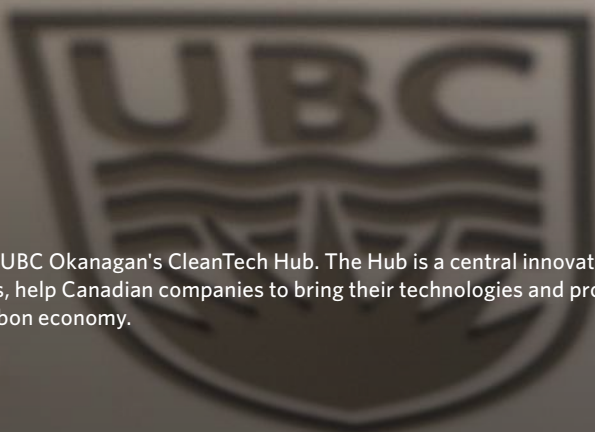
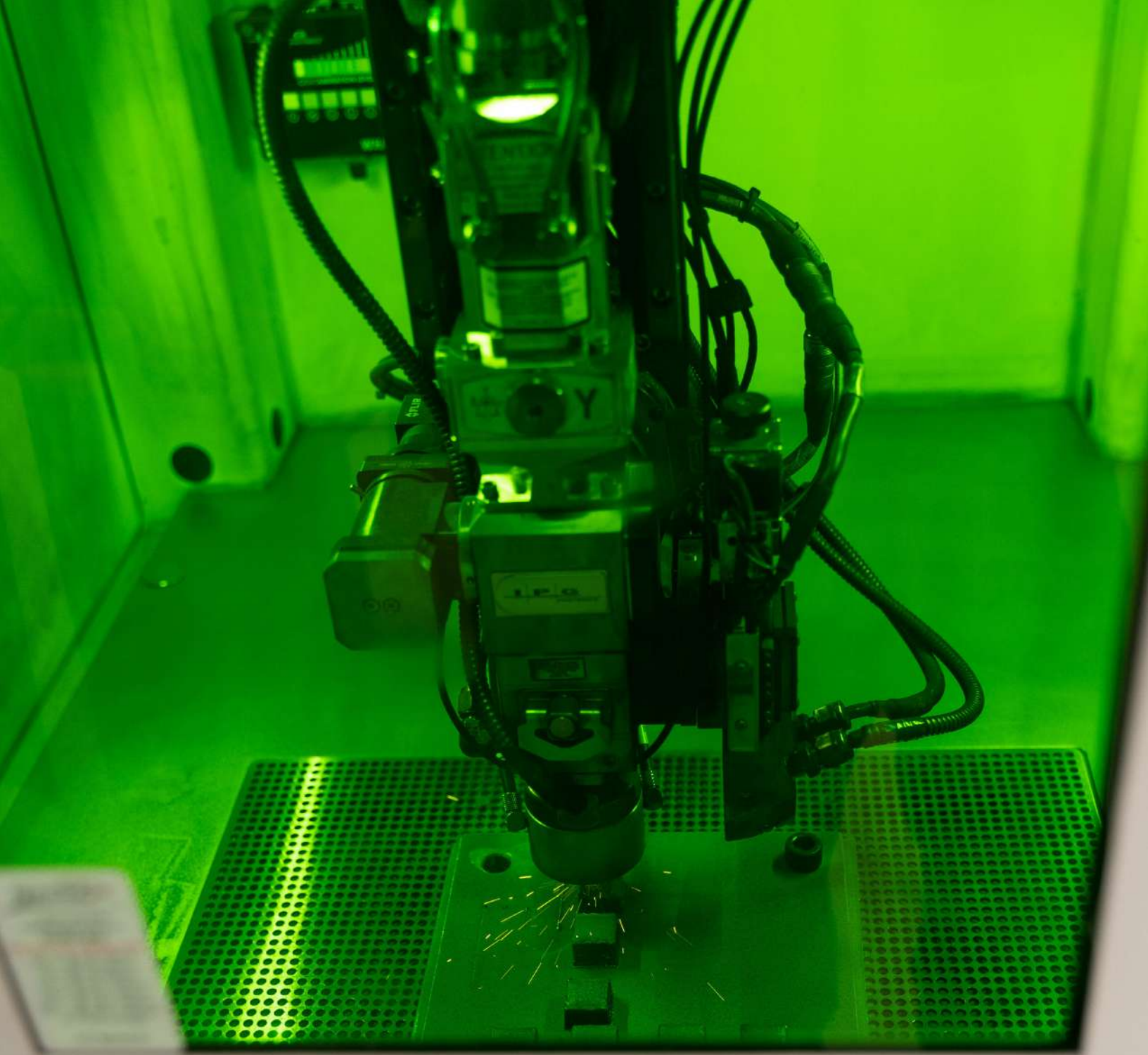




School of Engineering

Okanagan Campus

ANNUAL REPORT 2022-23



Researchers fabricate a metal component at UBC Okanagan's CleanTech Hub. The Hub is a central innovation space that catalyzes academic-industry collaborations to promote clean technologies, help Canadian companies to bring their technologies and products to domestic and international markets, and support Canada's transition to a low-carbon economy.

Welcome



MESSAGE FROM THE DEAN

Over the past five years, I have had the privilege of serving a Faculty that spans across UBC's two campuses. Everytime I venture onto the Okanagan campus, I'm struck by our School of Engineering's energy – an energy that is palpable in the student body already making an outsized mark on campus, as well as in our faculty and staff who aspire to create consequential impact well beyond the Okanagan.

As I reviewed this year's annual report, I was particularly impressed by the School's accomplishments – from the recognition that our students are receiving, such as the Solar Decathlon Team's podium finish, to the innovations that engineering faculty are uncovering, including heading the vanguard in battery research – the School is a crucial contributor to our global rankings as a leading engineering program not only in Canada but globally. And over this past year, the connections between our two campuses have grown stronger than ever.

In June 2023, the School of Engineering hosted the Canadian Engineering Education Association annual conference. It was an opportunity to showcase the pedagogic innovations taking shape at the School of Engineering. Our students are the beneficiaries of these innovations, and it is positioning them with solid footing as they embark on careers across all sectors in our province and beyond.

I am incredibly proud of the depth and breadth of research, innovation and teaching that has helped the School achieve so much in such a short amount of time. As I start my second term as dean, I am excited and honoured to be working with the School of Engineering to continue their positive and progressive trajectory.

James Olson, PEng, PhD, FCAE
Dean, Faculty of Applied Science
Professor of Mechanical Engineering



MESSAGE FROM THE DIRECTOR

Exciting changes have been taking place behind the scenes this past year in nearly every facet of the School of Engineering's operations from teaching and learning to research and beyond. We have asked all members of our community to take a step back and review how and why things are done the way they're done. In some cases, there have been minor tweaks while in others, we have re-engineered processes.

Adjustments and tinkering are important parts of the engineering process. When something is successful, we can take it for granted. However, if we want success to continue or to improve upon it, we need to constantly be asking questions and challenging preconceived notions. At the School of Engineering, we are fortunate to have the right people in place, a strong community, and be at an age and stage in our growth where we can ensure we are addressing the needs that matter most (our teaching, research, and service).

This past year, we launched Aerospace Engineering and Environmental Engineering Options while preparing for the highly-anticipated Computer Engineering program that starts next year. In the process, we've streamlined course offerings while improving the educational experience for our students and creating capacity to support responsible growth and innovation among our faculty and staff.

Having had the benefit of a year in my current role, I can confidently say that the School of Engineering is structurally, culturally, and financially healthier than the prior year. I am looking forward to what the next year holds for our vibrant and gifted community. By all accounts, the best has yet to come.

Will Hughes, PhD
Director, School of Engineering
Professor of Mechanical Engineering

The School of Engineering is one of the fastest growing post-secondary engineering programs in Canada. New programs, options, and minors are providing students with new paths to success during their time on the Okanagan campus and as alumni. The School is committed to responsible growth and innovation as a basis for meeting the needs of its community today and into the future.

1703 Undergraduate students

508 Graduate students

76 Faculty

43 Staff

UNDERGRADUATES BY YEAR

26% First-year

28% Second-year

23% Third-year

23% Fourth-year

UNDERGRADUATES BY PROGRAM*

18% Civil

19% Electrical

3% Manufacturing**

33% Mechanical

* All first-year students are considered undeclared

**Manufacturing launched in 2018/19 with its first graduating cohort in 2022





UNDER-REPRESENTED STUDENT GROUPS

19% UBCO Engineering students identify as female

17% UBCO undergraduate students are female

4% Students who self-identify as Indigenous

My time at UBC School of Engineering was very fulfilling. From choreographing dances for our cultural events to working at UBC's Disability Resource Centre, I've collected memories that I cherish forever.

Atousa Soltani, PhD (Civil '15)



Learning on the job

Learning on the job is a concept that engineering students embrace from their first day at the School of Engineering. It is a concept that staff and faculty also take to heart when they start in their roles on the Okanagan campus.

For Trudy Chimko, manager of administration, the learning was done in tandem with the School's Director, Will Hughes, when they stepped into their portfolios in mid-2022. "We dug in deep to learn about the current state, the challenges, and the opportunities," says Chimko.

At times over their first year, the experience was difficult, but the take-aways have been worthwhile especially when it comes to getting to know the faculty and staff. "I am so happy to be part of this amazing group of people. They are kind, energetic, and passionate about supporting our students and each other. I am proud of the accomplishments that everyone has made."

From the outset, Chimko and Hughes quickly recognized that leadership changes were causing some anxiety while mounting workloads were building a sense of frustration. Taking some lessons learned from her time at Interior Health, Chimko joined Hughes in empowering staff and faculty to create the culture and processes so that everyone can be at their best.

"At Interior Health, we were focused on patients while at the School of Engineering, we are focused on students," explains Chimko. "With that said, it is the team behind the scenes that play a crucial role in the experience of patients or students."

That sentiment is shared by the School's administration team who identified the School's core mission, at a recent teambuilding workshop, as a place of knowledge, imagination and creativity, that students come to the Okanagan with a dream of being an engineer and faculty have dreams of changing the world. They choose to walk alongside faculty and students by being knowledge sharers and by creating and implementing processes and best practices to support the student experience.

Chimko points to the success of the 2023 Strategic Retreat where staff and faculty shared stories and ideas around change, transition, people, process, performance, and a cultural shift. "The work didn't end that day, and transition can be difficult as we move towards our goals, but I am encouraged by the collaboration and commitment I see from the faculty and staff as we gracefully move into the next phase of the School of Engineering."

As she heads into her second-year in the role, Chimko is setting her sights on what's next. "We continue to listen and learn, and our focus is on improving processes and tools to support the School's bright future."

"Change is exciting, especially when we have the support of a fantastic team who share a common goal," says Chimko. "I can't wait to see what the future holds for the School of Engineering."

Award Winning Staff

Colin Wilson is the Director of Business Development, Research and Industry Partnerships at the School of Engineering. In 2023, he was recognized for his work with a UBC Okanagan Staff Awards of Excellence in the category of Global Citizenship.

He is a leader, facilitator, and especially strong listener who oversees a small team who shoulder an important role in empowering research collaborations and student opportunities at the School of Engineering and beyond. Wilson's role transcends business development as his title suggests. He develops the ideas that originate from researchers, staff and students and make them a reality. His contributions have played an instrumental role in helping UBC's Okanagan campus achieve its strategic imperatives.

A wonderful example of his work in this area includes assembling and negotiating the \$1.5M "One Water" approach (OWA) that is investigating ways to improve monitoring of municipal water systems across the Okanagan and beyond. The project is resulting in graduate training, municipal partnerships, research expansion, positive sustainability outcomes and overall public health.

In six years, research funding generated by School of Engineering researchers has jumped from \$3M to \$17M. School of Engineering research funding now accounts for almost half of all UBC Okanagan research dollar intake. While the expertise of our faculty researchers plays an important role in generating this remarkable output, it is the relationship-building and connections developed by Wilson and his team that have forged lasting and on-going research partnerships.

As is his way, Wilson focuses on the School of Engineering researchers, but still finds opportunities to develop initiatives that benefit other researchers and other Faculties across the Okanagan campus and the UBC institution as a whole.

After beginning his UBC career with the UBC Okanagan Development Team, he continues to mentor and collaborate with Business Development colleagues on the Okanagan and Vancouver campuses. Wilson started a Business Development working group on the Okanagan campus that includes representation from all faculties. His leadership and vision continue to help transfer the School of Engineering and the Okanagan campus for the better.

What made me fall in love with engineering is finding creative solutions to real-world problems to help people and the environment.

Samantha Krieg, fourth-year student



Innovation & Design

Solar Decathlon team addresses the impacts of climate change

A second-place finish at an international competition is motivating a team made up of students from UBC Okanagan and Thompson Rivers University to learn from their success to date and start preparing for next year's competition.

The Solar Decathlon challenges students to design and build high-performance, low-carbon buildings that mitigate climate change and improve our quality of life through greater affordability, resilience, and energy efficiency.

The team was supported by the Innovate, Design, Sustain Club at UBCO. IDS is UBCO's first sustainability-focused design club. The team is now turning their attention to the 2025 Build Challenge. It encompasses a 20-month competition to design and build a high-performance, resilient house designed with a team's specific community in mind.

UBCO team shines at international event with a living light bulb

The an inter-disciplinary UBCO team earned a gold medal at the International Genetically engineered Machine (iGem) Competition in Paris. Their creation, called Life Bulb, is not reliant on electricity and can convert greenhouse gases into oxygen.

iGem is a synthetic biology competition that involves more than 350 teams from more than 40 countries.

The UBCO team included 16 students from backgrounds in biology, chemistry, engineering, computer science and management. In addition to faculty advisors from the Irving K. Barber Faculty of Science and the School of Engineering, the team consulted with various stakeholders and industry professionals during the creation process.

ENGINEERING GRADUATE STUDENTS RECEIVE PRETIGIOUS AWARD

Killam Doctoral Scholarships are the most prestigious awards available to graduate students at UBC. The purpose of the scholarship is to support advanced education and research. Killam Doctoral Scholarships are awarded to students who are likely to advance learning or win distinction in a profession. And, for the first time, five UBC Okanagan students have won Killam Doctoral Scholarships!

This year's winners include engineering students Alexander MacGillivray, Rubaiya Rumman, and Kishoare Tamanna.

PHD STUDENT AWARDED A JOHN TIEDJE FELLOWSHIP

Siddha Moutoshi Shome is a 2023 recipient of a John Tiedje Fellowships in Clean Energy and Greenhouse Gas Mitigation. The fellowships are awarded to students whose research help create and maintain a healthy environment, with preference for research developing clean and renewable energy, advancing the electrification of the economy, reducing greenhouse gas emissions, or improving the efficiency of energy utilization.

TWO GRADUATE STUDENTS AWARDED SPIE AWARDS

Each year, the Society of Photographic Instrumentation Engineers (SPIE) awards scholarships to 72 outstanding SPIE Student Members based on their potential contribution to optics and photonics, or a related discipline.

Malley Richardson, who recently completed her BAsC at the School of Engineering and is a research assistant with the Collier Research Group has been awarded the 2023 Teddi Laurin Scholarship by SPIE. The Scholarship aims to raise awareness of optics and photonics, and to foster growth and success in the photonics industry by supporting students involved in photonics.

The Laser Technology, Engineering, Applications Scholarship by SPIE recognizes contributions to the field of laser technology, engineering, or applications. This year's recipient is Alexis Guidi, a MASc student in the Integrated Optics Laboratory at UBC Okanagan.

Teaching Excellence

CURRICULUM DEVELOPMENT

DR. CLAIRE YAN

2023 recipient of the Provost Teaching Excellence and Innovation Award

Since joining UBC Okanagan in 2008, Dr. Claire Yan has strongly impacted the student experience in the School of Engineering and plays an instrumental role in making engineering accessible for current and future generations of scholars. Beyond her invaluable contributions to the school's engineering curriculum, Dr. Yan's impacts extend far beyond the classroom through her leadership in developing innovative outreach and bridge programs and creating open education resources.



INNOVATIVE PEDAGOGY

DR. PEYMAN YOUSEFI

2023 recipient of the Provost Teaching Excellence and Innovation Award

Dr. Peyman Yousefi has made significant impacts on the teaching and learning community since he first joined this campus in 2016 as a PhD student. Now a dedicated engineering educator and faculty member, Dr. Yousefi has earned a strong reputation for educational innovation and teaching excellence through incorporating new technologies in his classroom and ongoing commitment to the scholarship of teaching and learning. He was also the recipient (along with Claire Yan and Ernest Goh) of a UBC Okanagan ALT-2040 Fund Award (OER Focus Stream), for a project titled "Engineering Dynamics for the Modern World: An Inclusive and Interactive Digital Open Textbook for Engineering Students."



PROVOST'S AWARD FOR TEACHING ASSISTANTS AND TUTORS

Recognize exceptional undergraduate and graduate teaching assistants and tutors for their contributions to academic life at UBC's Okanagan campus. We are proud to recognize this year's award recipients:

Dylan Goode - School of Engineering

Mehrnaz Makuei - School of Engineering

Moustafa Mansour - School of Engineering

Alon Eisenstein receives UBC Okanagan Teaching Fellowship

The Teaching Fellow Award recognizes instructors with outstanding teaching, scholarship, and educational leadership activities who contribute broadly to the teaching and learning mission on the Okanagan campus. A key component of the recognition is contributing to the community and Centre for Teaching, Learning and Technology (CTL) and UBC priorities and events. As part of this recognition, Dr. Eisenstein will serve as a connection between the CTL and the School of Engineering through participation in the CTL advisory committee to help direct its priorities.

Dr. Eisenstein connects his passion for teaching and learning with his knowledge and expertise in entrepreneurship then bridges that with engineering. The combination brings our students and Dr. Eisenstein's colleagues a rich tapestry of pedagogy that benefits everyone.

Dr. Eisenstein is one of the founders of UBC Okanagan's interdisciplinary leadership community of practice where he works with faculty from a variety of programs to share ideas and techniques for integrating leadership into the curriculum.



Having a strong foundation in cooperative education programs as well as practicums, other modalities of work-integrated and community-based learning, can offer all disciplines a richer and deeper learning experience that is grounded in experiential education philosophy, facilitated by critical reflection.

Alon Eisenstein, assistant professor of teaching

Student & Alumni Success

With over 2000 graduates since the first graduating class in 2009, School of Engineering alumni are becoming a major force throughout industry and academia in Canada and around the world. The lessons they learned at UBC and the networks they developed serve as the foundation of their success.

2022 Convocation Numbers

23	PhD	26	MEng
35	MASc	326	BASc





New art installation, created by artist Krista-Belle Stewart and Secwépemc artist Tania Willard situated outside the Engineering Management and Education building, was unveiled as part of UBC Okanagan's School of Engineering 14 Not Forgotten ceremony in December 2022. The memorial also honours the lives and legacies of missing and murdered Indigenous women and girls, and 2SLGBTQIA+ people.



Research Headlines

NEW NET ZERO HOME IS READY TO BE EXPLORED

A unique, made-in-Kelowna collaboration to create an energy-efficient, high-performance home is taking the goal to the next level - **Shahria Alam**



NEW RESEARCH IMPROVES THE COOLNESS FACTOR FOR ATHLETES

Thanks to a new collaboration with Lululemon, UBCO researchers and their partners are working to develop a next-generation fabric that will keep a person warm, dry and comfortable regardless of temperature and level of exertion - **Farzan Gholamrez**



BETTER UNDERSTANDING TRAVEL BEHAVIOUR WILL HELP CLEAR PATH TO GREENER FUTURE

New funding paves the way to an inter-disciplinary project that will assess the impact of travel behaviour changes and alternative strategies, such as work-from-home and mobility pricing - **Mahmudur Fatmi**



ENGINEERS DIVE INTO LOCAL FLOOD RECOVERY AND PREVENTION

Evaluating hydrothermal liquefaction as a means to sustainably convert sludge waste into a renewable energy source - **Rehan Sadiq and Sadia Ishaq**

RECOVERING VITAL RESOURCES

New technique can extract and recycle phosphorous from municipal waste - **Cigdem Eskicioglu and Huan Liu**



INVESTIGATING NEW USE FOR PLASTIC BOTTLES

Researchers investigate new ways to use discarded plastics, diverting them from landfills, and using them to stabilize cover materials within landfills - **Sumi Siddiqua and Alok Chandra**

REIMAGINING EDUCATION THROUGH INNOVATIVE APPROACHES

Engineering lecturer engages students with forward-thinking approaches and real-world applications - **Peyman Yousefi**

UBCO RESEARCHERS ENERGIZE FRUIT WASTE

UBC Okanagan researchers are looking at the potential of using fruit waste—both solid and leachate—to power fuel cells - **Nicolas Peleato, Deborah Roberts and Hirra Zafar**

AUGMENTED REALITY HOLDS POTENTIAL KEY TO STREAMLINING REMOTE CONSTRUCTION

Despite harsh conditions and a small workforce, new research from UBC Okanagan suggests Augmented Reality (AR) could improve the efficiency of remote construction projects - **Kantheepan Yogeewaran and Qian Chen**

ULTRASONIC SENSORS CAN SAFEGUARD RESIDENTIAL GAS LINES

A team of UBC Okanagan researchers is investigating a new method to monitor underground gas pipelines with high-tech sensors that can make it easier to find weaknesses, discrepancies and even a diversion in residential natural gas lines - **Anas Chaaban and Abdullah Zayat**

ROOTS ARE TAKING SHAPE FOR UBC OKANAGAN'S INDIGENOUS MICRO-FOREST

New funding from UBC's Indigenous Strategic Initiatives Fund (ISI Fund) will enable relationship building with the Syilx Okanagan People in support of establishing an Indigenous-inspired natural space for teaching and learning - **Alon Eisenstein**

BREAKING THE ICE

New research aims to keep planes and wind turbines ice-free - **Mohammad Zarifi and Zahra Azimi Dijvejin**

WHERE THE RUBBER HITS THE ROAD

UBC Okanagan researchers suggests an increasing amount of microplastics—fragments from tires and roadways—are ending up in lakes and streams - **Rehan Sadiq and Haroon Mian**

INDUSTRY PARTNERSHIP PROVIDES A BOOST IN UBCO BATTERY RESEARCH

New industry support establishes first university-based battery prototyping facility in western Canada - **Jian Liu**

I'm grateful for the perspective I gained while attending the School of Engineering.

**Solomon Thiessen (BASc, Electrical '23)
Recipient of the 2023 EGBC Certificate in Engineering**



Pictured: Alyse Keisser, Civil Engineering Assistant Professor

Funding Announcement Highlights

Canada Foundation for Innovation (CFI) John R. Evans Leaders Fund (JELF)

Smart Analytics Lab for Modelling Advanced and Livable Infrastructure Systems (\$111,995)

Principal Investigator: **Suliman Gargoum**

Emerging Technologies for Optical Wireless Communications (\$399,338)

Principal Investigator: **Jonathan Holzman**

Applied Microbial Systems Ecology: An Integrated Approach to Stable Bioprocesses (\$125,000)

Principal Investigator: **Alyse Kiesser**

Multi-Axial Subassemblage Test System (MAST) to Develop Resilient and Sustainable High-rise Buildings (\$619,000)

Principal Investigator: **Lisa Tobber**

Natural Sciences and Engineering Research Council of Canada (NSERC) Discovery Grants

Digital and responsive systems for construction supply chain integration and construction circular economy (\$172,500)

Principal Investigator: **Qian Chen**

Intelligent Wireless Robotic Communications (\$345,000)

Principal Investigator: **Julian Cheng**

Terahertz spectroscopy and microfluidic devices for agri-food applications (\$250,000)

Principal Investigator: **Christopher Collier**

Emerging Technologies for Wireless Communication Systems (\$210,000)

Principal Investigator: **Jonathan Holzman**

Interfacial Phenomena in Next-Generation Energy Storage Technologies (\$295,000)

Principal Investigator: **Jian Liu**

Data-driven modeling and control for safety-critical applications (\$172,500)

Principal Investigator: **Klaske van Heusden**

In-situ Analysis of Mass and Mechanical Changes of Interfaces and Interphases in Energy Storage Systems by Electrochemical Quartz Crystal Microbalance with Dissipation Monitoring (NSERC Research Tools & Instruments \$139,618)

Principal Investigator: **Jian Liu**

SCHOOL OF ENGINEERING OPERATING BUDGET

As of August 2023, the School of Engineering has 76 Faculty members and 43 staff.

Operating Expenses	Capital Expenses, Salaries and Benefits	Total Expenses
\$913,000	\$16,305,000	\$17.043M

Note from School of Engineering Director Will Hughes: "While data paints a picture, there is also important substance behind data. When it comes to the School, we carefully review and interpret our numbers throughout the year. but ultimately it is the quality and impact of our work that has a lasting influence."

2022/23 RESEARCH PROJECTS

17%	Electrical - 59
37%	Civil - 126
2%	Manufacturing - 6
42%	Mechanical - 146

FUNDING BY SOURCE

31%	Tri-Council Funding \$5,245,723
3%	Infrastructure \$532,745
11%	UBC Internal Funding \$1,814,034
54%	Other External Funding \$9,151,193

PUBLICATIONS

1421	Scholarly outputs 2020 - 2023
>15k	Citation count during that period
10.6	Citations per publication
1.59	Field-weighted citation impact

*According to SciVal



2022/23 Funding

FUNDING BY DISCIPLINE

Civil Engineering	\$6,183,966
Electrical Engineering	\$3,683,590
Manufacturing Engineering	\$370,477
Mechanical Engineering	\$6,362,260
Other	\$301,246



Disseminating research

Master's of Applied Science student Rita Lam's research presentation on healthy building design and infectious disease control in built environments hit home with the audience at this year's Three Minute Thesis final. A timely topic combined with impeccable delivery and audience engagement helped her secure the top spot at this year's competition.

She shared her research into the effect of indoor daylight on the microbiome within a building through a newly developed electrochromic smart window.

As the winner of the UBC Okanagan competition, Lam represented UBC Okanagan at the Western Regional Three Minute Thesis Competition at the University of Saskatchewan where she placed third.

Research Excellence

Our Clusters of Research Excellence are interdisciplinary networks of researchers focused on solving key challenges facing society.

The Battery Innovation Cluster will take a holistic approach to creating renewable solid-state batteries that meet the increasing demand for environmentally responsible energy sources.

Cluster Lead: **Jian Liu**

Research Team includes: Michael Benoit, Kasun Hewage, Rehan Sadiq, and Babak Tosarkani

The Build Better Cluster will investigate solutions to improve reinforced concrete for building tall, high-density, sustainable and resilient housing.

Cluster Leads: **Lisa Tobber and Solomon Tesfamariam**

Research Team includes: Qian Chen

The Solar Energy Cluster will develop solutions and reduce greenhouse gas emissions by identifying low-cost materials for high-volume manufacturing, developing advanced devices, and examine power grid challenges for solar energy integration.

Cluster Lead: **Alexander R. Uhl**

Research Team includes: Jonathan Holzman, Jian Liu, Walter Merida, and Stephen K. O'Leary

Elevated to IEEE Fellow

An expert in digital communications and signal processing, Dr. Cheng is a global leader in optical and radio frequency (RF) wireless communication and optical technology research. His research has advanced multiple access techniques and beyond 5G wireless technologies and has applications in machine and deep learning, quantum communications and blockchain technology.

Each year, following a rigorous evaluation procedure, the IEEE Fellow Committee recommends a select group of recipients for elevation to IEEE Fellow. Less than 0.1% of voting members are selected annually for this member grade elevation. IEEE recognized Dr. Cheng for contributions to mathematical modelling of wireless systems and energy-efficient resource management of wireless networks.

In 2023, Dr. Cheng was also awarded a UBCO Principal's Research Chair in Wireless Communications (Tier 1). In this role, he will develop next-generation wireless technologies and integrate artificial intelligence into wireless networks.

Other Awards & Recognition

Jian Liu

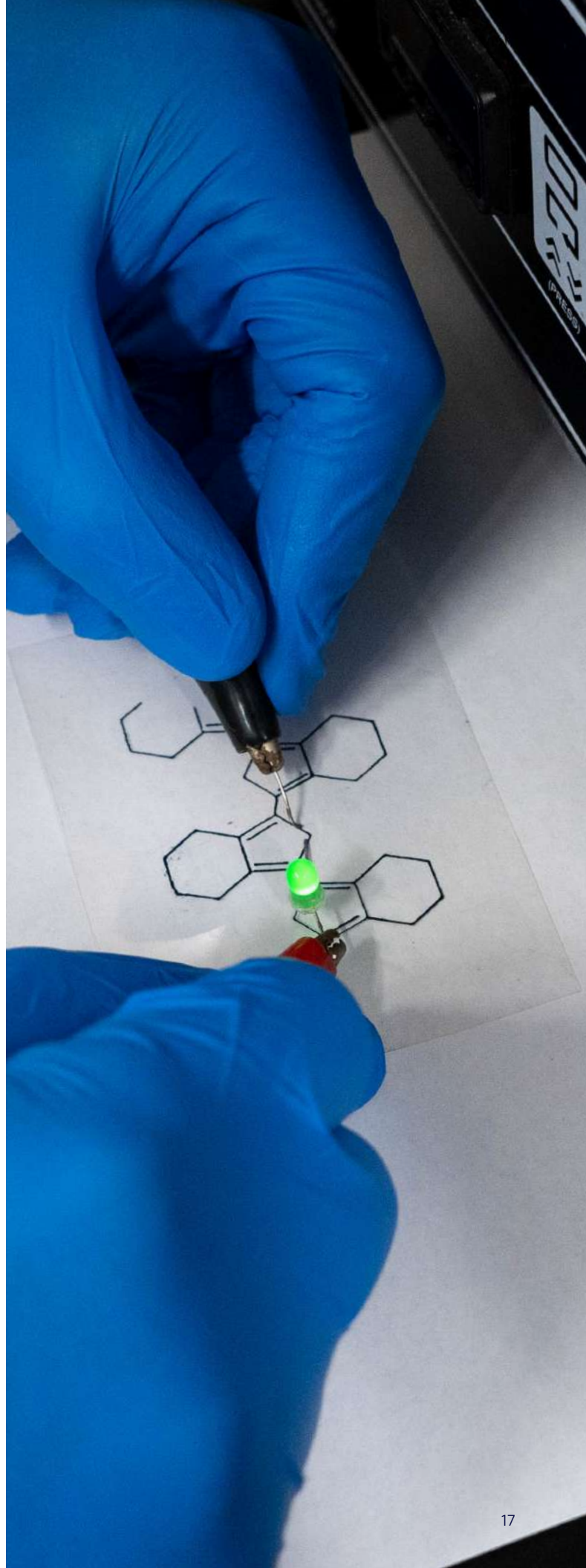
UBC Killam Accelerator Research Fellowship

Mohammad Arjmand

UBC Killam Research Prize (Junior Category)

Rehan Sadiq

Fellow to the Engineering Institute of Canada (EIC)





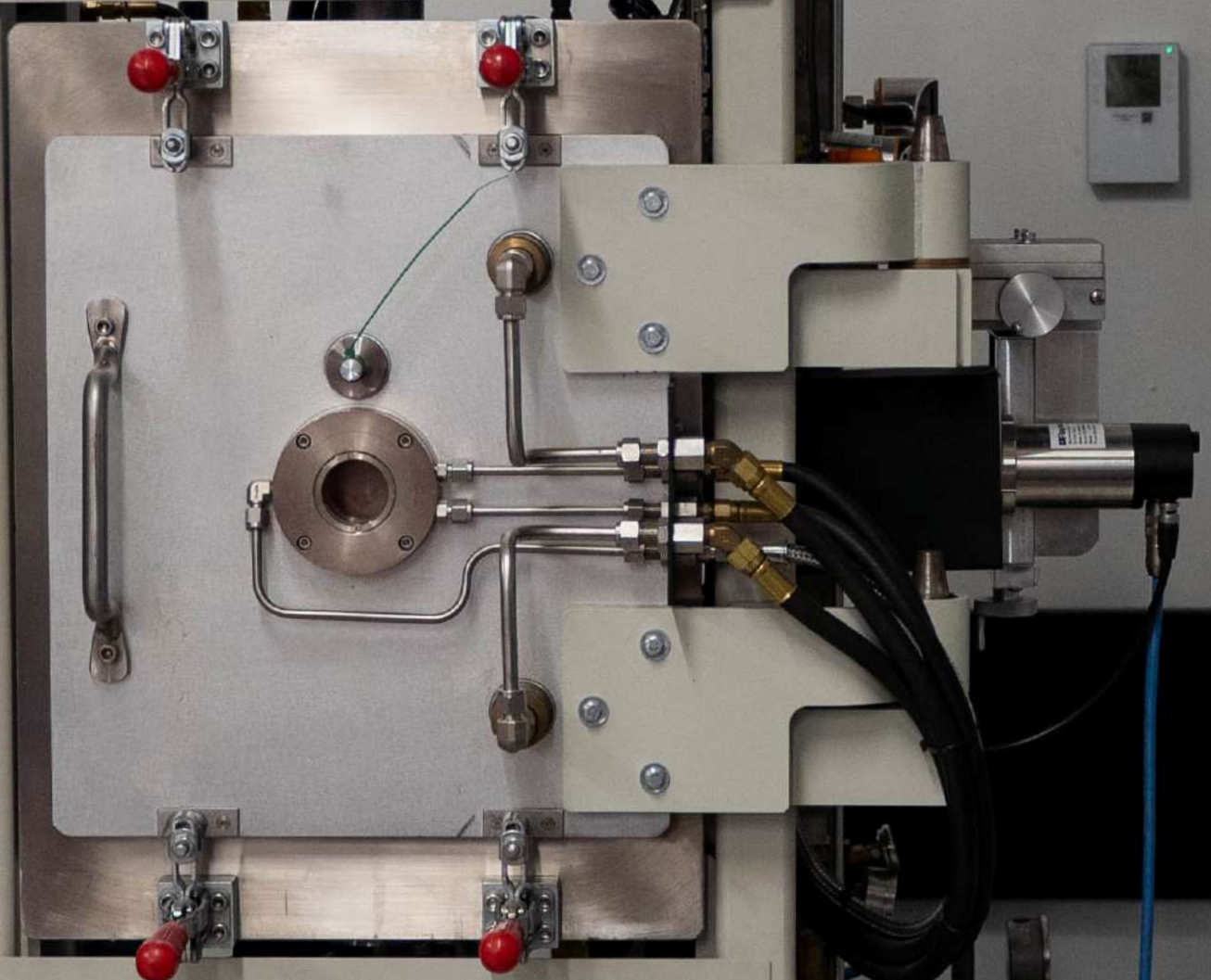
CHAMBER



WINDOW



CHAMBER PRESSURE



HYDRAULIC RAM CONTROL



RAM
ENABLE



RAM JOG
READY

PRESS



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