

EXCELLENCE IN ENGINEERING

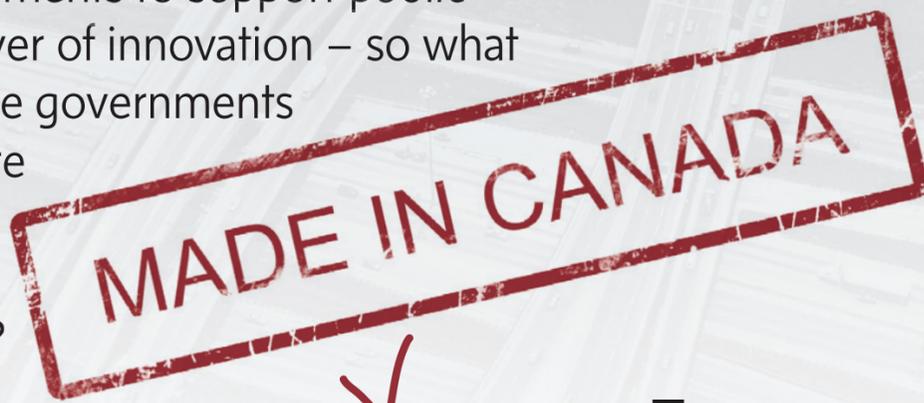
THE 2016 ONTARIO PROFESSIONAL ENGINEERS AWARDS GALA

THE GLOBE AND MAIL

FRIDAY, NOVEMBER 4, 2016

SECTION OPEA

There are strong arguments to support public procurement as a driver of innovation – so what is required to convince governments in Canada to buy more groundbreaking technologies from domestic companies?



A better policy

The call to reform procurement methods to support innovative sectors

Environments that drive innovation are usually described as places that combine fiscal incentives with infrastructures and programs such as business incubators, technology clusters, leading-edge universities, and robust communication and transportation networks.

But a key factor that's often overlooked is government procurement from domestic companies that provide innovative products and services.

"Simply put, procurement isn't a hot or flashy topic, but it could be," says Sandro Perruzza, CEO of the Ontario Society of Professional Engineers (OSPE). "Governments need to put their money where their mouths are, so to speak, and start actively reforming procurement methods to not only support innovative sectors and their broader innovation agendas and strategies, but also to deliver better value for money to taxpayers."

Mr. Perruzza's observations are backed by numerous studies, includ-



"Government procurement is a clear opportunity to signal to business that Ontario is the place for innovative entrepreneurs, and it could spur the development of wholly new industries and the next 'big companies' of this era to call Ontario home."

Sandro Perruzza
is CEO of the Ontario Society of Professional Engineers

ing a Swedish government study that looked at procurement practices in a neighbouring country and uncovered an intriguing fact: between 1948 and 1998, public procurement accounted for almost half of projects that led to successful innovation in Finland.

This issue is particularly important to the engineering profession, because engineering and entrepreneurship have always gone hand in hand.

Engineers have the trained ability to evaluate current trends and predict future societal needs. They have the technical expertise to develop new technologies and services to meet those needs, and the analytical mindset to continually make improvements, so that new ventures remain competitive and relevant. OSPE's role involves consistently reminding government that with over 200,000 engineers and engineering alumni in the province, Ontario has a lot to give. Ontario's engineers are taking on today's challenges to further a sustainable society

that brings a high quality of life to its citizens, while protecting the land on which we live.

"Engineering has a very rich history in this province, both in terms of innovation and the quality of work that is done," says George Comrie, M.Eng., P.Eng., CMC, FEC, president of Professional Engineers Ontario, whose mission is to regulate and advance the practice of engineering to protect the public interest.

"Through their licence, professional engineers make a commitment to enhancing people's quality of life, health, safety and well-being, and a dedication to protecting the environment."

Another study, conducted by Deloitte about seven years ago for the Ontario Environment Industry Association (ONEIA), points to opportunities for the provincial government to lead in the adoption of new technologies and set efficiency, waste and emissions targets for public contracts and public buildings.

"We need to get to the point where innovative and environmentally progressive purchasing is the norm and not something that's considered novel," says Alex Gill, ONEIA's executive director. "Governments are the biggest procurer of services and goods, but they still haven't realized the full breadth of what they could be doing."

The imperative to allocate more of the public purse towards locally supplied innovative products and services is underpinned by two key issues, notes Mr. Perruzza. The first is the need to fuel full-time job creation in the face of declining foreign direct investments from large international companies that set up shop in Ontario or other parts of the country.

The second issue stems from the fact that many of today's innovations flow from individual entrepreneurs or small startups – and governments need to demonstrate that their jurisdictions are where these successful businesses of the future need to be today.

"The innovative outputs of these fledgling entrepreneurs are moving faster than government decision-making has been able to capitalize on it," says Mr. Perruzza. "Government procurement is a clear opportunity to signal to business that Ontario is the place for innovative entrepreneurs, and it could spur the development of wholly new industries and the next 'big companies' of this era to call Ontario home."

Mr. Gill at ONEIA says governments' role as market makers go beyond **Procurement, Page OPEA 3**

ABOUT

2016 ONTARIO PROFESSIONAL ENGINEERS AWARDS GALA

Since 1947, the Ontario Professional Engineers Awards have recognized professional engineers in Ontario who have made outstanding contributions to their profession and their community. Professional Engineers Ontario and the Ontario Society of Professional Engineers are proud to co-host the awards gala in celebration of the very best of engineering. This year's gala will feature keynote speaker John Molloy, managing director of Southeastern Ontario Angel Network (SOAN) and chairman of the Regional Innovation Centre, Launch Lab. Awards will be presented for young engineer, research and development, engineering excellence, in addition to the Citizenship Award and Gold Medal.

For more information, please visit www.ospe.on.ca/oepa.

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COMMITTED TO THE FUTURE OF ENGINEERING

In Ontario, the engineering profession has two sister organizations that are strongly committed to the future of engineering, as well as celebrating engineering excellence. Although Professional Engineers Ontario and the Ontario Society of Professional Engineers have different mandates, the organizations have been working in partnership to advance the profession for many years.



REGULATES

The mission of Professional Engineers Ontario (PEO) is to regulate and advance the practice of engineering to protect the public interest.

- Licensing individuals who have met the rigorous qualifications
- Disciplining licence holders who fail to maintain the profession's technical and ethical standards
- Ensuring that only licence holders practise professional engineering
- Establishing and maintaining standards of practice

PEO and OSPE work together for the future of engineering in Ontario

OSPE and PEO partner to celebrate the engineering profession by participating in National Engineering Month activities every March and by co-hosting the annual Ontario Professional Engineers Awards gala in November. The organizations also work together to promote engineering licensure as well as their respective programs to help international engineering graduates pursue licensure.



ADVOCATES

The Ontario Society of Professional Engineers (OSPE) is the advocacy association and voice of the engineering profession in Ontario, representing the entire engineering community.

- Influencing public policy
- Building awareness of the many ways engineering enhances Ontario's economy and quality of life

INSIDE

The innovation culture at McMaster Engineering. **OPEA 2**

Improving testing efficacy with the help of paper. **OPEA 3**

Meet the 2016 OPEA winners. **OPEA 4**

A sustainable solution for the world's water needs. **OPEA 6**



2016 ONTARIO PROFESSIONAL ENGINEERS AWARDS
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ONTARIO PROFESSIONAL ENGINEERS AWARDS

THINKERS AND LEADERS

Engineers must be intellectually and socially aware to be innovative



Innovation is embedded in the culture of McMaster University's Faculty of Engineering, says Dean Ishwar K. Puri.

The ability to anticipate, understand and innovate solutions to society's needs is inherent in the faculty's approach to education, where the focus is on building thinkers and future leaders, says Dr. Puri.

While engineers require rigorous technical capabilities, they must also be intellectually and socially aware to be innovative, says Dr. Puri.

Developing these leaders to think creatively and strategically requires that the process start early during their university education, he adds.

"We must ensure that our students are aware that important pathways exist for them to assume leadership, not only in industry and in commerce, but in the various facets of society, such as politics, non-governmental organizations and policy think-tanks.

"An educator who is truly vested in benefits for one's region, province, nation and world must think of today's engineering education far differently than it was a few decades ago," he says.

Throughout its 58-year history, the engineering faculty has constantly innovated its programs to prepare engineers for the diverse and complex challenges they will face, ranging from equity for all populations and human rights to climate change. These are problems that can't just be solved with only an engineering solution, says Dr. Puri.

"Engineers have to work with people outside of their disciplines, adopting different nomenclatures and lenses in order to look at the problem," he adds.

The Engineering and Society program, for example, has a foundation in sustainability as a base from which to explore grand challenges such as climate change, diminishing resources and extraction efficiency, referred to by Dr. Puri as the "wicked problems" of the world.

Pending final approval is another avenue of learning intended to position students to solve society's challenges,



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Dr. Ishwar K. Puri
is dean of engineering at McMaster University

the Integrated Biomedical Engineering and Health Sciences (IBEHS), a program that integrates aspects of engineering and health sciences to provide an education in either biomedical engineering or health sciences and entrepreneurship.

Dr. Puri also highlights the Engineering and Management program that gives students the option to pursue any discipline of engineering and also take business courses. Students graduate with an engineering degree and a designation in business, and can continue with management courses at McMaster for a year to gain an MBA.

But, he says, the faculty's vision of entrepreneurship is broader than simply business or startups that develop different processes and products.

"We also encourage our students to think about social entrepreneurship. Innovation, entrepreneurship and globalization can overlook a segment in our society, which has been unable to leverage and make use of the global knowledge society, he says. "By focusing on both the business aspects of entrepreneurship and exposing pathways toward social entrepreneurship, we hope to improve the lives of those

who participate fully in the knowledge society and also those who have been less fortunate in this context."

Dr. Puri divides his faculty's teaching into two distinct areas: providing perishable and durable skills to graduates. Perishable skills are highly technical, rooted in mathematics, physics and chemistry.

"They are very important for a graduate to become technically com-

petent. However, if you don't use these skills, you lose them. They're perishable," he says.

Looking ahead, Dr. Puri says that his engineering faculty is strengthening its focus on durable skills. He defines these as the transferable skills that are necessary to move graduates into leadership positions.

"These are skills related to teamwork, communication and presentation. Through these, graduates improve their emotional IQ, how they relate to other people, their empathy. This makes them into better citizens and better graduates," he says.

Meanwhile, Dr. Puri welcomed the Government of Canada's and the Province of Ontario's \$43-million investment in science and engineering teaching and research labs at McMaster. The funding is part of a massive \$75-million project that will support the repair and retrofit of existing labs in the Arthur Bourns Building, the construction of a new addition to that building, and improve energy efficiency.

"We're going to build a world-class space centred around student collaboration, student learning about innovation and specifically on research into bio-innovation. We are aiming to build one of the world's premier bio-innovation hubs and clusters through McMaster Engineering," says Dr. Puri.

GOVERNMENT INVESTMENT IN MCMASTER LABS

The Government of Canada and Province of Ontario are investing \$43-million in engineering and science teaching and research labs at McMaster as part of a massive \$75-million project.

The funding will support the repair and retrofit of existing labs with a focus on bio-innovation, plus the construction of a new six-storey addition to that building.

As a result of these investments, students, professors and researchers will work in state-of-the-art facilities advancing the world's best research. They will collaborate in specially designed spaces that support lifelong learning and skills training.

They will work in close proximity with partners to turn discoveries into products or services. In the process, they will train for – and invent – the high-value jobs of the future. Their discoveries will plant the seeds for the next generation of innovators.



INNOVATION IS IN OUR DNA

At McMaster Engineering, innovation is in our DNA. It's embedded in our bones.

Assistant professor Kathryn Grandfield uses high-powered microscopes and a 3-D imaging technique called electron tomography to look at how implants bond to bone at the nanoscale.

Soon, bio-innovation researchers like Kathryn will have more space to advance the world's best research.

Thanks to a recent \$43 million investment from the government of Canada and province of Ontario, McMaster University engineering and science researchers will have new state-of-the-art facilities.

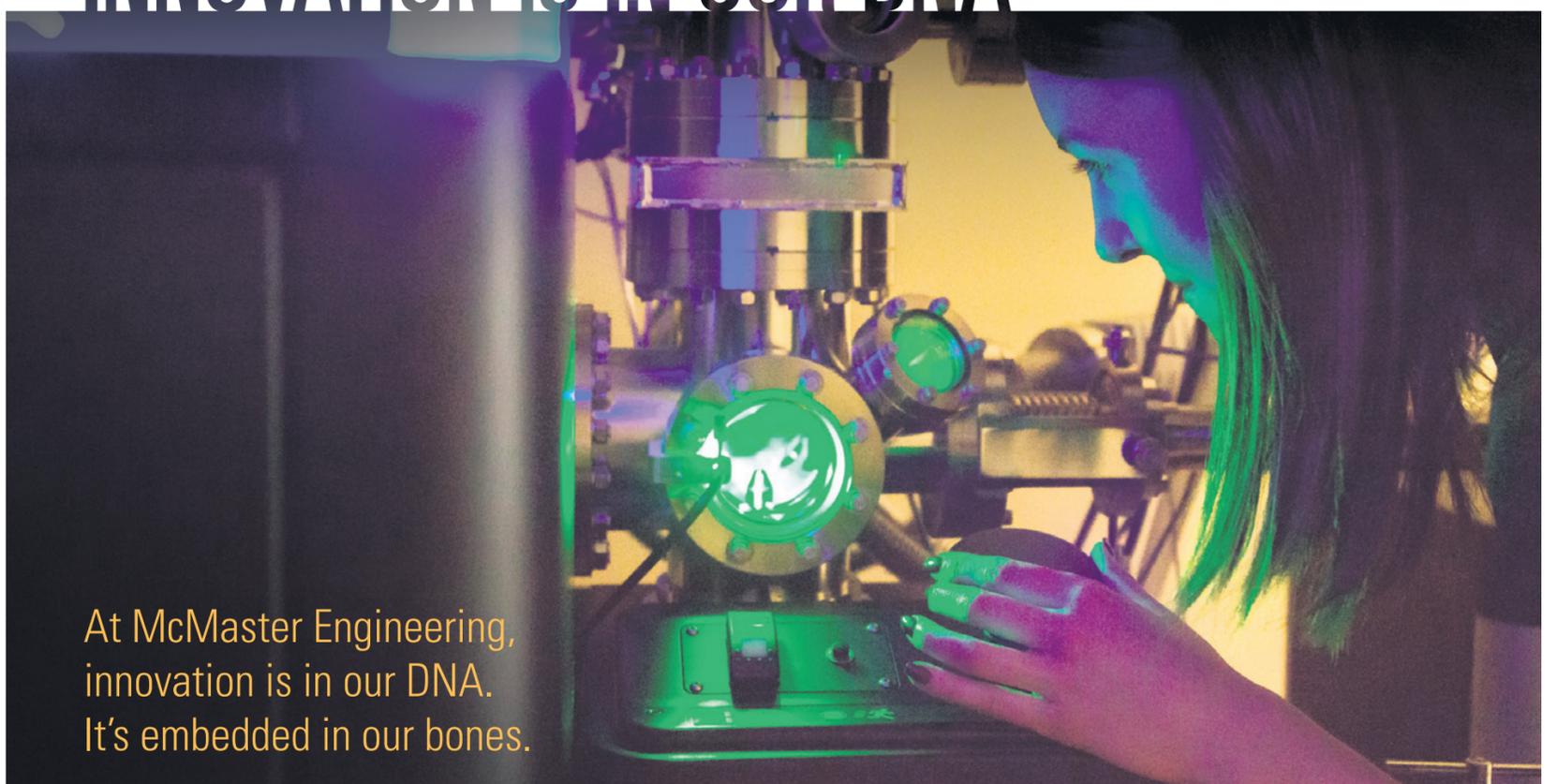
This is the single largest government investment in laboratories and research capacity in the University's history and part of a massive \$75 million project.

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Prof. Brendan MacDonald and his team have developed a pen-shaped device that helps health care providers in Vietnam test for hepatitis B. SUPPLIED

FOCUS ON PAPER

UOIT team tackles testing efficacy, affordability and accessibility

It's not a stretch to view testing as crucial to the advancement of civilization: it identifies everything from water potability to contaminants in our atmosphere, as well as diseases both airborne and within our bodies.

But testing efficacy, along with affordability and accessibility, is an ongoing challenge for both developed and developing countries – which is why Brendan MacDonald and his six-member team of grad students at his lab at the University of Ontario Institute of Technology are relying on an unusual material to improve testing capabilities: paper.

A mechanical engineer, Prof. MacDonald is quite at home amid test tubes and beakers, researching paper-based microfluidics that involves the analysis of fluid flows through paper fibres. "There's considerable crossover in the mechanical and chemical engineering realms, and in my lab both are required to achieve our goal of solving large-scale sustainable energy and global health challenges," he says.

Prof. MacDonald and his team have already transformed their ideas into practical devices, case in point: a pen-shaped device that helped health care providers in Vietnam test for hepatitis B. "People in Vietnam need to be tested without having to go through the time and cost of lab analysis," he says.

The device itself contains a sharp point that delivers a finger prick; a chemically infused paper membrane collects the blood, and a simple change of colour indicates whether or not the patient has the disease.

Prof. MacDonald recalls how he and his colleagues came upon the idea of the device: "There we were in the lab in 2012, brainstorming while absent-mindedly clicking our pens and tapping them on tabletops – and we suddenly saw what we were holding and realized it was the perfect vessel for field use."

With funding help from Grand Challenges Canada the team has also

developed a T-shaped device that was recently used to test for arsenic in groundwater in Bangladesh, where the bedrock reportedly contains some of the greatest concentrations of the poisonous substance in the world.

As for his lab's focus on paper, he points out that the material has considerable historical precedent. "It's the basis for the classic litmus test and for pregnancy and diabetes testing," he says. "We tell people we're doing the equivalent of pregnancy testing but for everything else – because by infusing paper with the proper chemicals, its testing capabilities seem to be limitless."

The main benefit of paper compared to other delivery methods (such as plastic syringe and pump devices) is that testing is achieved through the simple wicking of liquid – no other manipulation is required; plus, paper is inexpensive, disposable, and made from common materials.

In this regard, Prof. MacDonald's paper research is very much in keeping with his and his colleagues' propensity for taking inspiration from nature – which is also driving some of his other research such as the development of cooling systems based on the supremely efficient evaporation system of the human body.

If all goes well, the lab's work may soon benefit allergy sufferers on a wide scale. "A Waterloo-based start-up company called ExVivo recently approached us with the intention of developing over-the-counter allergy tests using paper, so we're working with them to bring something to market," says Prof. MacDonald.

When asked what inspired him to pursue a life in research, Prof. MacDonald, 36, replies, "When I was growing up, my parents, who were teachers, kept telling me, 'It doesn't matter what you do in life as long as you help people.'"

"Today more than ever, I realize how true that is."

BY THE NUMBERS

1922

Year Professional Engineers Ontario was established

1947

Year the Ontario Professional Engineers Awards was established

2000

Year the Ontario Society of Professional Engineers was established

80,000

Number of P.Eng. licence holders

5,250

Number of holders of a Certificate of Authorization

1,000

Number of Professional Engineers Ontario volunteers

250,000

Number of engineering graduates in Ontario

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FROM PAGE OPEA 1

Procurement: Make innovation a key metric

their own jurisdictions. Government procurement and use of a product or service are, in essence, endorsements that boost credibility among other potential buyers, including those in other foreign markets.

"Within the environment industry, prospective buyers will typically ask about usability case studies for a particular technology," says Mr. Gill. "To be able to say it's been adopted by a government in Canada – that's a big plus."

So given the solid arguments for public procurement as a driver of innovation, why aren't governments in Canada buying more groundbreaking technologies from domestic companies?

"The biggest barrier is the phrase 'but we've always done it this way,'" says Mr. Gill. "And one of the things governments have always done is look at initial pricing, full stop, instead of factoring in lifecycle and total ownership costs to determine the best value for taxpayer dollars."

As an example, he cites high-tech heating and lighting controls that automatically adjust temperatures and switch lights on and off based on real-time usage.

"Those have higher upfront costs, but over the lifetime of that facility will result in significant savings,"

says Mr. Gill.

Mr. Perruzza agrees. Innovative new technologies are, in general, more efficient and robust than their conventional counterparts, he says. So while they may come with a higher price tag, they cost less to operate and maintain, and will also last longer.

With the Ontario and federal governments poised to stimulate economic growth through massive infrastructure investments, public procurement policies should be reviewed – and adjusted – to ensure purchase decisions are made with innovation as a key metric as well as an end-goal.

"Ontario is home to many innovative companies that have longer-lasting, stronger, smarter and scalable, interchangeable technologies that won't be used for our own investments unless government acts to recognize their value-add and reform the current lowest-bid procurement methodology," says Mr. Perruzza. "It takes a leap of faith for some, but for technical audiences like the engineering community, the decision could not be more clear: invest in what will last, invest in what is equipped for where technology is headed – not just where it is now – and in doing so, you will build a showcase to the world for our home-grown businesses."

ONTARIO PROFESSIONAL ENGINEERS AWARDS

Award winners boost Ontario's

The Ontario Professional Engineers Awards (OPEA) celebrate the accomplishments of the province's engineers. The awards recognize engineers' contributions to the well-being of the profession, and honour their commitment to innovation and excellence. The recipients of these awards will be honoured at the OPEA Gala in Mississauga on November 19. Here, they share their views of the profession and its role in solving the wide-ranging challenges facing communities in Canada and around the world.



LARRY SEELEY

M.A.Sc., PhD, P.Eng.
Chair and CEO, Seeley Group

GOLD MEDAL

Through a spectacular commitment to research, pursuit of innovative technologies and strong entrepreneurial skills, Larry Seeley has become an internationally recognized leader in

developing successful mining and metallurgical processes, and profitable Canadian businesses.

In 1971, Dr. Seeley began a 24-year career with Falconbridge Ltd. in Sudbury, taking on several research and operational roles to enhance the recovery of nickel, copper and cobalt, and to improve the environmental impact of these operations by reducing emissions and restoring mining sites to greenfield conditions.

In 1992, he took on the newly created role of vice president of environmental services, where he developed and implemented both environmental and safety accountability frameworks for every role within the organization. He also fostered remediation of approximately 100 Falconbridge properties across Canada and oversaw the creation of the company's first annual Public Environmental Report.

In 1995, he facilitated the management buyout of Lakefield Research Ltd. from Falconbridge and led its growth from 120 employees to more than 1,000 employees, and its evolution into the premier research and development

facility for the mining industry with Canadian and international operations, serving nearly 50 per cent of all projects relating to the development of metal and mineral extraction processes worldwide. This, in part, led to his selection as a recipient of an Engineering Medal in the Entrepreneurship category at the 2003 Ontario Professional Engineers Awards gala.

Dr. Seeley and management sold Lakefield Research to SGS in 2002 and, two years later, he left to become president of startup company Recapture Metals Ltd., which would become a significant producer and recycler of gallium, a rare metal used in electronics, with facilities in Ontario, the United States and Germany.

In 2009, Dr. Seeley negotiated its sale to Neo Material Technologies Inc., where he became vice president of corporate development.

In 2012, Dr. Seeley formed Seeley Group Ltd., which facilitates investments and development in commercial real estate, solar energy production, mining exploration and protein production from canola.

Throughout these endeavours, Dr. Seeley has maintained a keen interest in mentoring young engineers and developing the profession through his volunteer and financial support of numerous cultural, professional and educational institutions. These include the Canadian Metallurgical Society, the Canadian Society of Chemical Engineering, the University of Toronto, Trent University, the University of Ontario Institute of Technology, Cambrian College and Science North.

Dr. Seeley has received numerous other awards such as Fellow and Past President's Memorial Medal of the Canadian Institute of Mining, Metallurgy and Petroleum; Honoree Life Member of Science North; Silver Medal of the Canadian Metallurgical Society; Industrial Practice Award of the Canadian Society of Chemical Engineers; induction into the Engineering Hall of Distinction at the University of Toronto; International Award of the Society of Chemical Industry; Governor Emeritus of Trent University; and Fellow of the Canadian Academy of Engineering and the Engineering Institute of Canada.



GEORGE J. ANDERS

PhD, P.Eng.
President, Anders Consulting; Adjunct Professor, Department of Electrical and Computer Engineering, University of Toronto

ENGINEERING MEDAL – ENGINEERING EXCELLENCE

The contributions of Dr. George Anders to power engineering are recognized worldwide, with the results of his work influencing today's standards and applied in practical applications in industry.

“Engineers solve problems and provide solutions. Take the cell phone. Engineers from many disciplines were involved in developing this technology: somebody had to figure out how to convert voice to electrical signal, another to figure out how to transmit the signal over long distances; another team designed its functionality and how to interact with it. This is engineering. We're very creative people, but society doesn't value our creativity as much as artists.

Engineering permeates every aspect of our life. We design, build and test things, and we also advance knowledge. The majority of great recent developments are built on addressing human needs. It is great work for those with curiosity and who want to try different things.”



VAUGHN BETZ

B.Sc., M.Sc., PhD, P.Eng.
Associate Professor, Department of Electrical and Computer Engineering, University of Toronto

ENGINEERING MEDAL – ENGINEERING EXCELLENCE

Already a pioneer in the modernization of programmable chip technologies in his early career, Dr. Vaughn Betz has since revolutionized their use to allow engineers to rapidly create new hardware systems and realize their design visions.

“I think engineers have had and continue to have a huge impact on the world. We take for granted the huge amount of change that engineering has produced: worldwide ubiquitous communications; medical imaging; the ability to travel immense distances very quickly. The world has been changed profoundly by engineers. But we still face huge challenges with problems like efficiently using resources, providing food and shelter for all, and treating disease. However, engineers are natural problem solvers, and we're well positioned to tackle these issues. We understand how to apply the science and technology that surrounds us and are trained to be analytical, to look at a problem and to find a solution.”



JOHN T.W. YEOW

PhD, P.Eng.
Professor, Systems Design Engineering; Canada Research Chair in Micro/Nano Devices, University of Waterloo; President, ArtSensing Inc.

ENGINEERING MEDAL – ENGINEERING EXCELLENCE

As one of Canada's foremost researchers in microsystems and nanodevices, Dr. John Yeow is pioneering miniature devices and sensors that serve as building blocks for powerful medical instruments in the early diagnosis and treatment of disease.

“I saw the impact engineering has on society through my father's work. He was a civil engineer who worked around the world on different construction projects in both the developed and developing world. He built hospitals and schools in developing countries, and I saw the effects these structures have on local communities.

In my own research, we are trying to develop low-cost medical imaging machines for use in developing countries where health care is harder to access than it is in Canada. My goal as an engineer is to make effective and economical imaging devices for developing countries that lets them provide quality health care for their citizens.”



J. STEWART AITCHISON

B.Sc., PhD, P.Eng.
Professor, Department of Electrical and Computer Engineering, University of Toronto

ENGINEERING MEDAL – RESEARCH & DEVELOPMENT

Dr. Stewart Aitchison has earned a remarkable reputation as an innovative researcher and entrepreneur through his internationally recognized work in non-linear optics, nano-photonics and lab-on-a-chip technology.

“Engineering has broad impacts for communities. I'm most interested in sustainable development and particularly the United Nations Sustainable Development Goals that are seeking solutions around clean water, safe infrastructure and ending poverty. I think in every one of those development goals, engineers have a role to play.

I grew up in a rural community and saw first-hand the need for better water systems, better infrastructure and better access to primary health care. Engineers are critical to developing these kinds of solutions. For example, if you can develop lab-quality tests [for use] in a rural or remote setting, it can deliver better water systems and better infrastructure.

What fires me is the ability to take engineering principles and techniques and develop products and ideas that will help society.”



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SUSAN LOUISE TIGHE

B.Sc., M.Sc., PhD, P.Eng.
Norman W. McLeod Professor of Sustainable Pavement Engineering, Director of the Centre for Pavement and Transportation Technology, and Professor of Civil and Environmental Engineering, University of Waterloo

ENGINEERING MEDAL – RESEARCH & DEVELOPMENT

Recognized globally as a leading authority on pavement composition and performance, Dr. Susan Tighe has made profound contributions to both fundamental research and industry practice.

“I think, globally, engineers have a really important role to play. We’re currently facing a lot of challenges in both the developed and developing world related to water: clean water and water resources that are safe and efficient.

Globally we want to provide communities where people can live safely and securely. In terms of transportation, we want to build infrastructure that is all-season. In many parts of the world, during certain parts of the year, we lose infrastructure – due to monsoons, hurricanes, tornadoes, flooding. Engineers have a key role to play in society because we’re the ones that keep the lights on and keep society functioning. We manage the infrastructure – whether that’s communications, transportation, hygiene or agriculture.

Canadian engineers are well respected internationally, and I feel we have an important role to play in keeping society safe, functioning and well managed.”



EBRAHIM BAGHERI

PhD, P.Eng.
Associate Professor, Department of Electrical Engineering, Ryerson University

ENGINEERING MEDAL – YOUNG ENGINEER

Dr. Ebrahim Bagheri is revolutionizing the way computers interpret user-generated content and how information is shared and interpreted.

“My inspiration for going into engineering happened when I was in high school and we did pasta bridge competitions with a visiting engineer. That’s where I really became interested in engineering – seeing how you can apply science to build simple things that actually work. My inspiration has always been to build things based on science that solve real-world problems.

I am most proud of my students – both current and graduates. We have accomplished so much based on their expertise, brilliance and ideas. I am very excited that my graduates have gone on to successful positions in industry and academia and we still collaborate with them on a regular basis.

I think we should encourage more women and more diversity within engineering. Diversity is what gives you multiple perspectives. In our research, we analyze and crunch social data, which is itself generated by a diverse range of people. Having a diverse team that understands this diversity gives us a better method to understand the data, not only from a technology perspective, but also about the society and community that we live and engage in.”



LIN TAN

PhD, P.Eng.
Associate Professor, Department of Electrical and Computer Engineering, University of Waterloo

ENGINEERING MEDAL – YOUNG ENGINEER

In six short years, Dr. Lin Tan has already proven herself an ingenious researcher poised to rank among the elite in the field of software engineering.

“The impact of my research is very broad. For the research community, our innovations have advanced the state-of-the-art for software dependability. But for people generally, my research impacts people’s daily lives. Because software is everywhere and embedded in our lives and work, by improving software dependability, we’re making software much more reliable and fun to use for everyone. Our work has helped to detect hundreds of bugs, and our technology has been integrated into software that’s been used by millions across the globe.

I would recommend an engineering career because it is exciting. There are always new problems to address. I like it because it’s challenging and interesting and it often leads to well-paid jobs.

Engineering can have very broad impacts. Consider software: it is now pervasive in everything we use – cars, medical devices, phones. It’s hard to imagine a day without software, so it’s highly important that we make it dependable to make everyone’s life better.”



EDUARDO (TED) MAULUCCI

B.Sc., MBA, P.Eng.
Chief Information Officer, Tridel Corporation

CITIZENSHIP AWARD

Leadership, innovation and a commitment to giving back to society have been the backbone of Ted Maulucci’s distinguished career.

“Engineers are builders, designers and problem solvers. The world has a never-ending supply of problems, and I think engineers are well suited to make the world a better place.

The world is fundamentally changing: we have self-driving cars; IBM Watson has created the ability to replace a call centre agent; there has been a shift where technology is wiping out jobs that used to be done by humans. Now, some people look at that and see the sky falling, but generally that’s not what happens. The standard of living has improved globally, and it’s generally improved because of all the efficiency that’s being delivered by technology advancements. And when you look at these new technologies and processes, that’s exactly what engineers do.”



VALERIE DAVIDSON

B.Eng., M.Sc., PhD, P.Eng.
University Professor Emerita, School of Engineering, University of Guelph

CITIZENSHIP AWARD

For more than three decades, Dr. Valerie Davidson has been an exceptional citizen within the engineering community and a dedicated champion of diversity in the profession.

“There are clearly complex problems such as global warming and energy resources that will require the technical expertise of engineers from many different disciplines. However, I think engineers need to understand the broader dimensions of these problems – the social, political and economic factors – in order to effectively contribute to solutions at a global level. I think that’s something most engineers need to develop because their first inclination is to focus on the technical issues and try to solve specific technical problems. But it’s important, when you’re talking about solutions that are going to impact a community, that you understand the social implications for that community.

A career in engineering can mean so many exciting things in terms of the type of work that you do and the projects that you work on. There are new areas of engineering such as biomedical and nano engineering that didn’t even exist when I was an undergraduate.”

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ADSORPTION TECHNOLOGY

Focusing on the world's growing water needs



At one time, Majid Bahrami, P.Eng., may have been regarded as a magician: with a simple-looking device and a few procedures, he can conjure water out of thin air.

But, as the Simon Fraser University (SFU) engineering professor points out, our atmosphere is anything but thin: it contains 13 trillion cubic metres of water that is constantly replenished due to ocean evaporation.

And Prof. Bahrami's device, which measures roughly one metre by two metres by one metre, is firmly grounded in science: the Hybrid Atmospheric Water Generator (HAWgen) uses adsorption technology to collect and extract moisture from the air, even in desert conditions, and filters it for potable use – up to 38 litres per day.

Prof. Bahrami and his PhD student Farshid Bagheri began working on a sustainable solution to the world's

"[the Hybrid Atmospheric Water Generator (HAWgen)] can be used in food production and industrial settings, and it's useful for emergency services in remote locations. We're even hoping to build a system that grows food as well as generates water for drought-stricken countries."

Prof. Majid Bahrami is an engineering professor at Simon Fraser University

growing water needs three years ago in his Laboratory for Alternative Energy Conservation (LAEC) at the SFU Surrey campus.

The major benefit of HAWgen, which would be marketed through Prof. Bahrami's company Watergenics Inc., is that even if the technology were applied on a huge scale, it wouldn't upset the replenishment of atmospheric moisture or the rate of ocean evaporation; but the million-dollar question is, will HAWgen be commercially viable?

Prof. Bahrami, believes it will be. "Yes: it can be used in food production and industrial settings, and it's useful for emergency services in remote locations. We're even hoping to build a system that grows food as well as generates water for drought-stricken countries."

The professor's goals may be achieved sooner than expected depending on the success of HAWgen's

use in the City of Surrey's BioPod Initiative, a lab for researchers to test vertical growing systems, self-watering machines and robotic fruit pickers. "We're building a model that will produce up to 200 litres of water per day

for that project, and we're confident of the outcome," he says.

In the meantime, HAWgen is enjoying a high profile on the awards circuit, with a 2017 Canada Clean50 award for research in September.

LEADING-EDGE COLLABORATIVE RESEARCH



U of T Engineering's newest building, the Centre for Engineering Innovation & Entrepreneurship (CEIE), seen looking southwest over the University of Toronto's Front Campus field. The CEIE is currently under construction on the last buildable footprint on U of T's St. George Campus in downtown Toronto. RENDERING COURTESY OF MONTGOMERY SISAM ARCHITECTS INC. AND FEILDEN CLEGG BRADLEY STUDIOS

The Centre for Engineering Innovation & Entrepreneurship (CEIE) at the University of Toronto will set a new standard for engineering education and research at the premier engineering school in Canada and one of the world's best.

"Multidisciplinary collaboration and innovation are at the heart of the engineering profession. When the Centre for Engineering Innovation & Entrepreneurship opens, it will catalyze diverse partnerships among our faculty, students and industry partners, working across disciplines to address pressing global challenges," says Dr. Cristina Amon, P.Eng., dean of the Faculty of Applied Science & Engineering.

The CEIE will be a lively hub featuring unique collaborative learning and design spaces, as well as space for multidisciplinary research centres, including the Centre for Global Engineering and Institute for Sustainable Energy.

The CEIE boasts advanced sustainable design strategies and smart technologies. It will be one of the most efficient buildings at the University of Toronto, collecting rainwater for landscape irrigation and maximizing air conditioning distribution and heat recovery. Rooftop photovoltaic cells will harness the sun's energy to power the building, and passive solar shading on the building's exterior will minimize solar gain in summer and maximize in winter.



Prof. Majid Bahrami with the Hybrid Atmospheric Water Generator (HAWgen). SUPPLIED



Bell 206 Helicopter Simulator, developed at the Carleton University Visualization and Simulation Centre

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