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A NATURAL CHANGEMAKER

University of Windsor
Faculty of Engineering

WE

WE WINDSOR ENGINEERING IS PUBLISHED ANNUALLY BY THE
FACULTY OF ENGINEERING AT THE UNIVERSITY OF WINDSOR

content

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A MESSAGE FROM THE DEAN

Windsor Engineering (WE), our annual magazine, gives us a chance to share the incredible work our students, faculty and alumni are conducting in our own backyard and around the globe.

Like our Hyperloop team, which made it to the finals of Elon Musk's international SpaceX Hyperloop Pod Competition in its first year competing. The team generated extensive community support, including words of encouragement on social media from the Canadian Prime Minister. Or our University of Windsor Space and Aeronautics Team (WinSAT), which finished first in the design review portion of the Canadian Satellite Design Challenge.

Our faculty members and alumni continue to produce innovative work at the forefront of their fields. In this issue of WE, you'll find out how one of our electrical engineering professors hopes to improve the cybersecurity of electric vehicles and an alumna who is reducing the environmental footprint of Canada's largest heavy crude oil and independent natural gas producer.

The Faculty of Engineering believes diversity is essential to creating a healthy and robust dialogue in the engineering workforce. That's why we've taken steps to hire an equity, diversity and inclusion advisor to be an advocate, spokesperson and a champion, who will provide strategic leadership in promoting a faculty-wide culture that values and supports equity, diversity and inclusion. We've also added an international student advisor to provide information and support services to our faculty's growing number of international graduate and undergraduate students. This position will support students with social, financial, health and well-being services from the point of admission to graduation.

Our new Engineering Student Services Support Centre opened its doors this fall. The one-stop hub for students brings together the WINONE Office for First Year Engineering, engineering communication support, counselling, co-op and international student advisors as well as our outreach team to enhance the student experience outside of the classroom and help our students navigate key parts of their academic journey.

We'd like to thank our many supporters for helping us enrich the student experience in the Faculty of Engineering. Your active partnership and investment help us provide an engineering education that extends beyond the traditional classroom.

Sincerely,

Dr. Mehrdad Saif, FCAE, FIET, P.Eng.
Dean, Faculty of Engineering
Professor, Electrical and Computer Engineering

ENGINEERING BY THE NUMBERS

68
outstanding scholars

20+
engineering student clubs

440
student co-op placements

12,320
alumni worldwide

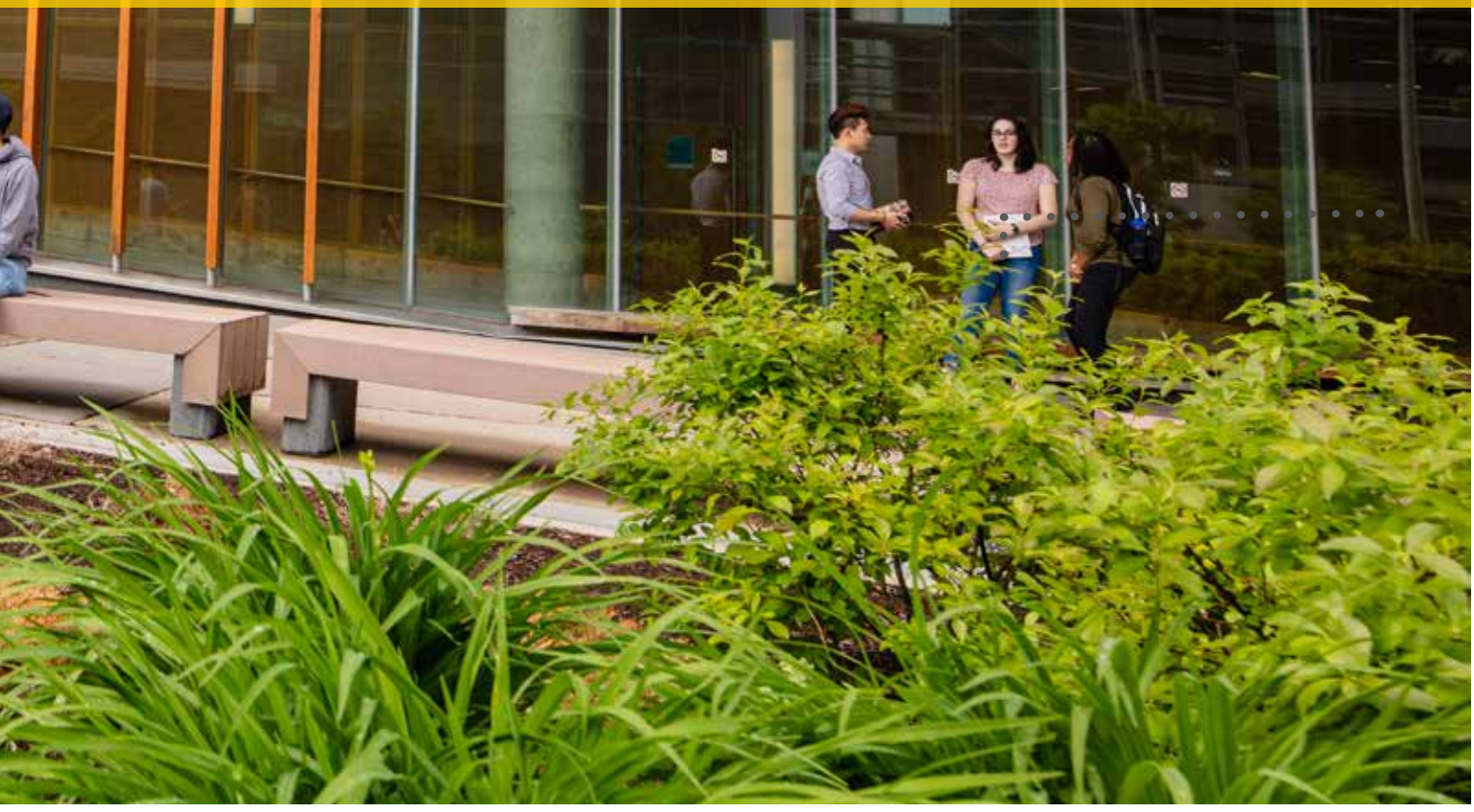
125
faculty and support staff

$846,250
graduate scholarships

74% + 26% = 1,500
domestic | international | undergraduate students

2.15+ million
in undergraduate scholarships

12% + 88% = 1,710
domestic | international | graduate students



DRIVING CYBERSECURITY EVOLUTION

HOW SECURE ARE ELECTRIC VEHICLE CHARGING STATIONS?

COMPANIES ARE WELL AWARE OF THE ENVIRONMENTAL BENEFITS OF ELECTRIFYING VEHICLE FLEETS, BUT HOW MUCH IS KNOWN ABOUT THE SECURITY OF THESE SYSTEMS?

A University of Windsor researcher aims to dig deeper through the investigation of cybersecurity issues that arise when using electric vehicle fleets with battery charging infrastructure.

"The environmental, geopolitical and financial advantages of electric vehicles are well-studied and addressed in many research publications. However, security of these systems is not given the full attention that it requires," says Dr. Mitra Mirhassani, the project lead and associate professor who specializes in electrical engineering.

Amazon announced in fall 2019 the largest order of electric delivery vehicles ever, according to David Clark, Amazon's senior vice president of operations. The world's largest retailer purchased 100,000 electric delivery vans from Rivian, a Michigan-based start-up. While companies like Amazon are making the switch to electric fleets, municipalities are preparing with plans to add infrastructure to accommodate the surge in consumer and corporate investments in alternative fuels. The City of Windsor is looking to set up 11 dual-port electric vehicle (EV) charging stations across the municipality, according to a 2019 city council report.

The most common method of recharging electric vehicles is to use exchange or recharge stations. When the energy resources are converted to electrical systems, security issues come into play, Mirhassani says.

The main components of a charging station include the main board, communication equipment that is connected to a central unit, radio-frequency identification (RFID) readers, and other electronic components such as circuit breakers and electrical measurement systems.

"This means that essentially a computer is placed on the street, with potential access to the smart grid that it is connected to. This creates the potential for weak security points that can provide a hacker with possible access to the primary network."

Once they're in the system, hackers have access to a plethora of information, which can lead to identity and financial theft and Denial of Service (DoS) attacks that can create a disruption in the electrical and power generation systems.

Meitong Pan, a master's student who works with Dr. Mitra Mirhassani in the Analog and Mixed Signal Research Lab, examines an FPGA board used to implement complex digital computations.

Master's students Harikrishan Balagopal and Daisy contribute to the design and safeguarding of hardware chips as part of the research team in the Analog and Mixed Signal Research Lab.

Mirhassani notes some of the weak points in EV charger systems include the physical access, which can be directly accessed through a panel, an open port or wirelessly through its communication lines. She also says the use of RFID access cards provide an easy and convenient way for vehicle operators to access charging stations.

"However, the security level of these cards is very low. An RFID card can be broken in a short time and hence is vulnerable to attacks."

Another weak point is "backdoors" used for maintenance and possible future system upgrades, which are often not protected, she adds.

The three-year project is funded in partnership with the WindsorEssex Economic Development Corporation as part of a FedDev Ontario $5 million investment in community economic development and diversification that supports the Windsor-Essex Region in transitioning from traditional automotive manufacturing to transformative automotive technologies.

Up to $640,000 has been allocated to the University of Windsor and Dr. Mirhassani's work on cybersecurity and automotive technologies.

"This project will help further position Windsor-Essex as the automobility capital of Canada, by building on the automotive history, knowledge and experience of its past to emerge as a cybersecurity powerhouse in automotive technologies," says Stephen MacKenzie, the president and CEO of WindsorEssex Economic Development Corporation. WE

"This project will help further position Windsor-Essex as the automobility capital of Canada, by building on the automotive history, knowledge and experience of its past to emerge as a cybersecurity powerhouse in automotive technologies."

Stephen MacKenzie
President and CEO
WindsorEssex
Economic Development Corporation

WINDSOR PROUD.

uwindsor.ca

“I am a registered nurse, registered pharmacist and local business owner. My journey to becoming a successful healthcare professional started at the University of Windsor’s Faculty of Nursing. The University provided me with a first-class education, stimulated a lifelong commitment to learning, and inspired me to pursue a career path that is focused on building a healthier and more compassionate community. I am proud to be part of the University’s exceptional alumni. We are all Windsor Proud.”

Dorothy Leung, BScN 2008

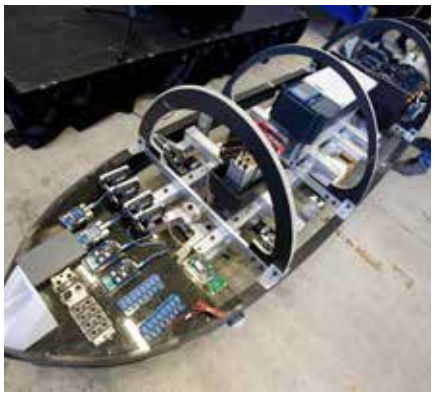
Registered Nurse,
Registered Pharmacist,
Owner of Shoppers Drug Mart at
Lauzon and Menard in Windsor

University of Windsor
Alumni Association

STUDENT SPOTLIGHT

HYPERLOOP TEAM PUTS WINDSOR ON WORLD STAGE

uWinLoop team members and Dean of Engineering Dr. Mehrdad Saif reveal Windsor's hyperloop pod to a crowd of supporters in the Ed Lumley Centre for Engineering Innovation.



Hyperloop technology uses electric propulsion in a low-pressure tube to propel a pod above the track using magnetic levitation. The competition challenges students to build a functional, scaled-down prototype that can propel at maximum speed and stop within 100 feet of the end of SpaceX's vacuum test track.

Overwhelming support from the community, a shout-out from the prime minister and a chance to pick Elon Musk's brain has left the uWinLoop team feeling charged and driven to compete again in next year's SpaceX Hyperloop Pod Competition.

The team of University of Windsor and St. Clair College students made it to the final round of the international competition, but was not one of the four teams out of 21 to be selected to test its pod due to stringent safety requirements.

"Our team worked closely with SpaceX engineers leading up to the competition day," says Solange Rennie, the team's business lead. "We were provided with advice and guidance in order to continuously improve our pod, which we plan to utilize for next year's competition."

Prime Minister Justin Trudeau commended uWinLoop along with two other Canadian teams on Twitter for their innovative work. The team also had a chance to speak with Elon Musk during competition day on July 21, 2019.

Hyperloop technology uses electric propulsion in a low-pressure tube to propel a pod above the track using magnetic levitation. The competition challenges students to build a functional, scaled-down prototype that can propel at maximum speed and stop within 100 feet of the end of SpaceX's vacuum test track.

Rennie says in addition to the critical advice given by SpaceX advisors, the team toured SpaceX and The Boring Company's headquarters and displayed its pod's technology during the competition showcase.

"Our booth gained lots of attention and curiosity, which was very validating, especially from championing teams who were impressed that this was our first year of competition," she says.

Engineering Dean Dr. Mehrdad Saif attended the competition in Hawthorne, Calif. along with one of the team's faculty advisors, Dr. Rashid Rashidzadeh and representatives of Advantage Engineering Inc., one of the team's largest supporters.

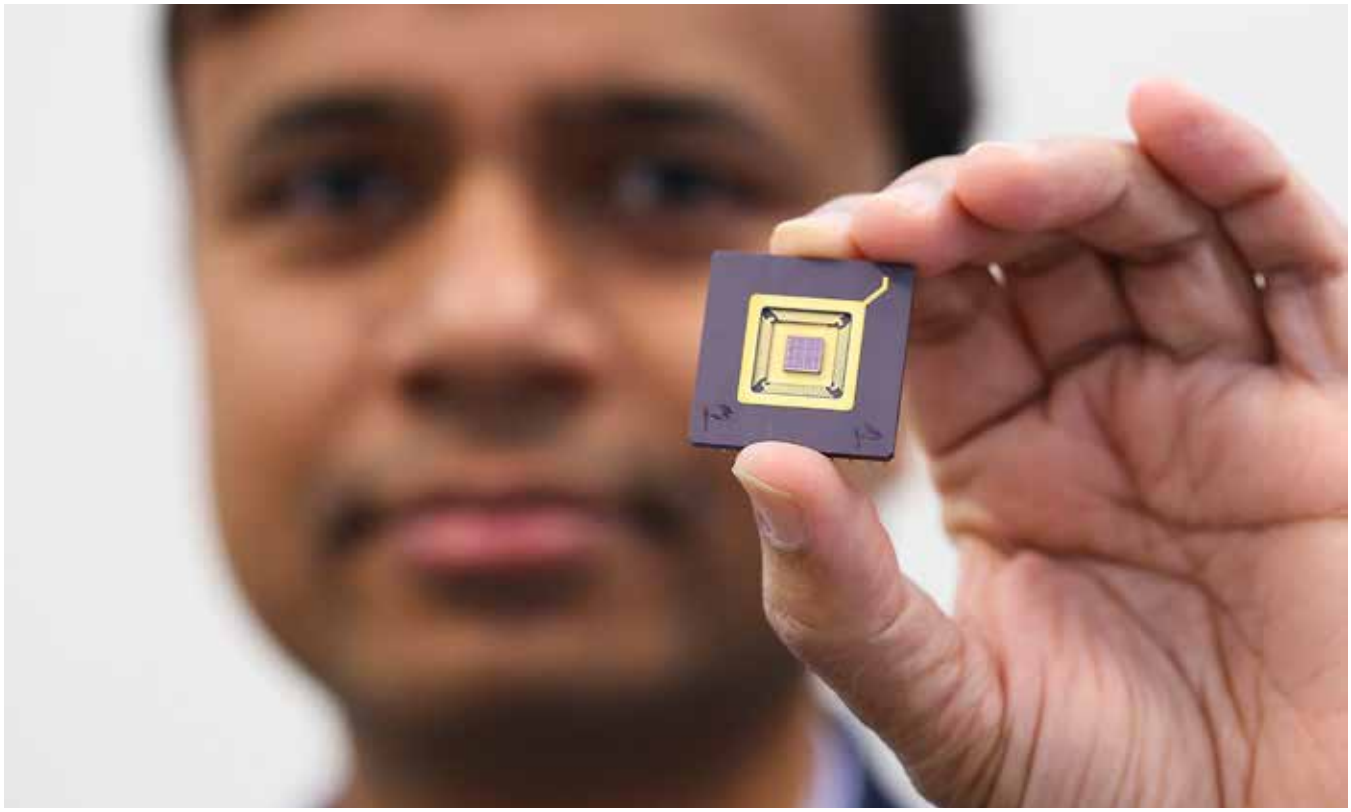
"Even though UWinLoop was unable to race, I am proud of their achievements along this exciting journey," Saif says. "They have learned valuable lessons in their first year in this competition and will go back and work on a re-design for next year's competition. After all that is what engineering design is all about — iterative methods."

The Windsor team raised more than $150,000 in donations, sponsorships, and in-kind contributions to fund the construction of its pod. Stefan Sing, uWinLoop's president and founder, says they have already started working on next year's pod.

"We are also tracking all our lessons learned to make sure next year's team is as strong as possible," Sing says. "The experience left our team extremely motivated for next year as we are all inspired by the amazing teams and technology being developed in this competition." WE

FACULTY INNOVATION

NATURE INSPIRED TECHNOLOGY



Dr. Jalal Ahamed and his team in the Micro Nano Mechatronic Research Lab have designed a microchip with nine sensors that can simultaneously track orientation, acceleration, velocity, position, temperature and elevation of a moving object.

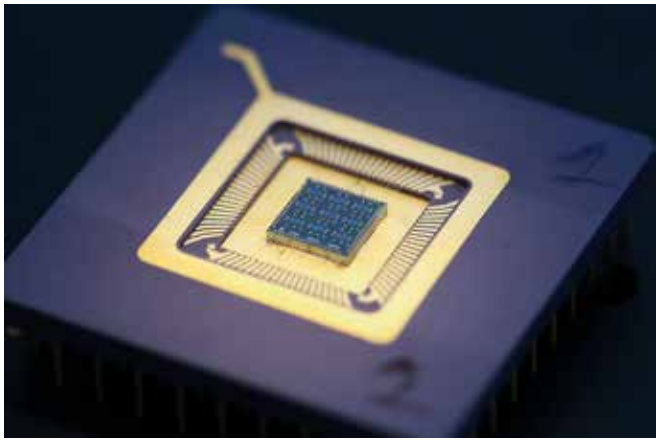
A University of Windsor engineering professor is turning to nature to inspire his research.

Dr. Jalal Ahamed and his team in the Micro Nano Mechatronic Research Lab are working on technologies that replicate the stabilizing, rapid wingbeats of a bee and the echoes bats use to navigate and forage.

The research group has designed a microchip with microscopic wings that flap at high speeds at a set frequency when electrical wires apply voltage. When a change in orientation or motion is detected, the thin, gold-coated, silicon wings will alter their flapping speed.

"This allows the sensor to register a change in frequency and process it in relation to the target physical parameters," Dr. Ahamed says about the signals sent via electrical connections underneath the wings. "We can detect any physical parameters that change by the frequency of the buzzing wings."

One chip houses nine sensors that can simultaneously track orientation, acceleration, velocity, position, temperature and elevation of a moving object. Less than half a centimetre in size, the chip can be used in many applications from detecting motion and orientation of virtual reality headsets to airplanes.



Top: Less than half a centimetre in size, the chip can be used in many applications from detecting motion and orientation of virtual reality headsets to airplanes. Bottom: Each device is branded with the smallest University of Windsor crest ever produced at about twice the size of the diameter of a single hair.

Dr. Jalal Ahamed and his team in the Micro Nano Mechatronic Research Lab are working on technologies that replicate the stabilizing, rapid wingbeats of a bee and the echoes bats use to navigate and forage.

The tiny sensors are constructed on a micro scale using standard semiconductor-based microfabrication techniques, the same way most electronic components are manufactured.

The engineering professor, who specializes in small scale manufacturing, says what makes their research unique is the combination sensors that are densely packed on a single microchip. The intricate design of the flaps includes details that are half the size of the diameter of a single hair. Each device is branded with the smallest University of Windsor crest ever produced.

Another project the lab is perfecting is a navigation system to assist the visually impaired and those in low-visibility environments. Unlike most navigation systems, which rely on a GPS satellite signal, the research team's wearable smart device uses motion and acoustic wave sensors to detect nearby objects — the same way bats use sound waves to navigate.

"The design, testing, packaging and miniaturizing have been done," Dr. Ahamed says. "At this point the accuracy is good enough for consumer grade applications, but not quite precise enough for airplanes. We can improve it for high grade applications, however consumer grade products are the biggest market." WE

THE NEXT GENERATION OF ENERGY STORAGE

By 2022, the International Energy Agency expects offshore wind generation capacity will almost triple from 2016 levels.

With a surge in renewable energy generation, researchers worldwide are pushing to innovate methods that combat the technology's intermittent nature.

One of the solutions is energy storage and is the focus of an international cluster of leaders in offshore energy and storage spearheaded by the University of Windsor and University of Nottingham.

For the past five years, the Offshore Energy and Storage Society (OSESS) has met annually to exchange ideas and foster collaborations that will propel the integration of renewable energy and storage technologies.

"We've relied on the inertia of big fossil fire and nuclear plants in the past, but energy systems are changing and how that future system is going to work is still an open question. Grid integration, storage and other technologies are going to be critical," says Daniel Laird, director of the United States National Wind Technology Center and National Renewable Energy Laboratory and keynote speaker at OSESS's 2019 Offshore Energy and Storage Summit.

Tonio Sant, an associate professor at the University of Malta and member of the OSESS technical committee, says without energy storage, it's impossible to reach 100 per cent penetration of renewable energies.

"Events like the OSESS summit offer a great opportunity to bring together different researchers and industry from around the world to discuss technical challenges and chart a way forward on how we can advance energy storage and make it more economical."

A University of Nottingham energy storage bag is prepared for ocean trials.

"These forms of renewable energies have their own problems. They are intermittent — today you have a lot of wind and tomorrow you don't. We need to integrate energy storage as soon as possible," he says. "Events like the OSESS summit offer a great opportunity to bring together different researchers and industry from around the world to discuss technical challenges and chart a way forward on how we can advance energy storage and make it more economical."

Sant leads a research team that created a system that uses compressed air for energy storage. Unlike existing concepts that rely on deep-sea hydrostatic pressure to maintain a stable pressure, Sant's FLASC dual-chamber technology allows the operating pressure range to be established independently of the deployment depth. The first prototype was installed in 2017 in the Grand Harbour of the Maltese Islands and stores energy generated from PV panels.

Dr. Rupp Carriveau, a UWindsor engineering professor and OSESS co-creator, played a critical role in developing Canada's first underwater compressed air energy storage and conversion system with Hydrostor and Toronto Hydro, which currently operate the only grid connected underwater energy storage facility in the world. His most recent work is examining the stability and durability of offshore structures in deep waters that are subject to extreme weather conditions, such as tornadoes, extreme thunderstorms, down bursts and other strong windstorms.

"What we would like to see is OSESS be at the heart of major projects that make an impact for communities," Carriveau says. "For example, we've talked about the electrification of an island. We plan on translating these lab scale and smaller field scale pilot projects into full-scale commercial support for the offshore scene."

OSESS co-creator Seamus Garvey, who teaches at the University of Nottingham, believes renewable energy will not only reach grid parity with fossil fuels, it will eventually take over as the primary energy supply. Garvey patented TetraFloat, a pyramid shaped platform for offshore wind turbines. TetraFloat's cost-effective design includes a single anchor and wide base that can withstand extreme wind and waves.

"Offshore wind is now in a very well-developed state where it's already completely washing its face as a commercial source of electricity," Garvey says. "Integrating is going to be massively important and massively difficult and this conference is digging out the solutions for those and producing some new ideas."

By 2022, the International Energy Agency expects offshore wind generation capacity will almost triple from 2016 levels. Today in Canada, the electricity grid is 80 per cent non-emitting and the federal government has adopted a target to have this increase to 90 per cent by 2030, according to the Canadian Wind Energy Association.

Andreea Strachinescu, head of unit, directorate-general for Maritime Affairs and Fisheries European Commission says it's interesting to see the variety of projects that are being developed in different countries, "from the European level to projects in South Korea."

"I think it will be great if we can continue to develop collaboration between different parts of the world on this topic. In the world that we in live today, I think that we need to work together in order to succeed and use our ocean in a sustainable way."

Visit **osessociety.com** to learn more. WE

ALUMNI PROFILE

A NATURAL CHANGEMAKER

Pamela Nadin-McIntyre meets with a drilling team during a visit to Canadian Natural Resources Limited's offshore operations on West Africa's Ivory Coast.

PAMELA NADIN-MCINTYRE WAS INTRODUCED TO THE IMPORTANCE OF INNOVATION AND ITS ROLE IN BUSINESS AT A YOUNG AGE.

As a daughter of a Windsor tool and die business owner, she remembers watching her dad brainstorm and execute countless ideas to drive business and stay competitive.

Decades later and three provinces away, she is the innovation lead — in addition to safety, technical safety, and risk management — for Canada's largest independent crude oil and natural gas producer, Canadian Natural Resources Limited (Canadian Natural).

"My dad's the one who really helped push me in this direction," says Nadin-McIntyre BASc '86.

In addition to ensuring the right systems are in place to maintain the safety of people across Canadian Natural's operations, she leads dedicated teams that are focused on improving the company's environmental performance through technology and innovation. And for someone who is passionate about the environment, it's more than just a job.

"We see there is still a need for fossil fuels for quite some time, which is why it's so important to continuously improve and ensure the smallest environmental footprint," she says. "Canada has world leading standards for responsible development of our resources, including safety, asset integrity and environmental protection."

Canada derives 77 per cent of its energy from fossil fuels and is pushing to reduce emissions by 20 per cent from current levels by 2020 and 60 to 70 per cent by 2050, according to 2019 federal government statistics.

Nadin-McIntyre says her company has reduced greenhouse gas emissions intensity at its Horizon oil sands operations by 37 per cent from 2012 to 2018 in addition to reducing methane vent volumes by 78 per cent at its primary heavy oil sites by capturing waste carbon dioxide before it enters the atmosphere.

"At today's production levels, the total reduction from these two areas from 2012 to 2018 is equivalent to taking over one and a half million cars off the road," she adds.

She is particularly proud of Canadian Natural's field pilot project that is underway on an alternative bitumen extraction method. Unlike previous methods, the In-Pit Extraction Process (IPEP) involves a relocatable, modular extraction plant that processes ore and separates bitumen in the mine pit rather than at facilities further away on the site, eliminating the need for material transportation by truck, pipeline length, tailings ponds and the energy needed to pump material. With enhancements, the pilot project is proceeding in 2020 at their oil sands mining operation 70 km north of Fort McMurray, Alberta.

Nadin-McIntyre originally thought she would be a pharmacist. Instead, she left the University of Toronto in her first year to pursue materials engineering at the University of Windsor.

"I loved the one-on-one interactions with my professors. I felt very much a part of a community and it really helped me with grounding and learning."

From there she landed a job at a foundry in Guelph and shortly after, at ArcelorMittal Dofasco, Canada's leading steel producer.

"Students today really need to understand it's not about identifying what you want to be because you probably won't be in that role for your whole career. Instead, focus on what skills you're developing. I've always focused on where I see gaps in my skills and worked to develop in ways to bridge those gaps."

This mindset helped her start a career in Alberta at an engineering consulting firm before eventually launching her own, giving her exposure to the business and marketing world. From there she moved to a mid-sized oil company then graduated to a midstream company before she was approached by Canadian Natural in 2003.

As the company's senior vice-president of safety, risk management and innovation, she oversees occupational safety, technical safety, asset integrity — which includes the company's entire inventory of pipelines and pressure equipment — and the most recent additions to her department, technology, innovation, environment, regulatory and stakeholder relations.

"It's really interesting and exciting," she says about acquiring different portfolios over the course of her 16-year career with the company. "If you're up for a challenge, Canadian Natural will challenge you."

Although Nadin-McIntyre lives in Calgary, she maintains close ties with the University of Windsor. In 2013, she established two scholarships in honour of her parents — Mary Elizabeth Nadin '74 BEd, '80 MEd, and Eric Nadin, who owned Nadin Molds Inc. and often assisted University of Windsor engineering students with capstone projects free of charge with consulting and manufacturing support. The Eric and Mary Elizabeth Nadin Memorial Bursaries are distributed annually to two undergraduate students in engineering and education based on academic standing and financial need.

Nadin-McIntyre and her husband Kory McIntyre are also legacy donors to the University of Windsor with a planned gift that will support the education of future students. WE

MANUFACTURER BREAKS THE MOLD WITH VISIONARY INVESTMENT

MEET WINDSOR MOLD GROUP

Keith Henry, president and CEO of the Windsor Mold Group, announces a first-of-its-kind University of Windsor endowment that will provide financial assistance to a minimum of eight capstone teams and more than 50 students on an annual basis.

Keith Henry (R), president and CEO of the Windsor Mold Group, is pictured at a funding announcement in the Ed Lumley Centre for Engineering Innovation March 22 with Dr. Mehrdad Saif (centre), dean of engineering and Dr. Marcello Guarini (L), dean of arts, humanities and social sciences.

The Windsor Mold Group Capstone Endowment will provide financial assistance to a minimum of eight capstone teams and more than 50 students on an annual basis.

The Windsor Mold Group has announced a first-of-its-kind University of Windsor endowment that will propel UWindsor Engineering student education and innovation.

The endowment will support capstone design projects, which challenge fourth-year engineering students to apply the formal knowledge they've gained during their undergraduate studies to solve real-world problems. In addition to the Faculty of Engineering, Windsor Mold Group is supporting the university's Entrepreneurship Practice and Innovation Centre (EPICentre), and the Faculty of Arts, Humanities and Social Sciences.

"The Windsor Mold Group is proud to continue its support of the University of Windsor in many ways, the most recent of which demonstrates our continued commitment to the students in Engineering, EPICentre, and Faculty of Arts, Humanities and Social Sciences," said Keith Henry, president and CEO of the Windsor Mold Group.

The Windsor Mold Group Capstone Endowment will provide financial assistance to a minimum of eight capstone teams and more than 50 students on an annual basis. Capstone projects focus on engineering design, fabrication, testing, and project management. Learn more at **uwindsor.ca/engineering/capstone**

Jeff Bilek, Connor Holowachuk, Aaron Marson and Larry Sandhu display their fitness movement tracker they designed to help users prevent injuries and track progress. The team is one of eight 2019 team recipients of The Windsor Mold Group Capstone Endowment.

Additional university-wide benefits of the gift include:

EPICentre will use the WMG's gift to support EPICentre's makerspace, the Windsor Mold Group EPIC Makers' Base, which is collaborative space equipped with high-tech tools such as 3D printers and a laser cutter as well as simple hand tools for its members to learn new skills and create prototypes. The funding will also be used to support a part-time Makerspace Lead and to deliver the Make It & Take It workshop series. FAHSS will provide the naming rights of two rooms in the School of Creative Arts — HCol Keith Henry 31 Svc Bn Classroom (in the Armouries) and the Windsor Mold Group 3D Print Lab (in the Alan Wildeman Centre for Creative Arts). The gift from Windsor Mold Group will assist in the development of the downtown campus and the Armouries, which has preserved a historic community landmark with a rich military history.

"Windsor Mold's sustaining investment in arts, engineering, and entrepreneurship is both visionary and long-lasting," says Douglas Kneale, provost and vice-president, academic. "We don't often see such wide-ranging philanthropy. In fact, it is fair to say that this example of interdisciplinary, cross-faculty giving 'breaks the mold.'"

Windsor Mold Group of companies provides world-class products and services for domestic and international customers in the tooling and automotive plastic molding industries. WE

"Windsor Mold's sustaining investment in arts, engineering, and entrepreneurship is both visionary and long-lasting," says Douglas Kneale, provost and vice-president, academic. "We don't often see such wide-ranging philanthropy. In fact, it is fair to say that this example of interdisciplinary, cross-faculty giving 'breaks the mold.'"

FOSTERING INNOVATION AND STUDENT SUPPORT

Joe Liburdi BAsc '67, says the University of Windsor's challenging materials engineering program helped him hone his multi-disciplinary skills, acquire his technical confidence and establish Liburdi Engineering Limited as an innovative technology leader.

As an engineering student at the University of Windsor, Joe Liburdi honed his multi-disciplinary skills and acquired his technical confidence.

Now, as the president of his own global enterprise, Liburdi wants to ensure future students have the opportunity to follow in his footsteps.

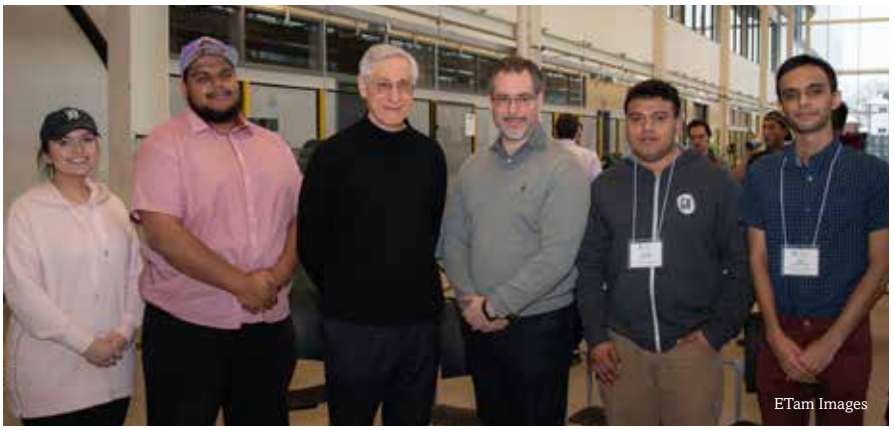
"The University of Windsor's challenging multi-disciplinary materials program and one-on-one attention with my professors gave me the tools I needed to establish Liburdi Engineering Limited as an innovative technology leader in global markets," says Liburdi BAsc '67, who produces advanced welding and coating systems for turbine, aerospace and power generation components. "They challenged me to always be the best."

A philanthropist at heart, Liburdi has given back to numerous charities in his community. The Faculty of Engineering at the University of Windsor is among the proud beneficiaries of his generous support. In 1997, he established the Carlo and Domenica Liburdi Memorial Award, a scholarship endowment in memory of his parents, supporting dozens of engineering students since its inception. Liburdi plans to build upon this support by expanding his scholarship program and equipping teaching labs with the newest technology, in hopes of igniting the same passion in aspiring engineering students who are walking in his footsteps.

Liburdi started his career at Westinghouse Canada. Eventually working his way up to become the company's manager of metallurgy, he led the development, manufacture and service of gas and steam turbines. Twelve years later, in 1979, he established Liburdi Engineering Limited, an international supplier of automated welding equipment and unique rejuvenation and repair of expensive turbine components. Based in Dundas, Ont., the company provides services to OEMs, major gas turbine operators and overhaul facilities globally and has since expanded operations in the United States, China, Russia and Abu Dhabi.

Liburdi plans to build upon this support by expanding his scholarship program and equipping teaching labs with the newest technology...

Liburdi was inducted as a fellow of the Canadian Academy of Engineering (CAE) in 2018. In the last five years, Liburdi Engineering Limited has filed 12 patents. The team has pioneered the development of life assessment techniques, HIP rejuvenation of superalloys, automated welding of turbine blades, powder metallurgy joining processes, erosion resistant PVD coatings and green slurry coatings for internal/external oxidation protection. WE



Joe Liburdi and his son, Gianni Liburdi (centre), meet with student recipients of a scholarship he established for University of Windsor engineering students.

HYDROGEN: THE FUEL OF THE FUTURE

DR. OFELIA A. JIANU

Dr. Ofelia A. Jianu is an assistant professor in the Mechanical, Automotive and Materials Engineering Department at the University of Windsor. Her area of expertise is in transport phenomena for efficiency improvement of energy systems and alternative fuel generation.

There are 35.11 million vehicles registered in Canada out of which 12.55 million are registered in Ontario. Simultaneously, Canada's population is 37.59 million out of which Ontario hosts 14.57 million people. This might all look good in terms of the economy; however, it is troubling when you consider that eight molecules of CO_2 are released for every molecule of burned gasoline in an internal combustion engine. That translates to the average vehicle emitting approximately 4.6 metric tons of CO_2 per year.

In 2005, automotive pollution was responsible for 20 per cent of the European Union's CO_2 emissions, roughly 60 per cent of which can be attributed to private automobiles. The EU legislation has set mandatory emission reduction targets for new cars in order to meet the targeted 95 grams of CO_2 per kilometer by 2021, a significant drop from the 130 grams per km recorded in 2015. Still, this is not sufficient, and hydrogen may be a possible solution.

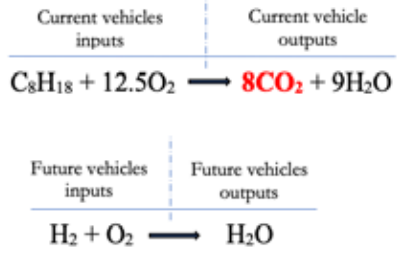
Hydrogen can have a significant role in providing better environmental sustainability as it combusts clean in the presence of oxygen and the output is water. Sounds great, right? So, why are we not using hydrogen as fuel yet? Well, although hydrogen is the most abundant element in the universe, filling stars and gas planets, it seldomly exists in its natural free state on Earth. Hydrogen strongly bonds to other elements, such as oxygen, to form water and vast amounts of energy are required to separate it. Additionally, hydrogen is only as clean as the method used to produce it. Currently the most common methods of hydrogen production are reforming fossil fuels in the presence of steam in processes such as steam methane reforming (SMR), coal gasification and partial oxidation of heavy oil. The steam methane reforming method is the cheapest, but it releases carbon monoxide.

You might have heard of "blue" hydrogen, which is produced via SMR and is not as bad for the environment as other methods of production, labeled "grey." At the University of Windsor in the Alternative Fuels and Energy Laboratory (A-FuEL), we are striving to create "green" hydrogen: the purest, cleanest hydrogen produced using sustainable methods not based on fossil-fuels. Some clean methods we are exploring are water electrolysis, thermochemical water decomposition, photochemical, photoelectrochemical and photobiological. Hydrogenics Inc. based in Mississauga, Ont. and Ballard, in Burnaby, B.C., are two internationally recognized manufacturers of water electrolyzers and fuel cells (electrolyzers operating in reverse). Other clean methods to produce green hydrogen are thermochemical cycles for water decomposition.

Thermochemical cycles split water into hydrogen and oxygen through a series of chemical reactions by recycling the constituents internally. The advantage is that they are capable of producing large amounts of hydrogen without releasing pollutants into our environment, while using waste heat from industrial emitters to drive the reactions. It would be no surprise if hydrogen production plants were erected next to nuclear power plants (waste heat at 450 °C), cement plants (waste heat at 1,200 °C) and foundries, to name a few.

This hydrogen research performed in A-FuEL is especially beneficial to Windsor considering Ontario's and USA's efforts to adopt hydrogen as a clean fuel. As a border city, Windsor is well positioned to become the "green" hydrogen generation hub, connecting the Greater Toronto Area and the United States.

In A-FuEL, we produce the fuel of the future, so your wheels can keep on turning. WE



Gasoline combustion vs. hydrogen combustion

NEWS

UWINDSOR SATELLITE DESIGN LEADING STUDENT COMPETITION

The WinSat team finished first in the design review portion of a national satellite development competition.

A team from the University of Windsor received top marks from the judges in the design review portion of the Canadian Satellite Design Challenge, in October 2019 in Quebec City.

The competition requires students to develop a satellite that can take a photo from space when commanded to do so by amateur radio operators around the world. It is intended to advance space education in Canada, inspiring students to pursue science and engineering educations and careers.

The satellites will undergo full launch and space environmental qualification testing, with the goal of launching the winning satellite into orbit.

In Quebec, teams conducted 2.5-hour presentations to a panel of industry experts.

Cole Nadalin, vice-president and business lead of the University of Windsor Space and Aeronautics Team (WinSAT), says the early results bode well for the school's first-ever entry.

"Placing first in Canada for our CubeSat design is an incredible achievement for the University of Windsor," he says. "Having collected valuable information from the competition judges, the team now needs to fabricate and test a functioning satellite."

Team president Atilla Saadat says the multidisciplinary pursuit requires students from many disciplines, including engineering, computer science, physics, chemistry, biology, business, and earth sciences.

"If you are a UWindsor undergraduate or graduate student interested in joining WinSAT — especially for your capstone project — check out **www.winsat.ca/apply** to read the requirements and submit your application," says Saadat.

Nadalin says members hope to bring local expertise in advanced manufacturing to national attention, and will seek in-kind donations of materials and services.

"We greatly appreciate all contributions," he says. "Via as many channels as are possible, we are hoping to gain the support of Windsor's manufacturing skills and knowledge base to showcase everything that Windsor has to offer from an engineering standpoint."

Find details of WinSAT's needs at **www.winsat.ca/sponsorship** WE

ENGINEERING STUDENT TAKES TOP HONOURS IN NATIONAL 3D PRINTING CHALLENGE

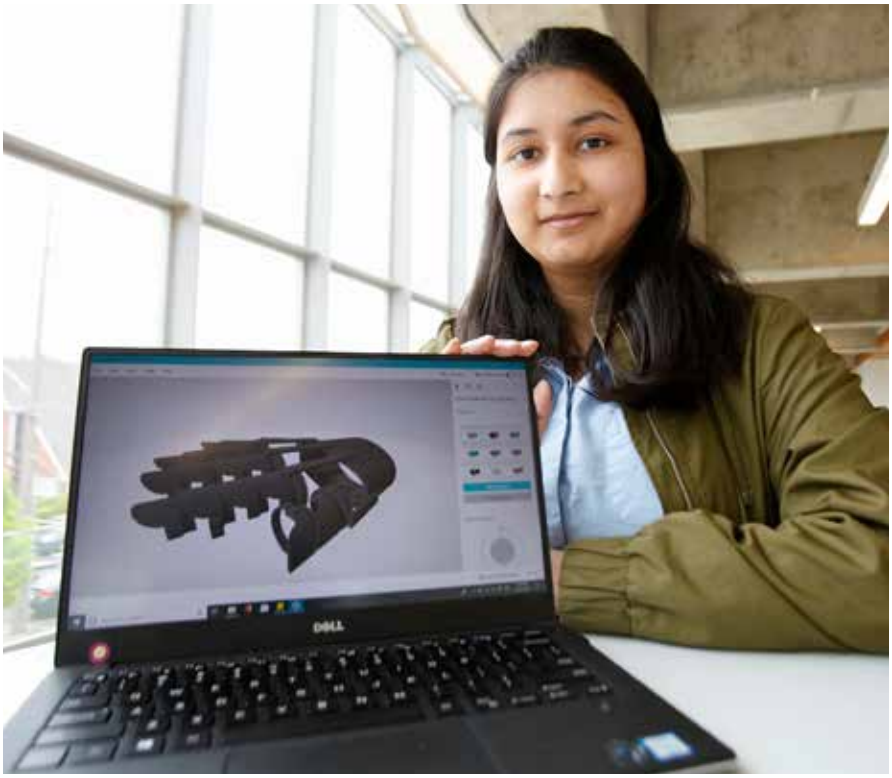
A UWindsor engineering student's design of a reconfigurable hand brace has landed her first place in a national competition.

Shreya Patki, a third-year mechanical engineering student and UWindsor Outstanding Scholar, took top honours in the Canadian Manufacturers and Exporters (CME) Canada Makes 2019 3D Challenge for her design of an environmentally friendly, custom hand brace that can assist elderly people who lack fine motor control or people with Ehlers Danlos Syndrome — a genetic connective tissue disorder.

"The problem with current braces is that they are expensive to customize and generally sized braces don't allow for flexibility or comfort. This is where my research comes in," Patki says.

Thanks to additive manufacturing — often referred to as 3D printing — Patki was able to use advanced design and modeling tools to create a cost-effective, environmentally-friendly brace that can easily be customized to all hand shapes and sizes. Additive manufacturing is a process that builds components in layers by placing material only where it is needed.

It does not require multiple cutting tools, machines or fixtures and as a result, has less material waste and energy usage when compared to fabricating components using a machining or molding approach, says Patki's faculty advisor Jill Urbanic, an associate professor in the Department of Mechanical, Automotive and Materials Engineering.



Mechanical engineering student Shreya Patki's design of a reconfigurable hand brace earned her first place in a national competition.

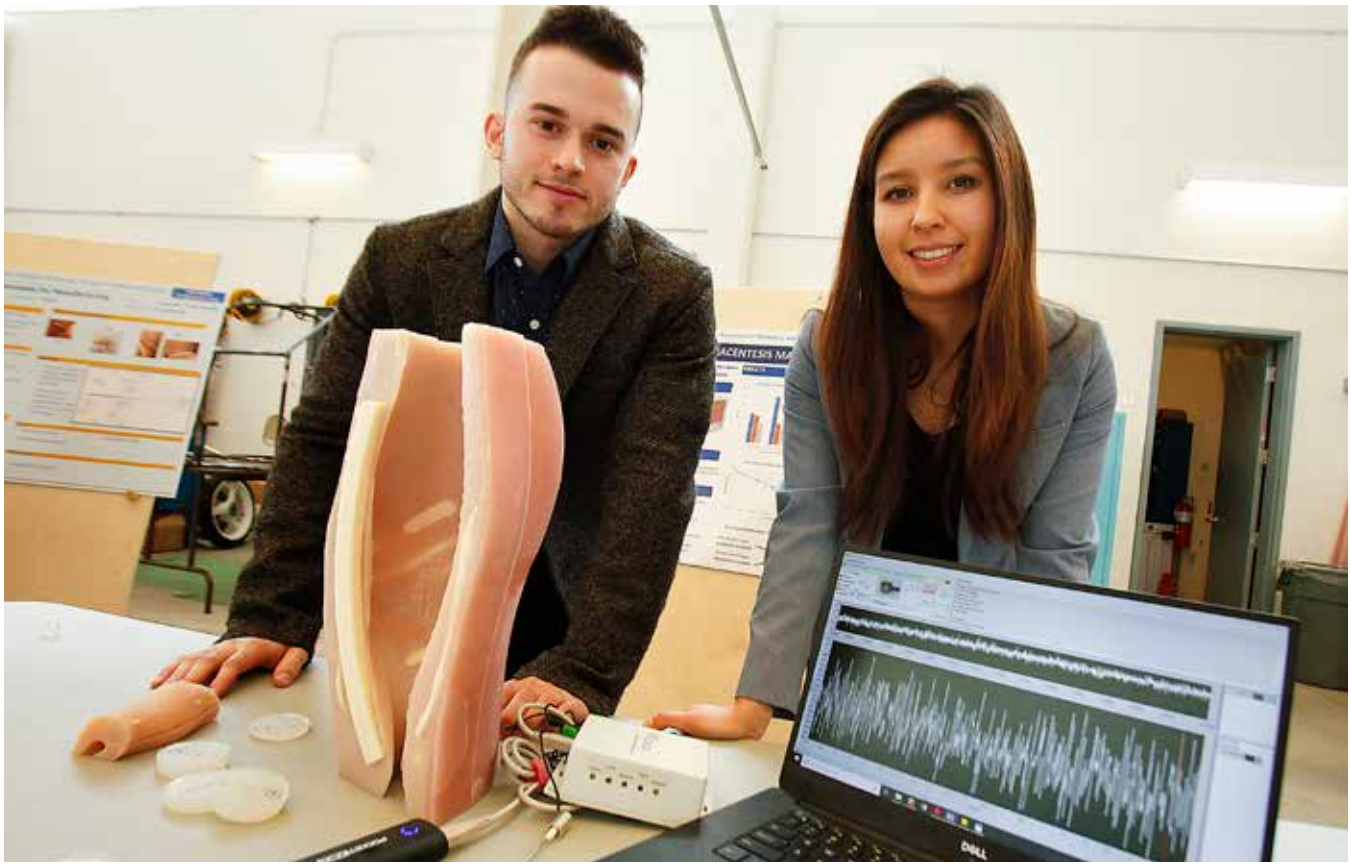
"I am very proud of Shreya's efforts," says Dr. Urbanic. "She has broken down a complex problem into bite-sized pieces and has worked on solving them. I am looking forward to seeing what she does in her fourth year."

The project Patki has been working on for nearly two years was judged by a panel drawn from industry and academia. Patki received a $1,250 scholarship and is now in the running for a paid internship with Burloak Technologies, an Oakville-based firm that produces highly engineered additive manufactured components.

"It is through design submissions like Shreya's, and the other participants, that we are able to grow the competition and program as a whole," says Cyndy Palleske, CME's vice president of Ontario operations and membership engagement. "We are excited to be able to encourage students to think outside of the box in their design skills and to continue to develop their experience and skills."

CME is a national non-profit organization that partners with industry, service providers, academia, and government to offer customized programs, events and services, including the additive manufacturing program, Canada Makes. WE

SOLUTIONS TO INDUSTRIAL CHALLENGES PROPOSED BY STUDENTS



Stefan Spiric and Jackie Ing's research aims to improve mannequins used to train medical students on perfecting thoracentesis, an invasive procedure that involves inserting a needle into the chest to remove fluid or air.

Fourth-year industrial engineering students at the University of Windsor are improving the accuracy of critical medical procedures, optimizing automotive production lines and using virtual reality to enhance manufacturing processes.

Students presented these projects and more at the Faculty of Engineering's annual Industrial Engineering Capstone Design Demo Day on March 29, 2019. Capstone projects challenge fourth-year engineering students to apply the formal knowledge they've gained during their undergraduate studies to solve real-world problems.

Jackie Ing and Stefan Spiric focused on improving mannequins used to train students on perfecting thoracentesis, an invasive procedure that involves inserting a needle into the chest to remove fluid or air.

"It's a very critical procedure, because if there's too much force, they can puncture the lung or cause internal bleeding," Ing says.

Windsor's Schulich School of Medicine uses a medical training mannequin that has one silicone tissue layer. Ing says their model, created by graduate student Andre Khayat, has two silicone layers, which is more similar to human skin and muscle layers.

Using cadavers, the two collected data while performing the procedure and recorded the needle's peak force, impulse force and pulsewidth. They then created a series of silicone trials to try and match the data.

"We focused on this one procedure, but it can be extended to include others," Ing says.

Spiric said there are alternative products on the market, but they are costly. Spiric says thanks to 3D printing, they can produce a significantly cheaper model.

Another group turned to virtual reality to help Centerline, a local manufacturer, train new employees in-house and solve industrial challenges.

"Our 3D simulation software allows you to mimic a manufacturing process, see how things are moving and be able to problem solve virtually without actually spending the money to build or test before it's tangible," says Mohanad Barakat.

The technology allows anyone to move around in a real-world manufacturing facility and perform operations, such as operating a crane.

Barakat says the software can also be used to help students at the University of Windsor gain more knowledge and experience in the manufacturing industry before graduating. WE

ADJUNCT PROFESSOR TO HEAD INTERNATIONAL OZONE RESEARCH BODY

A UWindsor adjunct professor will be the first Canadian to lead an international educational and scientific organization dedicated to ozone technology.

Dr. Saad Y. Jasim

Saad Y. Jasim was inaugurated as the president of the International Ozone Association during its World Congress and Exhibition, held Oct. 20 to 25, 2019 in Nice, France. He will start his two-year term as president in January 2020.

"It will be my duty to provide education and knowledge to different sectors in the world and make sure that knowledge transfer is the aim of our work," says Dr. Jasim, who has served as a UWindsor adjunct professor since 1996. "I would like to make a difference. That is what I believe I was able to do in places like Windsor and Walkerton, Ont."

Jasim introduced ozone to drinking water in Windsor in 2001 when he served as the Windsor Utilities Commission's director of water quality and production. Since then, the City of Windsor has repeatedly won Best Tasting Water in a competition organized by the Ontario Water Works Association. In 2004, Jasim designed an ozone system in Leamington for a 14-acre greenhouse, recycling more than 25,000 gallons of discharged water.

As an adjunct professor, Jasim supervises undergraduate and graduate students in UWindsor's civil and environmental engineering department. He has provided the university $125,000 in grants for research, more than $500,000 in in-kind contributions and helped secure $30,000 in federal funding in support of a study on the Windsor Hum. WE

AEROSPACE ENGINEERING STUDENT AIMING HIGH

A UWindsor student studying aerospace engineering is one of four province-wide to receive an Ontario Aerospace Council scholarship.

Atilla Saadat, a third-year mechanical engineering student in the aerospace stream, received a $2,500 scholarship for academic achievement and his work outside the classroom. Saadat is the founder and space systems technical lead of the University of Windsor Space & Aeronautics Team (WinSAT), a multi-disciplinary group of more than 30 students building a space-ready 3U Cube Satellite for Low Earth Orbit to compete in the Canadian Satellite Design Challenge.

"His work has already demonstrated a tangible impact at UWindsor, as WinSAT aims to increase the space and aeronautics engineering opportunities at our institution," says Afshin Rahimi, an assistant professor in the University's Department of Mechanical, Automotive and Materials Engineering.

In his first year of studies, Saadat designed a prototype lunar rover for Canadensys Aerospace in Toronto and joined the University of Windsor Rocketry Team to help create and test a small aerodynamic data acquisition module for post-launch simulation of the rocket. Last year, he worked at Mujin Inc. in Tokyo, Japan as a Robotics Engineering Intern, developing a Dynamics Identification Feature for industrial robots, which is now used by industry.

Aerospace student Atilla Saadat holds an avionics bay, which will log the altitude of a rocket he is building with a team of UWindsor students.

Saadat is now aiding Dr. Rahimi on a research project that uses ensemble machine learning techniques for fault detection and isolation in ADCS systems for satellites. WE

RAM BALACHANDAR RECOGNIZED BY NATIONAL CIVIL ENGINEERING SOCIETY

Ram Balachandar has been recognized for his "outstanding" contributions to the development and practice of hydrotechnical engineering in Canada.

Dr. Balachandar, a civil and environmental engineering professor, received the 2019 Camille A. Dagenais Award during the Canadian Society for Civil Engineering's (CSCE) annual conference on June 14, 2019, in Laval, Quebec.

Balachandar's research in civil engineering focuses on open channel flows and fluid-structure interaction. His research efforts in the area of scour have led to substantially improved design equations. Balachandar has published 150 journal papers, six book chapters and more than 200 conference papers and is an associate editor for the Canadian Journal of Civil Engineering.

The life time achievement award was established in 1981 in honour of Camille Dagenais, one of "the most renowned hydrotechnical engineers in the country," according to CSCE. WE

ENGINEERING STUDENT'S ENERGY RETROFIT EVALUATION TOOL GAINS RECOGNITION

How does a building manager decide which energy retrofit is the most economical and least impactful on occupants and the environment?

Rania Toufeili has the answer. A master's student of environmental engineering, she has designed an asset management decision support tool that can assist building managers in selecting the preferred technically feasible energy retrofit. The support tool landed her second place at the Canadian Network of Asset Managers student research symposium held May 6 to 9, 2019 in Kelowna, B.C.

"Building energy retrofits are a very effective way to decrease the energy consumption of a building and in turn decrease global greenhouse gas emissions," Toufeili says.

Her tool combines multi-criteria decision making with life cycle thinking to develop a more comprehensive and expansive retrofit evaluation method than others on the market. The evaluation considers the energy retrofit's environmental, economic, social, and technical performance by using a set of relevant key performance indicators.

Toufeili was selected from approximately 30 student applicants and nine student symposium presenters studying topics connected to asset management.

She graduated from the civil engineering program in 2017 with great distinction and completed the Outstanding Scholars program. Toufeili is the recipient of numerous awards, including, most recently, the 2018/2019 NSERC Canada Graduate Scholarships-Master's Program award. She speaks and assists at engineering outreach events and co-founded Windsor's Women in Engineering Club. WE

Environmental engineering master's candidate Rania Toufeili placed second at the Canadian Network of Asset Managers student research.

MOHAMMED KHALID TO LEAD CANADIAN ELECTRICAL ENGINEERING CLUSTER

Dr. Mohammed Khalid, pictured centre with members of the IEEE Windsor Section, displays an award the group received under his leadership. Khalid has been elected to the executive committee of the Institute of Electrical and Electronics Engineers (IEEE) Canada.

Mohammed Khalid, an electrical engineering professor, has been elected to the executive committee of the Institute of Electrical and Electronics Engineers (IEEE) Canada.

IEEE is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity. It has more than 400,000 members worldwide, including more than 16,000 in Canada. IEEE membership offers access to technical innovation, cutting-edge information and networking opportunities.

As the chair of the IEEE Canada's Central Area that includes large sections such as Toronto and Kitchener-Waterloo, Dr. Khalid will plan, coordinate and monitor the activities of seven central area IEEE sections comprised of more than 8,000 members.

"I am looking forward to working with the IEEE Canada Executive Team and volunteers to serve our members," Dr. Khalid said.

Khalid was the IEEE Windsor Section Chair from January 2017 to December 2018. Under his leadership the Windsor Section received two IEEE Canada's Exemplary Section Awards for its activities, leadership, management and administration.

For more information, please visit **www.ieee.ca/en/** WE

RUPP CARRIVEAU RECOGNIZED AS LEADER IN ENERGY SUSTAINABILITY

Dr. Rupp Carriveau was among 50 honourees to receive a Canada Clean50 award during a ceremony on Oct. 3, 2019, at the Clean50 Summit in Toronto.

What if electric vehicles are in every Canadian driveway? Solar shingles on every roof? What if you purchase your energy from your neighbour and not your utility?

His work to advance the nation's energy economy has won a University of Windsor engineering professor recognition as a Canadian leader in sustainability.

Rupp Carriveau was among 50 honourees to receive a Canada Clean50 award during a ceremony on Oct. 3, 2019, at the Clean50 Summit in Toronto. The awards are distributed annually to thought leaders and advocates and sustainability trailblazers in industry, academia, government.

Dr. Carriveau was chosen after a rigorous selection process conducted by search firm Delta Management from a pool of approximately 750 nominees across Canada.

Carriveau was recognized for founding the Climate Led Energy Evolution Network 2040, CLEEN2040, meant to increase awareness of operational, financial, and environmental opportunities for optimization of Canada's energy economy.

He has also partnered with Hydrostor for an Innovations in Energy Storage research project that has improved existing grid-scale energy storage and enabled the business case for two new bulk energy storage facilities in Goderich, Ontario, and Strathalbyn, Australia. Additionally, Carriveau's work on the YR21 Wind Farm Life Extension program is revealing the profitability of life extension for owners of well-maintained wind farm assets.

"The Clean50 come from a very broad array of backgrounds, such that only a few individuals are able to be recognized within any given category," says Gavin Pitchford, CEO, Delta Management Group. "To receive a Clean50 award is truly indicative of Rupp's leadership, both within his sector and within the category in which Rupp was named: Research and Development." WE

HISTORY CHANNEL SEEKS OUT ENGINEERING PROF FOR EXPERTISE ON WINDSOR HUM

Engineering professor Colin Novak's investigation of the Windsor Hum was featured on a History Channel program about unexplained mysteries.

A new History Channel show about the world's most fascinating and inexplicable mysteries featured a University of Windsor engineering professor and his investigation into one of Windsor's infamous enigmas — the Windsor Hum.

The intermittent rumbling sound has plagued local residents for the past seven years. In 2013, Colin Novak, an associate professor in the mechanical, automotive, and materials engineering department, was contracted by the Government of Canada to lead a study on the source of the hum.

A Los Angeles film crew from UnXplained, a show hosted and produced by William Shatner, visited campus to learn more about Dr. Novak's Noise Vibration and Harshness-Sound Quality Group, which set up low-frequency noise monitoring stations across the city's west end and portable infrasound arrays to record noise within the hum's frequency range.

"Most people don't know exactly where it comes from and have learned to live with it, but would like to find a solution so they don't hear it anymore," said Sandrine Magloire, UnXplained's co-producer, after spending the day interviewing residents affected by the hum, and Craig Pearson, managing editor of the *Windsor Star*.

The segment aired July 26, 2019 as part of an episode that focuses on mysteries in nature. The Windsor Hum appeared alongside the mysterious formation of Devils Tower in Wyoming; a lightning storm in Venezuela that lasts 10 hours a night, 300 nights a year; and the Crooked Forest, a cluster of oddly-shaped pine trees in Poland. WE

ROCKETRY STUDENTS REACH NEW HEIGHTS IN INTERNATIONAL COMPETITION

University of Windsor Rocketry Team members pose with the rockets they designed and launched in international competitions.

A team of mechanical engineering students placed fifth in the world's largest intercollegiate rocket engineering competition.

The Spaceport America Cup attracted 121 teams worldwide to compete June 18 to 22, 2019 in Las Cruces, New Mexico.

University of Windsor Rocketry Team member Katarina Berg says the competition has multiple categories based on motor type and either a target altitude of 10,000 or 30,000 feet.

The UWindsor team chose to compete in the 30,000 commercial, off-the-shelf motor, solid propulsion category against 19 teams.

"We came in fifth in our category and 31st in the overall competition. Our actual apogee was 26,517 feet," Berg says about the team's best competition performance to date. "It was absolutely an amazing experience to be able to connect with and learn from universities all over the world. To see all the different approaches to the same common problem is very intriguing."

Students were tasked with presenting their research and development to peers and prospective employers in an academic conference before launching at Spaceport America. The competition is hosted by the Experimental Sounding Rocket Association. WE

Team members prepare to launch their rocket at the Spaceport America Cup in New Mexico.

JONATHAN WU ELECTED TO ENGINEERING ACADEMY

The Canadian Academy of Engineering inducted UWindsor electrical and computer engineering professor Jonathan Wu as a fellow at a ceremony in Quebec City in conjunction with its 2019 annual general meeting.

The academy brings together the nation's most distinguished and experienced engineers to provide strategic advice on matters of critical importance to Canada.

A citation noting Dr. Wu's election called him a "world-leading expert in the field of computer vision and machine learning" and praised his development of systems for a wide variety of real-world applications.

His was one of 55 appointments announced by the academy; president Eddy Isaacs said he expects them to make considerable contributions to public policy.

"They are engineers from widely varying backgrounds, from industry, academe, and government, but they all have in common the demonstrated desire and ability to go beyond the normal practice of engineering and serve as role models in their fields and to their communities," Dr. Isaacs said in a release. WE

Jonathan Wu

GRAD INDUCTED INTO ALUMNI HALL OF FAME

Steve Ray BASc '96 (far right) was recognized for his outstanding accomplishments in volleyball as a Lancer Athlete.

UWindsor Engineering alumnus Steve Ray has been inducted into UWindsor's Alumni Sports Hall of Fame for his outstanding performances in volleyball.

The 34th annual Alumni Sports Hall of Fame Induction Ceremony and Awards Presentation was held Oct. 6, 2019.

Following Sunday's ceremonies, the Hall of Fame now boasts a distinguished membership of 135 inductees, 31 Sport Achievement recipients and 39 Team Achievement recipients.

Inductees in the Athlete category, recognized for their outstanding accomplishments as Lancer Athletes, include Steve Ray BASc '96 - Volleyball, Jamie Adjetey-Nelson BA '07, BEd '09 - Track and Field, Arjei Franklin BHK '05, BEd '06 - Football and Stephanie Gouin BHK '99 - Track and Field. WE

LOCAL GIRL GUIDES EARN STEM-RELATED BADGES AT UWINDSOR

Nearly 80 Windsor and Essex County girl guides spent the end of their March break building bridges, circuits and water filters at the University of Windsor.

The full day of activities at UWindsor's fourth annual Girl Guide Badge Day landed the girls engineering, science and water badges.

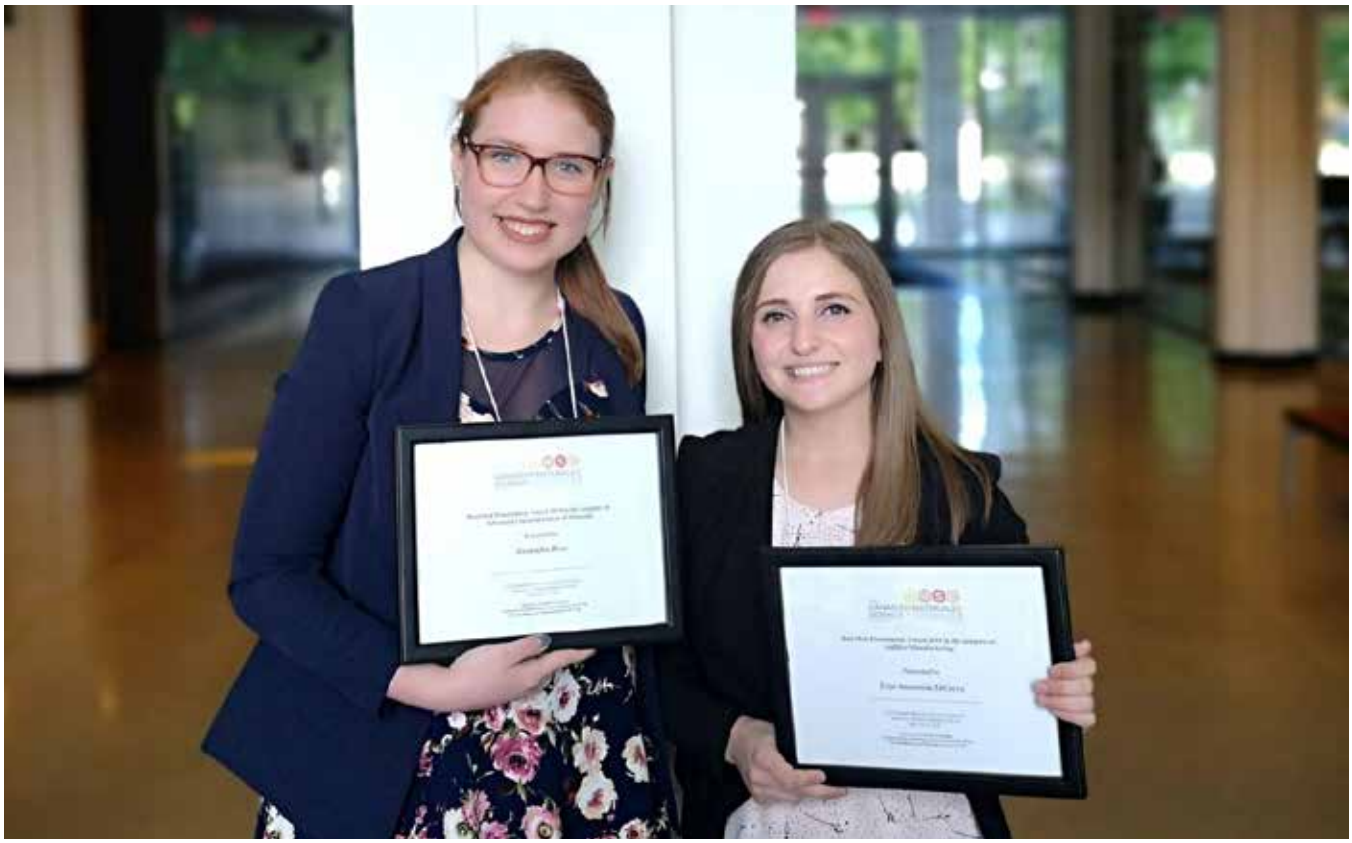
The groups conducted a chemical analysis, extracted DNA from a banana, performed a water quality test using filters they built with water bottles and designed popsicle stick bridges that could hold the weight of a mini hydrogen car.

"We hope that many of these young ladies will consider pursuing STEM-related studies like engineering in the future," says Dr. Jennifer Johrendt, the Faculty of Engineering's assistant dean of student affairs.

Girl Guide Badge Day is organized by the University of Windsor's Faculty of Engineering and Faculty of Science and sponsored in part by the Ontario Network of Women in Engineering and Let's Talk Science. WE

Aenea Bryson, a Grade 6 student, conducts a chemical analysis during the University of Windsor's Girl Guide Badge Day at the Ed Lumley Centre for Engineering Innovation.

MATERIAL RESEARCH PRESENTATIONS WIN RECOGNITION FOR WINDSOR ENGINEERING STUDENTS



Alexandra Rose with Liza-Anastasia DiCecco

Two UWindsor master's students of engineering materials claimed prizes for their oral presentations at the 2019 Canadian Materials Science Conference, June 10 to 13, 2019 in Vancouver.

The conference is a forum for academics and professionals to discuss advancements in a wide range of areas of materials science, as evidenced by the UWindsor winners.

Alexandra Rose's presentation "Analyzing the fracture behaviour of tool steels in various stress triaxialities," under the supervision of professors Ahmet Alpas and Daniel Green, was judged best in the symposium dedicated to advanced characterization of materials.

Liza DiCecco won the best oral presentation award in the additive manufacturing symposium for her work "Fatigue Behaviour of Shot-Peened Additive Manufactured Ti-TiB," supervised by professor Afsaneh Edrisy.

The scope of the conference includes aspects of the structure, processing, properties and performance as applied to structural materials, functional materials, electronic materials, nanomaterials, biomaterials, materials for energy, and others. WE

ENGINEERING PROFESSOR MAKES LASTING IMPACT AT UWINDSOR

A UNIVERSITY OF WINDSOR ENGINEERING PROFESSOR IS HELPING STUDENTS GRASP MORE THAN COMPLEX ELECTRICAL ENGINEERING CONCEPTS.

The Dr. Shervin Erfani Learning Studio is a 40-seat dynamic classroom in the the Ed Lumley Centre for Engineering Innovation where students will learn, collaborate and discover.

"THE GREATEST REWARD I HAVE EVER BEEN GIVEN IS THE SIMPLE OPPORTUNITY TO TEACH GENERATIONS OF YOUNG PEOPLE HOW TO THINK IN AN "ENGINEERING WAY" ABOUT THE WORLD AROUND THEM," DR. ERFANI

Dr. Shervin Erfani has made a six-figure dollar donation to the Faculty of Engineering to help students finance their education and foster collaboration in the classroom.

"The greatest reward I have ever been given is the simple opportunity to teach generations of young people how to think in an "engineering way" about the world around them," Dr. Erfani said at an intimate gathering with his immediate family and colleagues from the Faculty of Engineering.

A small ceremony was held to unveil the naming of the Dr. Shervin Erfani Learning Studio, classroom 2103 in the Ed Lumley Centre for Engineering Innovation and recognize his generous philanthropic investments to endow two scholarships in memory of his father Dr. Ibrahim Erfani. The scholarships will support undergraduate and graduate engineering students and are set to begin disbursing in 2020.

"These scholarships will empower our future engineering students for generations to come and showcase your life-long commitment to teaching and inspiring engineering students," said Dean of Engineering Dr. Mehrdad Saif. "On behalf of the faculty and students, I'd like to thank you for your generosity."

Dr. Shervin Erfani has taught electrical engineering at the university since 2002 and has been an industry consultant for more than 35 years.

"I want to express my appreciation for this latest gift by Dr. Erfani in support of our students and programs," said Douglas Kneale, provost and vice-president, academic. "We have such committed friends and supporters of the university, and when those friends and supporters are our own faculty members, it is even more deeply appreciated. It sets such a fine example of philanthropic leadership when it begins at home." WE

Dr. Shervin Erfani has made a six-figure dollar donation to the Faculty of Engineering to help students finance their education and foster collaboration in the classroom.

Engineering Dean Mehrdad Saif (L) is joined by faculty and staff to honour Dr. Shervin Erfani's (R) contributions to the Faculty of Engineering.

DR. SHERVIN ERFANI LEARNING STUDIO – CLASSROOM 2103

The Dr. Shervin Erfani Learning Studio is located on the second floor of the Ed Lumley Centre for Engineering Innovation. This 40-seat dynamic classroom is a space where students will learn, collaborate and discover.

DR. IBRAHIM ERFANI UNDERGRADUATE SCHOLARSHIP IN ENGINEERING

Scholarship to be granted annually to a full-time undergraduate student in the Faculty of Engineering who has special needs or a disability. This award is intended to recognize a student's determination, perseverance and commitment to the advancement of their engineering education.

DR. IBRAHIM ERFANI GRADUATE SCHOLARSHIP IN ENGINEERING

Scholarship to be granted annually to a full-time female graduate student in the Faculty of Engineering Electrical and Computer Engineering Department. This award is intended to recognize a female student with a strong track record of academic excellence.

FIRST GRADUATING CLASS

CLASS OF 2021

GIVING BACK

FROM ONE GENERATION TO THE NEXT

THANK YOU to our thousands of alumni, parents, friends and corporations who support the Faculty of Engineering each year. Your gifts will have a lasting impact for generations to come. Investments in our strategic funding priorities advance innovative engineering research, enrich the student experience and allow us to continue to grow our expanding engineering programs. Thank you for joining us in our vision of thinking forward, engineering an impact, and making a difference.

Learn more about how you can invest in our future engineers and innovators by contacting Katie Mazzuca at katie.mazzuca@uwindsor.ca.

THINKING FORWARD, ENGINEERING AN IMPACT, MAKING A DIFFERENCE

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