Laboratory at Ontario Tech University creates open-source soft robotic exoskeletons and assistive devices that help older adults and people with disabilities live independently and rehabilitate after their injury. Our team utilizes a user-inclusive design approach in which health practitioners, older adults and stroke and spinal cord injury survivors work with engineering students to ideate rehabilitation solutions and evaluate their efficacy through clinical trials. We train graduate students in robot design, artificial intelligence and human neurobiomechanics and utilize this knowledge to develop actuation mechanisms and control systems that are personalized and adaptive to the users' abilities and needs. Our HERO Glove hand exoskeleton is one such innovation that helps users to move their paralyzed hands. This device senses the user's intention to move through their brain, muscle and motion signals and provides motion assistance as needed to assist the user as they complete their rehabilitation exercises and everyday tasks. We are now integrating the HERO Glove into a telerehabilitation program and completing a clinical trial to evaluate its ability to increase the access and efficacy of rehabilitation in Canada. In addition, our team is developing lower limb exoskeletons that help people sit to stand and walk independently and assistive robots that provide hands-free methods for wheelchair users to interact with the world. The OntarioTech BioRobotics Laboratory is directed by Dr. Aaron Yurkewich, P.Eng, Assistant Professor in the Department of Automotive and Mechatronics Engineering.



ADVANCED REQUIREMENTS AND SOFTWARE ENGINEERING LAB

Since joining Ontario Tech University in July 2021, Dr. Sanaa Alwidian has been developing a research program that integrates technical excellence, interdisciplinary collaboration, and a strong commitment to social relevance. As the Director of the Advanced Requirements and Software Engineering (ARiSE) Lab, her work focuses on advancing human-centric requirements engineering, AI-enabled solutions for software analysis, and the design of software systems that serve the public good. Her research addresses how software engineering can be both socially responsive and ethically informed, with emphasis on Goal-Oriented Requirements Engineering (GORE), software evolution, and the application of artificial intelligence to enhance decision-making in complex software systems.

Her scholarly contributions include over 45 peer-reviewed publications in high-impact journals and premier conferences such as IEEE Access, Sensors, ICSE, RE, MODELS, and SAM, earning two Best Paper Awards. She has secured nearly $700,000 in research funding from agencies including NSERC, SSHRC, and OVIN, supporting projects ranging from autonomous vehicle requirements to equity-focused cybersecurity and STEM inclusion initiatives. Through collaborations with industry partners such as General Motors, Team Eagle, LeddarTech and PoolPal, her work remains deeply connected to practical applications while contributing to the advancement of trustworthy AI, adaptive systems, and software accountability.

Dr. Alwidian's research program is enriched by her commitment to mentorship and teaching excellence. She has supervised a diverse group of graduate and undergraduate students, many from equity-deserving groups, providing them with opportunities to engage in real-world projects, publish their work, and collaborate with industry. Her dedication to student success and scholarly excellence has been recognized through receiving the Student Choice Teaching Award for the 2024 academic year, receiving FEAS Research Award – Early Career Category, 2025, and the nominations for both the Early Career Teaching Award and the Tim McTiernan Student Mentorship Award.

RESEARCH FACILITIES AND LABORATORIES

ONTARIO POWER GENERATION ENGINEERING BUILDING (OPG)

This 40,000-square-foot, three-storey OPG Engineering Building has 17 laboratories, including state-of-the-art facilities and equipment for teaching and research. The advanced learning areas include a rapid prototyping and manufacturing lab, a combustion and engines lab, a mechatronics and robotics lab, and an emerging energy systems lab with solar, wind, hydrogen and fuel-cell technology.

ENERGY RESEARCH CENTRE (ERC)

ERC is a 9,290 square-metre building with unique capabilities and facilities in geothermal, hydraulic, hydrogen, natural gas, nuclear, radiation, solar and wind energy technologies. The centre has space and offices for faculty, staff and graduate students, as well as research labs for computational simulations in various engineering disciplines, including facilities for electrical power systems and “smart grid” research. The building features a glass-covered four-storey Atrium, a 72-seat lecture theatre, as well as numerous other labs and student-study breakout rooms.

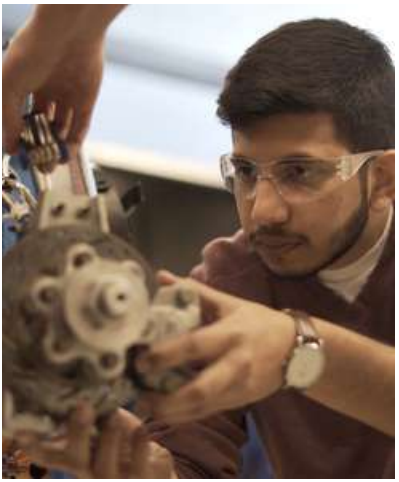
GENERAL MOTORS OF CANADA AUTOMOTIVE CENTRE OF EXCELLENCE (ACE)

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 Ontario Tech University and is an independent, commercial operation. ACE is divided into two distinct areas: a core research facility and an integrated research and training facility. The core research facility offers a range of full-sized test chambers that allow for full climatic, structural durability and lifecycle testing. The signature test chamber is one of the world's largest and most sophisticated climatic wind tunnels. The wind tunnel has a sizeable yawing chassis dynamometer (road simulator) that can, for the first time anywhere, test properties in crosswinds. Among the other chambers is a climatic four-post shaker that can test a vehicle's ability to handle a wide range of road conditions in the Arctic or high desert.

CLEAN ENERGY RESEARCH LABORATORY (CERL)

CERL is a cutting-edge laboratory that pioneers clean energy research and discovers major new energy solutions to the problem of climate change. CERL's mission is to develop clean energy technologies and move them from the laboratory to commercial and industrial applications. Researchers are working on the world's first lab-scale demonstration of a copper-chlorine cycle for thermochemical water splitting and nuclear hydrogen production. Using nuclear, solar or other heat sources (such as waste heat from industrial plant emissions), the Cu_CI cycle promises to achieve higher efficiencies, lower environmental impact and lower cost of hydrogen production than any other existing technology.

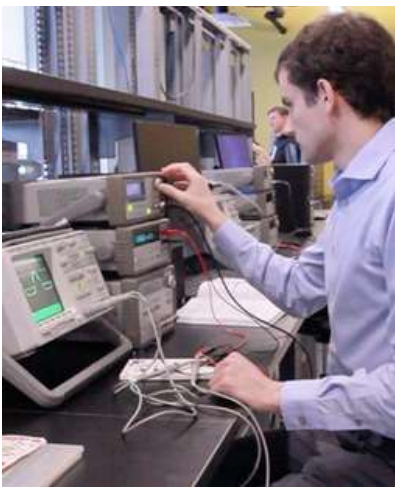
ASSOCIATED LABORATORIES BY DEPARTMENT



AUTOMOTIVE AND MECHATRONICS ENGINEERING

Associated research laboratories include:

- Autonomous Vehicle and Electro-Hydraulic Control (AVEC) laboratory;
- General Robotics and Autonomous Systems and Processes (GRASP Laboratory;
- Mechatronics and Robotics Systems (MARS) Laboratory; and
- Automotive Centre of Excellence (ACE).



ELECTRICAL, COMPUTER AND SOFTWARE ENGINEERING

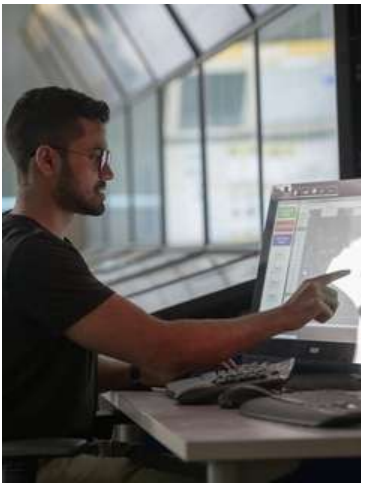
Associated research laboratories include:

- Energy Safety and Control (ESCL) Laboratory;
- Energy Research Centre (ERC);
- Internet of Things (IoT) Research Laboratory;
- Real-Time Embedded Software (RTEMSOFT) Research Laboratory;
- Borehole Thermal Energy Storage System; and
- Power Electronics and Drives Applications Laboratory (PEDAL).

ENERGY AND NUCLEAR ENGINEERING

Associated research laboratories include:

- Health Physics and Environmental Safety Research Group;
- Nuclear Fuels and Materials Group;
- Smart Energy Systems Laboratory (SELS);
- Advanced Nuclear Computation Laboratory;
- Aerosol and Radiation Research Laboratory;
- Corrosion and Waste Management Laboratory;
- Energy Safety and Control Laboratory;
- Nuclear Instruments and Methods; Research and Non-Destructive Testing Lab; and
- Special Imaging Techniques Laboratory.



MECHANICAL AND MANUFACTURING ENGINEERING

Associated research laboratories include:

- Advanced Digital Design, Manufacturing and Metrology (AD2M) Laboratories;
- Clean Energy Research Laboratory; (CERL);
- Macdonald Laboratory for Sustainable Energy, FLuidics and Phase Change;
- Machining Research Laboratory (MRL); and
- Silicon Hall Laser, Micro/Nano Fabrication Laboratory.

SELECTED PUBLICATIONS

AUTOMOTIVE AND MECHATRONICS ENGINEERING

AUTOMOTIVE ENGINEERING

Dr. Moustafa El-Gindy

H. Fathi, Z. El-Sayegh, J. Ren, and **M. El-Gindy.** (2024.) "Analysis of Tire-Road Interaction: A Literature Review." *Machines 12, no. 11 (2024): 812.*

A. Ly, C. Yoon, A. Tariq, G. Rizvi, Z. El-Sayegh, and **M. El-Gindy.** (2025). "Constitutive Modelling and Validation of a Racing Slick Tire Model in A Finite Element Environment". *Machines (under preparation 2025).*

M. Peiris, H. Lang, and **M. El-Gindy**. (2024). "Kalman filter-based sensor fusion for Ackermann steering mobile robots". *Journal of Physics: Conference Series 2811 (2024) 012004 IOP Publishing. doi:10.1088/1742-6596/2811/1/012004.*

W. Collings, Z. El-Sayegh, J. Ren, and **M. El-Gindy**. (2024). "Modelling of Truck Tire–Rim Slip on Sandy Loam Using Advanced Computational Techniques". *Geotechnics 2024, 4, 229–241. https://doi.org/10.3390/geotechnics4010012*.

J. Kim, **M. El-Gindy**, and Z. El-Sayegh. (2024). "Simulation and Validation of an 8 × 8 Scaled Electric Combat Vehicle." *Machines 2024, Vol. 12, No. 2, pp. 146-173. https://doi.org/10.3390/machines12020146*.

Dr. Zeinab El-Sayegh

H. Fathi, **Z. El-Sayegh**, and J. Ren. (2025). "Temperature-Dependent Analysis of the Tire–Road Interaction Characteristics for a Passenger Car Tire Using Finite Element Analysis." *SAE International Journal of Passenger Vehicle Systems 18, no. 15-18-02-0010.*

Z. El-Sayegh. (2025). "Influence of sand moisture content on mixed service truck tire performance using advanced hybrid techniques." *Proceedings of the Institution of Mechanical Engineers, Part D: Journal of Automobile Engineering 239, no. 2-3: 736-747.*

C. Sidhu and **Z. El-Sayegh**. (2024). "Comparative analysis of non-pneumatic tire spoke designs for off-road applications: A smoothed particle hydrodynamics perspective." *Geotechnics 4, no. 2: 549-563.*

H. Fathi, A. Ly, T. Pathak, and **Z. El-Sayegh**. (2024). "Sensitivity analysis of truck tire tread material properties for on-road applications." *Transactions of the Canadian Society for Mechanical Engineering 48, no. 3: 341-354.*

H. Fathi, **Z. El-Sayegh**, and M. H. R. Ghoreishy. (2024). "Prediction of rolling resistance and wheel force for a passenger car tire: A comparative study on the use of different material models and numerical approaches." *Proceedings of the Institution of Mechanical Engineers, Part D: Journal of Automobile Engineering (2024): 09544070241244556.*

Dr. Yuping He

A. Ajorkar and **Y. He.** (2025). "Design of autonomous driving controls for multi-trailer articulated heavy vehicles", *Journal of Vibration and Control, First published online, January 16, 2025, 1-20. https://doi.org/10.1177/10775463251313657*

C. Mao, **Y. He**, and M. Agelin-Chaab. (2024). "A design method for road vehicles with autonomous driving control", *Actuators, 2024, 13(11), 427. https://doi.org/10.3390/act13110427*

T. Sharma and **Y. He**. (2024). "On trade-off relationship between static and dynamic lateral stabilities of articulated heavy vehicles", *Design, 2024, 8(5), 103. https://doi.org/10.3390/designs8050103*

T. Sikder, S. Kapoor, Q. Zhou, Y. Jiang, and **Y. He**. (2024). "An active trailer steering design for long combination vehicles", *Mechanics Based Design of Structures and Machines, 2025, Vol. 53, No. 4, pp. 2548-2581. https://doi.org/10.1080/15397734.2024.2411262*

Q. Zhou, H. Zhang, **Y. He**, Y. Su, Y. Jiang, and S. Zheng. (2024). "A directional-performance control design for articulated heavy vehicles with extendable-trailers", *Vehicle System Dynamics, First published online, October 25, 2024. https://doi.org/10.1080/00423114.2024.2419460*

Dr. Xianke Lin

S. Hossain, and **X. Lin**. (2024). "Enhancing mapping precision in autonomous delivery robots through tightly-coupled fusion of uncertainty-aware GPS and LiDAR odometry." *International Journal of Intelligent Robotics and Applications (2024): 1-15.*

O. A. Khiyavi, J. Seo, and **X. Lin**. (2024). "New design of an electrical excavator and its path generation for energy saving and obstacle avoidance." *Vehicles 6, no. 2 (2024): 832-849.*

J. Gan, S. Li, **X. Lin**, and X. Tang. (2024). "Multi-agent deep reinforcement learning-based multi-objective cooperative control strategy for hybrid electric vehicles." *IEEE Transactions on Vehicular Technology (2024).*

Z. Bao, H. Lang, and **X. Lin**. (2025). "Efficient Sidewalk Route Planning on Aerial Images with Cost-Based A* and Mini-Max Objective Function". *No. 2025-01-8032. SAE Technical Paper, 2025.*

S. Hossain, and **X. Lin**. (2025). "RGB2BEV-Net: A PyTorch-Based End-to-End Pipeline for RGB to BEV Segmentation Using an Extended Dataset for Autonomous Driving". *No. 2025-01-8023. SAE Technical Paper, 2025.*

MECHATRONICS ENGINEERING

Dr. Meaghan Charest-Finn

M. Charest-Finn and R. Dubay. (2025). "General Industrial process optimization method to leverage machine learning applied to injection molding". *Expert Systems. 42(2): e13769.*

M. Charest-Finn and S. Pejhan. (2024). "Model Predictive Control used in Passenger Vehicles: An Overview". *Machines MDPI. 12(11): 773.*

D. Landori-Hoffmann, J. Mihalache, O. Aziegbe, M. Vella, **M. Charest-Finn,** and A. Yurkewich. (2025). "HERO Glove Insight: Utilizing Computer Vision and Force Sensors for Object-Specific Force Control". *IEEE International Consortium for Rehabilitation Robotics, Chicago, USA*

S. Mohsini, **M. Charest-Finn**, and R. Dubay. (2025). "Design and Construction of a Cost-Effective Dexterous Robotic Hand for Research and Development". *IEEE International Systems Conference 2025, Montreal, Canada*

Dr. Haoxiang Lang

Z. Bao, **H. Lang**, and X. Lin. (2025). "Sidewalk Extraction on Aerial Images With Deep Learning and Path Planning Algorithm," *IEEE Canadian Journal of Electrical and Computer Engineering, Vol. 48, No. 2.*

Y. Li, **H. Lang**, and Y. Wang. (2025). "Vision-based Motion Control for an 8-DOF Robotic Manipulator," *The 19th annual IEEE International Systems Conference, Montreal, QC, Canada.*

Z. Bao, **H. Lang**, and X. Lin. (2024). "Efficient Sidewalk Route Planning on Aerial Images with Cost-Based A* and Mini-Max Objective Function," *WCX SAE World Congress Experience, 2024.*

O. Joney, **H. Lang**, and Y. He. (2024). "Modelling and Validation of Multi-trailer Articulated Heavy Vehicles," *CSME Congress, Toronto, ON, Canada.*

X. Liu, **H. Lang**, and J. Ren. (2024). "Cross-Platform Kinematics Solver Architecture: A Matlab-Centric Approach in a ROS Ecosystem," *CSME Congress, Toronto, ON, Canada.*

Dr. Scott Nokleby

C. Baird and **S. B. Nokleby.** (2025). "Extended Testing of a Map Merging Algorithm for Long-Term Autonomous Navigation of Mobile Robots". *Proceedings of the 2025 CCToMM Symposium on Mechanisms, Machines, and Mechatronics, June 19-20, Ottawa, Canada, 12 pages.*

C. Baird and **S. B. Nokleby**. (2024). "Effective Map Merging for Long-Term Autonomous Navigation," *ASME Journal of Autonomous Vehicles and Systems, Vol. 4, No. 4, pp. 041001-1 to 041001-11.*

C. Baird and **S. B. Nokleby**. (2024). "Autonomous Firefighting Using a Quadruped Robot," *Transactions for the Canadian Society for Mechanical Engineering, Vol. 48, No. 4, pp. 605-616.*

R. Troy and **S. B. Nokleby**. (2024). "Design and Preliminary Testing of an Aerial Landing Dock for Mobile Robots for Multi-Modal Robotic Systems," *Proceedings of the 2024 IEEE International Conference on Smart Mobility, Niagara Falls, Canada, 7 pages.*

C. Baird and **S. B. Nokleby**. (2024). "Optimal Frontier Exploration for Maximum Information Gain," *Proceedings of the 2024 Canadian Society for Mechanical Engineering International Congress, Toronto, Canada, 5 pages.*

Dr. Shabnam Pejhan

S. Martin, S. B. Taylor, **S. Pejhan**, B. L. Shideler, R. Ogrin, and R. Begg. (2025). "Visual Feedback for Increasing the Accuracy of Foot Landing in Older people with Diabetes mellitus: A cross-sectional study". *PLOS ONE, 2025 May 21; 20 (5) :e0323569. https://doi.org/10.1371/journal.pone.0323569*

M. Charest-Finn and **S. Pejhan**. (2024). "Model Predictive Control Used in Passenger Vehicles: An Overview". *Machines, 12(11), 773 https://doi.org/10.3390/machines12110773*

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Dr. Mitchell Rushton

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RECENT SELECTED RESEARCH GRANTS AND CONTRACTS

AUTOMOTIVE ENGINEERING

Dr. Moustafa El-Gindy

Partnership - Volvo Group North America **($852,600)**

Discovery Grant - NSERC **($195,000)**

Dr. Zeinab El-Sayegh

Discovery Grant - NSERC **($135,000)**

Dr. Yuping He

Discovery Grant - NSERC **($192,000)**

Dr. Xianke Lin

Discovery Grant - NSERC **($189,000)**

Accelerate Entrepreneur - Mitacs **($67,500)**

MECHATRONICS ENGINEERING

Dr. Meaghan Charest-Finn

Grant - Eigen Innovations **($30,000)**

Accelerate - Mitacs **($90,000)**

Dr. Haoxiang Lang

Discovery Development Grant - NSERC **($44,000)**

Ontario Tech University - Contribution **($5,000)**

Dr. Scott Nokleby

Discovery Development Grant - NSERC **($44,000)**

Institutional Matching - Ontario Tech **($5,000)**

Accelerate - Mitacs **($120,000)**

Dr. Mitchell Rushton

Discovery Grant - NSERC **($140,000)**

Discovery Launch Supplement - NSERC **($12,500)**

Transfer of Funds - TMU **($17,500)**

Dr. Jaho Seo

Discovery Grant - NSERC **($138,000)**

Partnership - KIMM **($20,084.28)**

Partnership - SurroMind **($295,744.28)**

Partnership - City of Surrey **($44,931.60)**

SOFTWARE ENGINEERING

Dr. Sanaa Alwidian

Regional Future Workforce Program (RFW) - Empowering Equity in STEM Pilot Program - OCI-OCE **($125,000)**

OVIN Content Partnerships Program - OCI-OCE **($100,000)**

Dr. Akramul Azim

Discovery Grant - NSERC **($161,000)**

Alliance - NSERC **($90,000)**

Partnership - eCamion Inc **($100,000)**

Partnership - GlassHouse Systems **($458,850)**

Partnership - Team Eagle Ltd. **($79,800)**

Dr. Mohamed El-Darieby

Partnerships - LeddarTech Inc. **($10,000)**

Discovery Grant - NSERC **($103,863)**

OVIN Automotive Innovation Challenge - OCI-OCE **($100,000)**

Dr. Khalid Elgazzar

Discovery Grant - NSERC **($161,000)**

Chair, NSERC Tier 2 - CRC **($500,000)**

Infrastructure Operating Fund - CFI **($4,500)**

Innovation Fund - CFI **($15,000)**

ORF - Large Infrastructure Funds - MCU **($15,000)**

Highway Infrastructure Innovation Funding Program - MTO **($202,500)**

Alliance - NSERC **($30,000)**

Collaborate 2 Commercialize - OCI-OCE **($30,000)**

Partnership - PoolPal Inc. **($20,000)**

OVIN Content Partnerships Program - OCI-OCE **($100,000)**

Dr. Ramiro Liscano

Discovery Grant - NSERC **($138,000)**

CAS University Research - IBM Center of Advanced Studies **($102,000)**

Partnership - IBMC **($60,000)**

Alliance - NSERC **($118,900)**

Dr. Qusay Mahmoud

Discovery Grant - NSERC **($120,000)**

Promo Science - NSERC **($600,000)**

Dr. Masoud Makrehchi

Discovery Grant - NSERC **($120,000)**

ELECTRICAL ENGINEERING

Dr. Min Dong

Discovery Grant - NSERC **($330,000)**

Dr. Walid Morsi Ibrahim

Discovery Grant - NSERC **($265,000)**

Dr. Jing Ren

Discovery Grant - NSERC **($140,000)**

Dr. Langis Roy

Partnership - Magna Exteriors, Inc. **($48,750)**

TalentEdge Internship Program - OCI-OCE **($30,000)**

TalentEdge Fellowship Program - OCI-OCE **($35,000)**

Discovery Grant - NSERC **($165,000)**

Dr. Shahram ShahbazPanahi

Discovery Grant - NSERC **($210,000)**

Alliance - NSERC **($200,000)**

Partnership - Ericsson Canada Inc. **($100,000)**

Accelerate - Mitacs **($100,000)**

Dr. Tarlochan Sidhu

Discovery Grant - NSERC **($212,000)**

Dr. Vijay Sood

Discovery Grant - NSERC **($165,000)**

Accelerate - Mitacs **($20,000)**

Partnerships - Sunnybrook Health Sciences Centre **($10,000)**

Dr. Ying Wang

Discovery Development Grant - NSERC **($40,000)**

Contribution - Ontario Tech **($5,000)**

Dr. Sheldon Williamson

Chair, NSERC Tier 2 - CRC **($500,000)**

Partnership - Martinrea International **($200,000)**

Accelerate - Mitacs **($20,000)**

Alliance Missions - NSERC **($140,000)**

Discovery Grant - NSERC **($468,000)**

Partnership - IntellectuLogy **($17,500)**

Accelerate - Mitacs **($75,000)**

Alliance - NSERC **($160,000)**

Partnership - Wireless PNC **($65,000)**

Partnership - Customachinery **($15,000)**

Accelerate - Mitacs **($30,000)**

Partnership - QED BATTERY CORP **($105,000)**

Partnership - CTNS **($22,000)**

Dr. Mohamed Youssef

Discovery Development Grant - NSERC **($44,000)**

Contribution - Ontario Tech **($5,000)**

Research Grand - Imperial Oil of Canada, Ltd. **($50,000)**

ENERGY AND NUCLEAR ENGINEERING

Dr. Kirk Atkinson

Discovery Grant - NSERC **(192,000)**

Industrial Research Chair - NSERC **($385,000)**

Faculty Funding - Ontario Tech **($281,750)**

ORF - Research Excellence - MEDJCT-MRIS-MRI-MEDI **($511,000)**

NSERC Alliance - NRCan SMR Opportunity Expression of Interest (EOI) - NRCAN **($179,300)**

Alliance - NSERC **($358,600)**

Dr. Hossam Gaber

Discovery Grant - NSERC **($215,000)**

Accelerate - Mitacs **($90,000)**

Partnership - Pro-Flange Limited **($90,000)**

Partnership - UNENE **($84,000)**

Climate Action Awareness Fund - ECCC **($202,020)**

CNS Small Modular Reactors Research Grant Initiative - NSERC **($343,000)**

Dr. Glenn Harvel

Discovery Grant - NSERC **($195,000)**

Sponsored Research Agreement - UNENE **($141,000)**

Sponsored Research Agreement - UNENE **($141,000)**

CNSC Small Modular Reactors Research Grant Initiative - NSERC **($360,000)**

Dr. Lixuan Lu

Alliance - NSERC **($168,000)**

Collaborative Research and Development - UNENE **($84,000)**

Rachid Machrafi

Subatomic Physics Discovery Grant - NSERC **($235,000)**

Dr. Jennifer McKellar

Accelerate - Mitacs **($262,500)**

Partnership - OPG **($262,500)**

Dr. Eleodor Nichita

Discovery Grant - NSERC **($162,000)**

Partnership - COG **($53,000)**

Partnership - COG **($81,000)**

Dr. Akira Tokuhiro

Collaborative Research and Training Experience Program Grant - NSERC **($117,437)**

CNSC Small Modular Reactors Research Grant Initiative - NSERC **($235,400)**

Dr. Edward Waller

Discovery Grant - NSERC **($295,000)**

Alliance - NSERC **($1,019,057)**

Partnership - UNENE **($509,528)**

MECHANICAL ENGINEERING

Dr. Martin Agelin-Chaab

Discovery Grant - NSERC **($230,000)**

JELF - CFI **($180,600)**

OVIN Content Partnerships Program - OCI-OCE **($100,000)**

Collaborate 2 Commercialize - OCI-OCE **($65,000)**

Regional Future Workforce Program (RFW) - Empowering Equity in STEM Pilot Program - OCI-OCE **($125,000)**

Dr. Ibrahim Dincer

Discovery Grant - NSERC **($295,000)**

Admira Dhes Inc. **($21,600)**

Accelerate - Mitacs **($15,000)**

Partnership - Quwa Smart Services Inc. **($15,000)**

Partnership - GreenH2wave **($22,500)**

Accelerate - Mitacs **($90,000)**

Partnership - Viona Consulting Inc. **($100,000)**

Dr. Horia Hangan

Chair, NSERC Tier 1 - CRC **($1,400,000)**

Climate Action Awareness Fund LOI - ECCC **($505,908.07)**

Contribution - Ontario Tech **($45,000)**

Discovery Grant - NSERC **($250,000)**

Dr. Brendan MacDonald

Discovery Grant - NSERC **($162,000)**

Partnership - Gerdau Ameristeel **($37,500)**

Accelerate - Mitacs **($37,500)**

Alliance - NSERC **($75,000)**

Dr. Atef Mohany

Discovery Grant - NSERC **($160,000)**

Partnership - COG **($93,334)**

Alliance - NSERC **($93,333)**

Partnership - COG **($126,000)**

Research Excellence Chair - Ontario Tech **($30,000)**

Partnership - COG **($135,000)**

Dr. Shabnam Pejhan

Fellowship - Age-Well **($10,000)**

Dr. Marc Rosen

Discovery Grant - NSERC **($276,000)**

Dr. Zia Saadatnia

Alliance - NSERC **($60,000)**

MANUFACTURING ENGINEERING

Dr. Jana Abou-Ziki

Discovery Grant - NSERC **($189,000)**

Dr. Ahmad Barari

Discovery Grant - NSERC **($192,000)**

Alliance - NSERC **($60,000)**

Research Excellence Chair - Ontario Tech **($30,000)**

Dr. Ramona (Haniyeh) Fayazfar

Partnership - UWO ($18,000)

Discovery Grant - NSERC **($135,000)**

Accelerate - Mitacs **($30,000)**

Partnership - Cilimont Inc. **($15,000)**

Accelerate - Mitacs **($30,000)**

Partnership - Nidus3D **($15,000)**

Dr. Sayyed Ali Hosseini

Discovery Grant - NSERC **($162,000)**

Partnership - Ekstera Inc. **($30,000)**

Accelerate - Mitacs **($60,000)**

Dr. Amirkianoosh Kiani

Discovery Grant - NSERC **($135,000)**

Accelerate - Mitacs **($22,500)**

Partnership - Nova Graphene **($22,500)**

Alliance - NSERC **($45,000)**

University Research Grant - Imperial Oil of

Canada, Ltd. **($25,000)**

Dr. Hossam Kishawy

Discovery Grant - NSERC **($234,000)**

Dr. Ghaus Rizvi

Discovery Development Grant - NSERC

($40,000)

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