

ENGINEERING

MORE THAN ONE HUNDRED YEARS OF TEACHING AND RESEARCH EXCELLENCE

14 | SPRING 2020



DALHOUSIE
UNIVERSITY

FACULTY OF ENGINEERING

**THE
ULTRAFAST
ULTRASOUND**

ENHANCING LIVES OF CANCER PATIENTS

ENGINEERING



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CONTRIBUTORS


EDITORIAL

Theresa Anne Salah, Mark Campbell,
Rowan Morrissy

PHOTOGRAPHY Nick Pearce, Daniel Abriel


DESIGN Christin Roper

CONTACT Theresa Anne Salah, Editor,
tasalah@dal.ca

 @DalhousieEngineering

 @DalEngineering

 DalhousieEngineering

 Dalfacultyofeng



Dean's Message

GREETINGS TO OUR ENGINEERING COMMUNITY. I would like to begin by wishing you health and safety. The COVID-19 pandemic reminds us that we can never take such things for granted.

It's been a challenging time for our Faculty, our University and for each and every one of you around the world. As we've learned to adjust our daily lives to this unprecedented time, the safety, health and well-being of our students, faculty and staff have been amongst our top priorities.

Over the past few months, so much has changed within our Faculty. We've been able to swiftly move all of our Winter 2020 courses to remote online learning and I would like to thank our faculty and staff who worked tirelessly to ensure that our students were able to successfully complete their academic semester on time. In addition, our Faculty has continued to ensure that this form of online teaching will continue throughout the summer months. Above all, I'd like to commend our students for their patience and resilience and for their commitment to their academic studies and future endeavors.

The COVID-19 pandemic has presented everyone with challenges, but amidst the crisis, we've also had the opportunity to watch as our community has come together to combat the virus. This includes the creation of life saving tools and medical devices to equip our hospitals with the necessary resources to save lives.

Within the Faculty of Engineering, we've shifted some of our resources to fill this critical need. An example of this effort is the interdisciplinary team of researchers from our Faculty who worked in collaboration with the Nova Scotia Health Authority on the creation of face shields. These are amongst some of the most crucial pieces of personal protective equipment used by frontline health-care workers. As we continue to utilize our expertise and resources to support our global community, this project is one of several initiatives that we hope to share with you in the months to come.

Although the COVID-19 pandemic has significantly altered our personal and professional lives, it's important that we still recognize the accomplishments of our students, researchers and alumni throughout this past year. The Spring 2020 issue of our Engineering Magazine is filled with stories of the incredible work and achievements of our community. From Dr. Jeremy Brown's next generation ultrasound imaging device, to engineering innovative solutions to groundwater research, the Faculty of Engineering has a lot to celebrate.

While I look forward to seeing you once again at our future alumni events, I'm going to conclude by thanking our community for their support and understanding as we navigate our way through this global pandemic together. Please take care of yourselves and stay safe.

Sincerely,

Dr. John Newhook, P. Eng.
Dean of Engineering

2106

UNDERGRAD
STUDENTS

583

GRADUATE
STUDENTS

2689

TOTAL
ENROLLMENT

23%

FEMALE
UNDERGRADS

77%

MALE
UNDERGRADS



31%

FEMALE GRAD
STUDENTS

69%

MALE GRAD
STUDENTS

67%

CANADIAN

110

FACULTY

24,465

ALUMNI

32%

INTERNATIONAL

96%

CO-OP
PLACEMENTS

376 SEXTON
SCHOLARS

8 SEXTON
LEADERS

44%

FROM
NOVA SCOTIA

359

UNDERGRADUATE
SCHOLARSHIPS

487

UNDERGRADUATE
BURSARIES

9

RESEARCH
CHAIRS

WOMEN IN ENGINEERING

While women remain underrepresented in the field of engineering, three remarkable innovators from Dal's Faculty of Engineering are making great strides in inspiring the next generation of female engineers.



Dalhousie researcher helps protect our water



▲ Jar testers used to simulate treatment scenarios before they are sent to pilot-scale

AS WATER BECOMES AN

increasingly precious commodity, researchers like Dr. Amina Stoddart, of the Centre of Water Resource Studies at Dalhousie University, are looking at how better drinking and wastewater treatment practices can help ensure our public safety and protect our environment.

An assistant professor with the University's Department of Civil and Resource Engineering, Stoddart is leading a research initiative to enhance wastewater effluent quality at the Halifax Regional Municipality's wastewater treatment plants in downtown Halifax and Dartmouth. Made possible through a memorandum of understanding between the University and Halifax Water, Stoddart is looking at intensification and optimization strategies to bring the plants in line with incoming Federal Wastewater Systems Effluent Regulations. This requires them to reduce total suspended solids from 40 mg/L to 25 mg/L and carbonaceous biochemical oxygen demand from 50 mg/L to 25 mg/L by 2040.

"That might seem like a long time, but it is only 20 years," Stoddart says. "The goal is to see if their systems can be optimized to reach those targets without capital improvements. The work that we do will inform those improvements if they are required."

There will be considerable challenges in meeting these requirements. For one, the plants also treat stormwater, which means large variances in flow rate and water quality. Also, the plants' downtown locations place limits on their ability to expand or add treatment processes, which is why Stoddart is focused on process intensification and optimization.

"Given the chemical treatment processes that Halifax Water uses at these facilities, there is potential to enhance performance by changing the chemicals used or increasing the dosage to enhance the speed for adequate treatment to be achieved," Stoddart says. "We'll know better as the research gets underway."

Stoddart will also explore approaches to improve disinfection of wastewater before it is released from treatment. One promising method is UV LED technology, which would be energy efficient and require less maintenance than conventional UV treatment.

"There is the potential to operate UV LEDs at specific wavelengths to tailor disinfection and achieve improved efficiency, but this is a very novel technology and there is a lot of work to be done in this area before we can reach full-scale application," Stoddart says.

In addition to her research for Halifax Water, Stoddart is currently wrapping up a study supported by the Water Research Foundation involving Arcadis, a major engineering consulting company, the Alameda County Water District in California, and other US-based water utilities. For this project, she is exploring biofiltration as a way to remove manganese from drinking water.

Even as these projects keep her busy, Stoddart is thinking about what is next. For example, she is interested in studying treatment processes to maximize removal of microplastics and nanoplastics, which can have negative impacts on marine life, plants, and humans, from wastewater. "That's an emerging concern and one I would like to explore further because if we can

improve our ability to remove these contaminants from Nova Scotia's wastewater, that will benefit all of us," she says.



Student empowers the next generation of female engineers

WITH HER LONG BLONDE HAIR, white blazer and pointed heeled shoes, Sara Evely strolled to the Alumni Lounge for her first Women in Engineering Society meeting. She was, as she'd describe herself, a "true girly girl."

New to Dalhousie University at the time, she felt overwhelmed by the number of male students roaming the halls of the engineering school. It didn't surprise her. In her small hometown of Clarkes Beach, Newfoundland, few people had encouraged her to pursue a



degree in higher education, especially one in a male dominated profession.

"No one ever steered me towards engineering, and that's concerning because if you don't have the right people to push females into STEM (Science, Technology, Engineering and Mathematics) related careers, you're going to miss out on a lot of promising talent," says Evely.

Nonetheless, she enrolled in the Civil Engineering program at Dal and on the first day of class she discovered the Women in Engineering Society. Although there were only a handful of members at the first society meeting, Evely knew this was where she had to be to get the social support she needed to feel more at home within the male dominated program.

"When I learned about the society, I immediately identified with their mission. I told my family that I was going to be President of the society one day," she says. "I'm going to do what I can to help other female engineers on campus feel as though they belong too."

In September of 2019, she did just that. Taking over as the President, her enthusiastic demeanor and girl power attitude attracted over 100 female engineering students to the society's first meeting of the year; an all-time high.

The society, which Evely says was once viewed as a "girls club," is now one of the most active groups on Sexton Campus, leading initiatives that facilitate success amongst its members by creating a peer support system and providing opportunities to grow professionally.

"We try really hard to take care of the female students. We want to make sure that they succeed in engineering and are represented well on campus," says Evely.

She adds that improving female retention in the program is one of her top priorities. That means connecting females on campus and hosting career development opportunities through workshops and hands-on learning experiences.

"I work closely with other equality groups to tackle these goals, and the society participates in Engineers Nova Scotia's Women in Engineering Committee and Dalhousie's Equality Diversity and Inclusion Committee."

In 2013, Engineers Canada launched their "30 by 30" initiative; a goal to raise the percentage of newly licensed female engineers to 30 per cent by the year 2030.

Evely says one of the biggest challenges however is recruiting females into the Engineering program. She adds that most guidance counsellors and parents don't do enough to encourage young girls to explore STEM careers.

"Canada has one of the lowest rates of women in STEM overall. You wouldn't expect that from such a progressive country. It's because of a lot of underlying causes such as self-concept, self-confidence, lack of role models and sociocultural influences" she says.

Evely has spent a lot of time analysing and working to improve some of the challenges women face in engineering. Last December, she participated in a TEDx Talk at Mount Saint Vincent University speaking on the issues surrounding women in STEM, and how society can work together to close the gender gap.

Now ready to graduate with her Civil Engineering degree, Evely is pursuing a career in civil project management. She says one of the most challenging moves she ever made was realizing her potential, trusting her abilities and enrolling in an engineering degree.

"I did my research, I didn't let others discourage me from pursuing my degree, and I worked hard," she says. "Even though I'm graduating, I hope I can encourage other females to do the same."

She says no matter where her professional path leads, she plans to continue advocating for females in STEM.

Moving forward and inspiring change

SARAH DEVEREAUX (MENG CIVIL'99)

vividly remembers the day of the Montréal Massacre. On December 6th, 1989, a gunman burst into École Polytechnique de Montréal and killed fourteen women, most of whom were young engineering students.

At the time, Devereaux was a 2nd year engineering student at St. Francis Xavier University and says she was in a lab with classmates when news broke out about the tragic shooting.

"I was scared," she recalls. "It was easy to relate to the killing of the women, solely for the reason that they were women studying engineering, just like me."

Last December marked the 30th anniversary of the Montréal Massacre and Devereaux says a lot has changed within the field of engineering since that time. While she adds that the number of female engineers has gone up since 1989, there is still a large gender gap within the community.

"When I attended university, I knew there were few women studying with me, but I assumed as I progressed in my career that the percentages were increasing. Eventually I gained the knowledge that not much had changed, and it didn't seem like much was being done about it," she says. "At that time, I started to ask more questions and get more involved."

Today, Devereaux is an active advocate for women in STEM (Science, Technology, Engineering and Mathematics).

A Senior Design Engineer and Partner with Dillion Consulting in Halifax, Devereaux's primary focus is as the National Business Unit Manager for Community Infrastructure. However, in her 30-year long career, she says her most important work has been her efforts to encourage a new generation of young women to follow her into the field of engineering.

Growing up, she always knew she wanted to be an engineer.

"I pursued engineering because I excelled in science and math and we had friends in our family who were engineers, so I had some idea of what they did," she says. "I think the main reason women don't see engineering as an option is because they don't see anyone who looks like them. I think women role models are critical to the increased participation of women."

Devereaux first embraced the opportunity to be that role model by joining Engineers Canada Women in Engineering Advisory Group as an Engineers Nova Scotia representative.

Other opportunities opened up from there. As the Nova Scotia representative on the Engineers Canada Women in Engineering Committee, she successfully lobbied for Engineers Nova Scotia's full support of women in engineering initiatives.

Throughout the years, she has served as an inspiration to thousands of women and in recognition for her ongoing efforts to recruit and mentor female engineers, she was presented with the 2013 Award for the Advancement in Women in Engineering presented by Engineers Nova Scotia. In 2018, the Engineers Nova Scotia Council renamed the award to the S.L. Devereaux Award for the Advancement of Women in Engineering.

Since winning the inaugural award, Devereaux's accomplishments have been recognized on multiple occasions. She has been honoured with the 2014 Canada's Most Powerful Women: Top 100 Award Winner and as a Fellow of Engineers Canada. She was also recognized with the Canadian Progress Women of Excellence Award for demonstrating outstanding achievements in management in corporate and not-for-profit organizations.

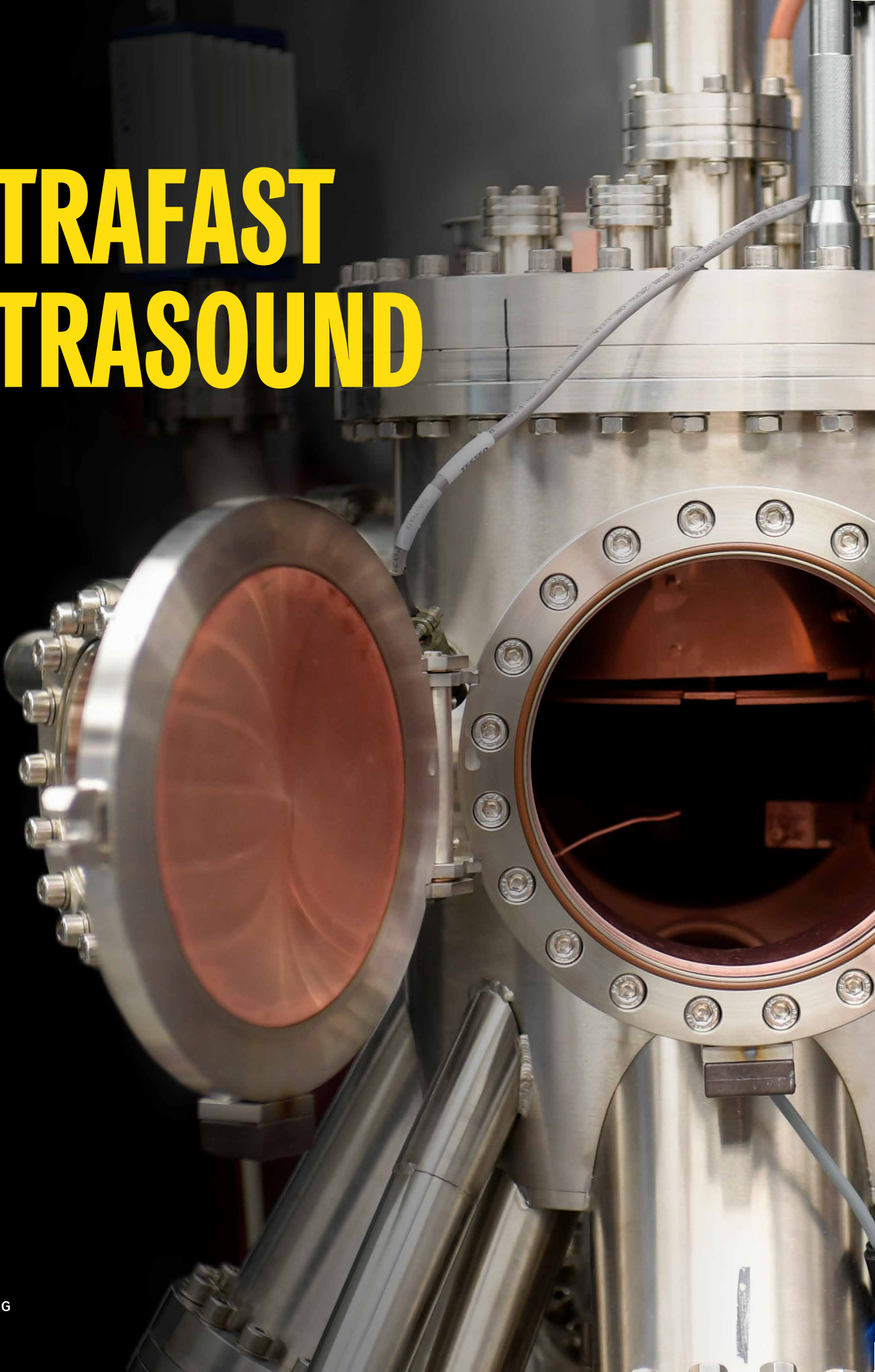


Devereaux served as the second female President for Engineers Nova Scotia and also the first female President of the Consulting Engineers of Nova Scotia. She has also served as the Nova Scotia Director on the Board of Engineers Canada.

Today she is an advocate for the Engineers Canada 30 by 30 goal. The initiative is an effort to increase the percentage of newly licensed engineers who are women to 30 per cent by the year 2030.

"I love my career and our profession, and I want everyone to know there is a place for them in engineering," she says. "I promote engineering to everyone because I believe our profession will be better when everyone participates. Our ideas will be more fulsome, and our solutions will be better."

ULTRAFAST ULTRASOUND





Enhancing the lives of cancer patients

“THERE’S NOTHING LIKE THIS ANYWHERE IN THE WORLD,” SAYS BROWN. “THIS IS THE WORLD’S FIRST DEVICE THAT IS THIS SMALL WITH THIS MUCH RESOLUTION.”



IN APRIL OF 2019, SAID BAYDAR (BEng, Electrical '76) was taking an early morning stroll through the streets of Cleveland, Ohio. Although he'd never been there before, a strange feeling fell upon him, and he began to feel a sense of déjà vu. He was then struck by the smell of a chemical odor so pungent it made him sick to his stomach, and he soon became disorientated and confused.

When he returned to Halifax, he immediately made an appointment to see his family doctor. After describing his symptoms, he was diagnosed with post-traumatic stress disorder, a condition the doctor said was likely brought on by the recent death of his dog Armano, a wheaten terrier who was dear to his heart.

Accepting the diagnosis, Baydar continued with his daily activities. Although he continued to experience a few mild episodes, all seemed well until July.

“Towards the end of the month, I was shopping with my wife and the chemical smell and déjà vu returned with a vengeance,” he says. “It felt like a dark

cloud approaching that was filled with a pungent smell, as if we were near a chemical factory.”

“So I turned to Dr. Google. If you google ‘déjà vu’ and ‘chemical smells’, you’ll get temporal seizures.”

Taking the information back to his family doctor, he says he watched as her face turned from a bright pink to a pale white. She immediately scheduled CT (computerized tomography) Scans.

“A day later I received a phone call from the doctor advising that I immediately go to the emergency because a neuro team was waiting with an MRI,” he says. “That same day, I had surgery.”

Baydar was diagnosed with stage 4 Glioblastoma; an aggressive cancer that begins within the brain. He says the tumor, located on his right side, was the size of an orange. While the successful surgery helped remove 99 per cent of the tumor, oncologists recommended radiation and chemotherapy to treat the remainder of the cancer.

“They said according to statistics, if I didn’t pursue any treatment, I’d have at best six months to live, and with chemotherapy and radiation it might give me 12 to 14 months of life,” says Baydar.

“After some contemplation and heart to heart discussion with family members, I decided to take a holistic and self-healing approach instead; mind, body and spirit.”

He changed his diet, began seeking care from a naturopath, and opened his mind to other forms of wellness to improve his overall health.

In late October, while researching alternative treatments to manage his cancer, he was invited to attend a presentation by Dr. Jeremy Brown about a new ultrasound device designed to treat patients with brain tumors. He says the presentation changed his life.

An ultrafast therapeutic ultrasound

An associate professor in Dalhousie's School of Biomedical Engineering and Department of Electrical Engineering, Brown has been developing next generation ultrasound imaging and therapeutic technologies at Dal since 2008.

His recent device is giving hope to cancer patients such as Baydar.

Working alongside a team of neurosurgeons, Brown has created a cutting-edge device aimed at improving cancer patient outcomes using minimally invasive surgical techniques.

The tiny device, which measures 3mm by 3mm in size, is the world's first high-resolution endoscopic surgical and imaging probe. Used for cranial procedures, it combines two different technologies; an ultrafast imaging platform which will allow surgeons to detect and reach brain tumors, and a therapeutic tool that will non-invasively vaporize tissues.

"There's nothing like this anywhere in the world," says Brown. "This is the world's first device that is this small with this much resolution."

Each year, there are over 250,000 primary brain tumors diagnosed worldwide. These tumors begin in the brain before spreading to other parts of the body. While treatment options often include aggressive approaches such as surgery, radiation, and chemotherapy, they depend on the size and location of the tumor.

Brown says when patients are diagnosed with brain tumors, they are often required to do an MRI or CT Scan prior to their surgery. The scan allows doctors to plan their surgical route ahead of time. Data collected is useful in making the distinction between tumor tissue and healthy tissue and reaching the precise location of the abnormal tissue.

However, during surgical procedures, one particular challenge in removing brain tumours is a phenomenon known as brain shift. This happens when the brain moves within the cranium once a surgeon has made a hole in the skull.

"Once the pressure is released from the skull, the brain will shift around quite a bit making those pre-operative images not as valuable," says Brown. "You can have shifts up to a couple of centimeters."

Without access to real-time images, a number of potential issues can occur. As a result, surgeons are often unable to safely reach the tumor, or a portion of the tumor is left behind. This may lead to additional treatments such as a second surgery or chemotherapy and radiation. Brown says his new imaging tool will help resolve some of these potential problems.

Small enough to insert into a small keyhole in the skull, the ultrasound probe will generate high-resolution images from within the brain, allowing surgeons to follow a surgical path to the tumor. Doctors will also have the ability to see the brain light up in certain areas when activated, allowing them to avoid potentially cutting into healthy tissues that could lead to other forms of impairments.

In addition to neurosurgical procedures, Brown says the tiny endoscope will also be useful in treating other medical conditions.

"The probe has been tested for spine imaging and the application would also work the same way for many types of cancers," says Brown. "We're beginning to do some studies into pancreatic cancer as well which is again, one of these cancers where to access the tumor, you have to create a very small surgical pathway to get there. It's very difficult to

visualize or image during the procedure, so this can be a tool that can guide the surgical intervention."

The ultrafast imaging probe is now undergoing pre-clinical evaluation in collaboration with a Toronto-based company and could be tested in operating rooms at the Nova Scotia Health Authority within the next two months. In the meantime, Brown says his team is in the process of combining a second technology to the endoscope that will allow surgeons to vaporize and treat cancerous tissues.

"The therapeutic component is called histotripsy. It's a very interesting method of removing tumors non-invasively where if you focus and shape the ultrasound pulse in a certain way, you can create cavitation bubbles from the tissue itself," says Brown. "Basically, you're changing the tissue from a solid to a gas and then using pressure and very little heat, so the tissue turns into gas bubbles. Within seconds it just liquifies the tissues."

While Brown says both technologies, the ultrafast imaging platform and therapeutic tool, are working independently, it may be another year before the two components are combined into one miniature device.

"We have devices that are a few millimetres that can vaporise tissue and we have devices that are a few millimeters that can image tissues very well, but we haven't been able to combine them yet. That's sort of the holy grail that we're working on," says Brown. "With the vaporizing tool, we have a system that's a little too big for guiding down a surgical pathway, it's perhaps 9mm in size."

Inspiring others

Brown says his team of neurosurgeons are anxious to see the endoscope used in operating rooms.

They aren't the only ones.

After hearing Brown's presentation in October, Baydar immediately connected with the researcher to get more information on his revolutionary device.

He was invited to Brown's lab to view the endoscope and was amazed by the technology.

"When I had my surgery last summer there were three people in the waiting room who were unable to do their surgery because the doctors couldn't safely access the tumor. I'm not a physician, but perhaps Dr. Brown's device could have helped these people," says Baydar. "After seeing the device and its capabilities, I am certain my surgeon could have safely removed the remaining 1 per cent of my tumor."

He says he'll do whatever he can to help advocate for Brown's remarkable work and hopes to see the device on the market as soon as possible.

"When it's a good cause and there's an emotional attachment, people will want to support this. This isn't just a device for Dalhousie, it's not just a device for Halifax, it's for the benefit of the world. It's revolutionary," he says. "And down the road, this device could be my last resort."

Since attending the October presentation, Baydar says he's had a second re-occurrence with his cancer. This time, the tumor is the size of a lentil. But despite that, he says he feels amazing.

"When you get a disease like this, a few things happen. One of them is that you wake up and you start to appreciate

life, environment and humanity to its fullest extent," says Baydar. "People don't believe that I'm fighting brain cancer, but it's all about the positive attitude and outlook. My mind is very strong, and my spirit is through the roof."

He says Brown's device has given him hope and a new purpose in life, and he hopes to inspire others in their fight against cancer.

"I really truly believe this idea extended from the heavens and Dr. Brown was the man assigned to come up with this solution. He really is my hero."

▼ *Dalhousie Engineering professor Dr. Jeremy Brown working on his revolutionary ultrasound device*



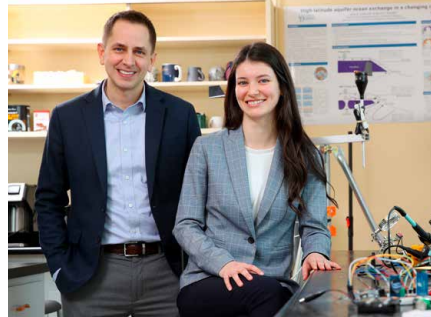
ENGINEERING A SOLUTION TO GROUNDWATER ISSUES

APPROXIMATELY ONE-THIRD

of all Canadians and more than fifty percent of Nova Scotians get their drinking water from groundwater. Those numbers concern Dr. Barret Kurylyk, not just because groundwater levels are declining drastically around the world but also because groundwater is not typically on many people's radar.

"When surface water levels go down in a river or lake, it is pretty obvious, so it triggers public concern and water management practices are adjusted accordingly," says Kurylyk, assistant professor and Canada Research Chair in Coastal Water Resources with Dalhousie's Department of Civil and Resource Engineering. "However, when groundwater levels decrease, no one sees it, so very little is done, except to drill deeper wells to reach a deeper water table, which only exacerbates the problem."

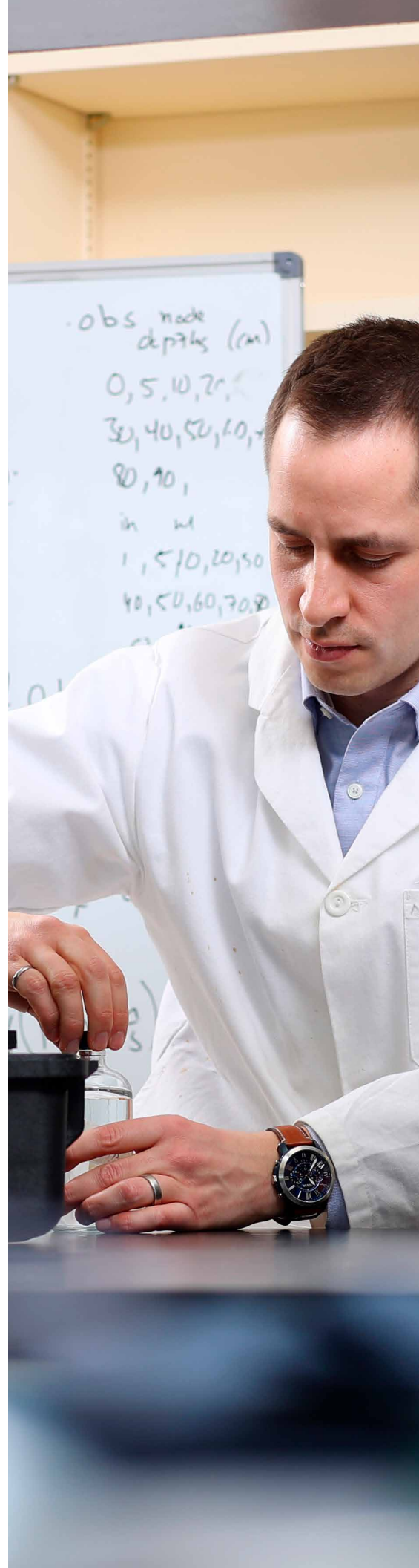
It is a problem that preoccupies Kurylyk as the principal investigator with the Dalhousie Groundwater Lab. As part of the Centre for Water Resources Studies and the Department of Civil and Resource Engineering, the lab is exploring the impact of environmental changes, such as climate change or human-caused contamination (e.g., oil spills, septic systems), on water resources. Supported by a team of 12 students and postdoctoral fellows, Kurylyk says his research is focused mainly on groundwater, but he is also interested in how environmental changes are affecting coastal water resources.



"Climate change means rising sea levels and more intense storms, resulting in saltwater intrusion—the migration of seawater into freshwater systems," Kurylyk says. "Because the interface between fresh groundwater and saline groundwater is moving inland, Atlantic Canadian communities have had to relocate wellfields that have started to pump saltwater."

Another focus of Kurylyk's lab is the impact of submarine groundwater discharge on the ocean. "Oftentimes, that groundwater is contaminated due to industrial or human activity," he says. "Because groundwater discharge points aren't monitored the way coastal rivers are, we don't know what contaminants are getting into the ocean, and that's very concerning when you think about how much Nova Scotia's economy relies on aquaculture or beach-based tourism."

What sets Kurylyk apart from other researchers in this field is his engineering background. "The discipline tends to be dominated by experts in geoscience and geology," he says. "I tend to look at the physics or math behind hydrogeologic processes and then





▲ *Engineering student Nicole LeRoux working at Dalhousie's Groundwater Lab*

apply the problem-solving engineering principles I've learned to address groundwater science issues."

That unique perspective has served as a calling card for Kurylyk's lab, which is engaged in several regional and international research projects. Some involve arctic and subarctic hydrologic systems in Canada's north, such as a study of saltwater intrusion issues in Sanikiluaq, Nunavut, and modelling to determine the potential impact of glaciation cycles on nuclear waste storage. "You have these facilities that are intended to last for up to a half a million years," Kurylyk says. "If you have a glaciation cycle occur, and permafrost develops, that could affect the performance of these systems from a waterflow to contaminant transport perspective, so we're working with Canada's Nuclear Waste Management Organization as well as organizations in Sweden, the Netherlands, Finland, and the UK on addressing that."

Kurylyk and his students are also conducting several saltwater intrusion studies involving small-island aquifers. The lab has partnered with Lennox Island First Nation, PEI's largest First Nations community, to assess the impact of erosion and other environmental changes on the island's wellfield. Another study involves Sable Island's freshwater pools, which are estimated to have declined 40 per cent in volume over the last 10 years based on satellite images.

"People ask why we are interested in an island where there's not much need for water supply, but Sable has an ecosystem of wild ponies

and endangered bird species that is sustained by the ponds," Kurylyk says. "Moreover, Sable enables us to isolate out the effects of human activity to gain a better understanding of climate change impacts. That means our findings could be adapted to address groundwater issues for the 11 per cent of people worldwide who live on small, low-lying islands that are particularly vulnerable to climate change."

There are other research projects in the works, including plans to study saltwater intrusion in Nova Scotia's Fundy dykeland system. That effort will be led by one of Kurylyk's students, Nicole LeRoux, as part of her master's studies. "These dykelands have been protecting our agricultural land since the 17th century, but sea-level rise and saltwater intrusion are distressing them," LeRoux says. "By studying the effects of this intrusion on an aquifer in the region, we hope the resulting data will enable the province to make informed decisions about our dykelands to ensure our food security."

Yet achieving such outcomes means it is necessary to raise general awareness about the importance of groundwater. Kurylyk is doing his part. "I do that through talking to the media, workshops, and community engagement, but I think the best way may be through my work as a professor," he says. "If I can increase people's knowledge about groundwater and influence a new generation of students like Nicole to think about how it interacts with the civil engineering world, then we can start to make progress in addressing the issues we are facing."

Emera
idea



A YEAR AT THE HUB

LAST APRIL, THE NEWLY

established Emera ideaHUB was awaiting the sounds of 3D printers and collaboration to echo across the open plan space. Just one year later, the HUB is bustling with activity as the 12 resident startup companies work to bring their ideas to life.

While the COVID-19 pandemic has halted all in-person production at the HUB, its online resources are providing startups with the support they need to proceed with daily operations.

Integrated into Dalhousie's Faculty of Engineering, the Emera ideaHUB accelerates the development of physical products by bridging the gap between creation and commercialization. With programming designed to support students, early stage startups, SMEs and industry, the HUB seeks to positively impact the long-term economic success of Nova Scotia and the Atlantic region in Canada.

"We are so grateful to the community that helped establish our facility and our program and has continued to support us in our first year of operation," says Margaret Palmeter, Director for the ideaHUB. "Our network continues to grow stronger."

THE CURRENT RESIDENTS & PROGRAMS

The Emera ideaHUB is home to 12 innovative and diverse companies in various stages of development. Some of the founders are local to Atlantic Canada, but a number of them are from different provinces and countries all over the world. They've chosen the HUB because they recognize the benefit of coming to Nova Scotia to develop their company and product.

LIST OF CURRENT COMPANIES IN THE HUB:

5 CARBON	GIBLI
AUREA	MARCOMMS
CLEAN VALLEY CIC	NOVALTE
DESIGN BY SCIENCE	NOVARESP
DECELL	PROSARIS
DOOBTOOL	RAYLEIGH SOLAR TECH

"Our ecosystem has reached a state of maturity where we're really supporting startup companies," says Palmeter. "The HUB is thrilled to fill a niche in the ecosystem and play a role in the economic success of our region."

The HUB is currently running a number of programs to ensure the

success of everyone who passes through their doors. Volta GEAR, in partnership with Volta, supports resident companies as well as other hardware companies in the ecosystem that are interested in innovation. The HUB has also solidified a strong partnership with Innovacorp in developing the BUILD program which helps companies develop better products faster.

"Looking to the future, we're excited to have plans in place to expand BUILD so we can offer it remotely to companies across Atlantic Canada," says Palmeter.

The HUB also introduced the Young Innovator program to help bright engineering students explore their ideas, figure out a business model, and explore the possibilities of starting a company. "By the time they graduate they're ready to hit the ground running with whatever opportunity presents itself," says Palmeter.

FIRST ALUMNI OF THE HUB

Since opening the doors in April 2019, the Emera ideaHUB has had four companies graduate from the BRIDGE residency program. With access to the facilities and expertise offered at the HUB, these companies were able to dramatically accelerate their path to market.



"LOOKING TO THE FUTURE, WE'RE EXCITED TO HAVE PLANS IN PLACE TO EXPAND 'BUILD' SO WE CAN OFFER IT REMOTELY TO COMPANIES ACROSS ATLANTIC CANADA,"

— MARGARET PALMETER

INTRODUCING THE IDEA SPEAKER SERIES

Palmeter says the IDEA Speaker Series is one of her proudest moments of the HUB's first year of operation. The Speaker Series, which launched in November 2019 in collaboration with Dal's Faculty of Engineering, Dal Innovates and the Halifax Partnership, aims to share stories of success, diversity, resilience and innovation with students, companies and the greater community. Local entrepreneurs and Dal alumni who have "built incredible businesses from the ground up" were invited as keynote speakers.

The series is a direct response to the outpouring of support from alumni and community leaders who saw their partnership with the HUB as an opportunity to share their story with the next generation of entrepreneurs.

Past speakers include Chris Huskilson, the former CEO and President of Emera Inc., Pat Ryan, Founder and President of Neocon International, Dale Robertson, Founder of Enerscan Engineering, Veronica Merryfield, CTO and consultant, and Giovana Celli, the Vice-President of Innovation & Quality at the Whole Coffee Company.

"The speakers helped everyone see that it is possible to have big success while still being based in Nova Scotia, even on an international scale," says Sara Evely, President of Dalhousie's Women in Engineering Society. "Showing students a personable example of success is great; it helps invoke optimism because if those individuals can do it, so can they."

The team at the Emera ideaHUB is looking forward to bringing the IDEA Speaker Series back in September 2020 to launch the new academic year. For more information about Emera ideaHUB events, news, programming and the Founders Pledge, please check out dalideahub.ca

▼ In November, the Emera ideaHUB hosted its inaugural IDEA Speaker Series. 300 community members attended the event which featured keynotes from innovation leaders Chris Huskilson, Pat Ryan and Dale Robertson





ENGINEERING ALUM CHANGING THE WAY COFFEE LOVERS CONSUME CAFFEINE

“NUDGE.™ WAS BORN FROM OUR DESIRE TO OFFER A ‘BETTER-FOR-YOU’ CHOCOLATE AND A NEW WAY TO EXPERIENCE COFFEE.”

— DR. GIOVANA CELLI

COFFEE LOVERS ACROSS CANADA

are in for a sweet treat. Tim Hortons' signature Double Double Coffee is now available as an edible coffee bar.

The delicious on-the-go product made its debut at Tim stores in January of 2020. Created with Tim's coffee beans, the edible products are similar in size to a chocolate bar but are completely chocolate free. They are also available in Dark Roast and French Vanilla.

The mastermind behind the creation: Dr. Giovana Celli (PhD'16).

The 33-year old who graduated from Dalhousie's Engineering program in 2016 with a PhD in Biological Engineering is now the Vice-President of Innovation & Quality at The Whole Coffee Company in Miami, Florida. Through the company, Celli has developed Nudge.™, an industry-leading brand that uses

a proprietary technology that processes coffee beans into delicious consumer goods.

"It was always my mission to take what I'd learned in an academic setting and apply it in a real commercial setting. I wanted to make a difference," says Celli.

Raised in Brazil, coffee has always played a big role in Celli's life. In fact, she says it was very common for children to drink a cup of coffee each day. While completing her Postdoc in Food Science at Cornell University, she grew fascinated with The Whole Coffee Company who were using novel technologies to turn coffee beans into edible products.

"I left Cornell to join The Whole Coffee Company and the CEO took a chance on me and asked me to lead R&D," says Celli. "Nudge.™ was born from our desire to offer a 'better-for-you' chocolate and a new way to experience coffee."

Their first product was a coffee butter, an edible spread made with whole coffee beans that contain 40mg of caffeine. The Brazilian version of the product, which was the first of its kind around the world, was awarded the Best New Product in the Food Category at the Specialty Coffee Expo 2019.

Celli soon teamed up with Dunkin Donuts in the United States to create and launch a variety of coffee bars similar to those now available at Tim Hortons in Canada. She says the

formulas are developed in collaboration with R&D teams at both Tims and Dunkin Donuts so that the bars taste exactly as the beverages you get at the stores.

"When it comes to formula creation, we brew and cup the coffee to understand the predominant notes, but we also evaluate the beans in their entirety," says Celli "This requires us to eat the beans. This is because eating the beans as opposed to drinking a brew has a significant impact on the flavor profile. The formulas are tailored to the beans so that the taste notes of the coffee can be highlighted."

She says that the amount of caffeine in each bar depends on the origin and profile of the coffee beans and the specific formulations used in lab development.

"An interesting point in our technology is that it is unaffected by the extraction method as it uses the coffee bean in its entirety; that is, all the compounds from the coffee beans will be retained in the various edible forms we produce, and variations are solely related to the properties of the raw material."

Celli says with the coffee industry worth close to \$75 billion alone in the United States, Nudge.™ is in the process of creating and launching even more edible coffee products in the months to come.

MAKING THE IMPOSSIBLE WORK



▲ *Dalhousie Engineering alum Pat Ryan at Neocon International in Dartmouth, Nova Scotia*

“I BELIEVED I COULD TAKE MY SKILLS, DEVELOP A UNIQUE PRODUCT, AND MAKE IT HAPPEN RIGHT HERE.”

— PAT RYAN

PAT RYAN (BENG'83) RECALLS THE reaction he got in 1993 when he told people his plans to manufacture custom plastic automotive components in Nova Scotia: It will never work.

Anyone else might have heeded that advice, but not Ryan. “I was a young engineer at the time, so I hadn’t been hardened by the barriers you encounter when you have years of business experience,” he explains. “I believed I could take my skills, develop a unique product, and make it happen right here.”

Drawing on his passion, bold idea, and the engineering principles he learned at Dalhousie University, Ryan launched Neocon International and scored a major retail hit with Trunk Guard, a durable easy-to-install plastic organizer sold at Canadian Tire and Pep Boys in the United States. It was an impressive out-of-the-box success that proved the naysayers wrong, but Ryan quickly realized that retailers were not loyal to suppliers like Neocon. They had no gravitation to support innovative product development and Trunk Guard

could be replaced on store shelves by a competitor with deep pockets. He decided a shift in focus was in order and that Neocon would become a tier-one supplier for the world’s biggest automotive manufacturers. That decision culminated in a fateful meeting with Ford Motor Company executives in Dearborn, MI in 1998.

“We believed Ford could be more innovative with their vehicle third compartment, the sedan trunk and sport utility cargo hold,” Ryan says. “The next logical step was we developed a prototype organizer and arranged to do a demonstration in the parking lot of Ford’s headquarters with a rented Taurus. It was pouring rain that day. I couldn’t really showcase the organizer on a boardroom table—it had to be in a vehicle—so I bought some umbrellas and convinced the executives to come outside. They told me I had 10 minutes to impress them, but they spent an hour checking out the prototype before we headed inside to talk about possibilities. That was the turning point for Neocon and we’ve never looked back.”

Today, Neocon’s specialized molded components, such as cargo hold organizers and protection systems as well as electroplated bumper protectors and other exterior appearance products, are installed in General Motors, Mercedes, Nissan, Subaru, and Toyota vehicles at automotive plants and vehicle “prep operations” primarily in North America but also other world ports. As a result, approximately 98 per cent of the company’s revenues are generated

outside Canada. It is an impressive success story by any measure, but Ryan is not content to rest on the company’s laurels.

“We have an expression at Neocon that it is safer to be risky because that is where the margins are,” he says. “If you go mainstream, you have to be the most low-cost manufacturer, so the real value is in innovation. That means once you reach the middle of the bell curve, you go back to the start and try something new. That’s the innovation life cycle we maintain at Neocon.”

That commitment to taking risks is one that is informed, as always, by engineering principles. All ideas are vetted through SWOT and Failure Mode & Effects analyses to identify shortcomings. There are also three dedicated teams charged with identifying opportunities for innovation in materials used, manufacturing processes, and product development.

Having made what others assumed to be impossible work, Ryan is now looking at what else is possible, not just for Neocon, but for the next generation of engineers. “Every year, I give a talk to the graduating students at Dalhousie,” Ryan says. “I want them to know that it is safer to be risky, and that if they want to start a business and do it here on the east coast, then they should go for it because they can succeed. Neocon is proof of that.”

ENGINEERING RESEARCHERS UTILIZE EXPERTISE IN COVID-19 PANDEMIC

AS THE COVID-19 CRISIS CONTINUES

to strain the global health care system, researchers in the Faculty of Engineering at Dalhousie University are doing what they do best: utilizing their expertise and resources in product development to provide front-line healthcare workers with personal protective equipment (PPE) to combat the deadly virus.

Under the leadership of Dr. Clifton Johnston, an associate professor in the Department of Mechanical Engineering and the NSERC Chair in Design Engineering at Dal, the interdisciplinary team from Dal mobilized in late March to rapidly design and prototype a headband for face shields that will be massed produced by local New Brunswick company Bouctouche Bay Industries Ltd (BBI). Face shields are among the most critical tools required by healthcare workers caring for COVID-19 patients.

DESIGN, INNOVATION AND COLLABORATION

The Dalhousie team, comprised of associate professor Dr. Jeremy Brown, senior mechanical engineering instructor Robert Warner, Health and Safety manager, Craig Arthur, and Emera ideaHUB technical lead, Graham Muirhead, have extensive expertise in product design, specifically in the area of med tech design.

“That’s really important because designing a medical product is different than designing a regular consumer good,” says Johnston. “There are additional requirements that the team needs to be aware of from the start in order for the product to get rapidly developed to the point where it can be deployed.”

Partnering with the Nova Scotia College of Art and Design, the Nova Scotia Health Authority (NSHA), and the Atlantic Canada Opportunities Agency (ACOA), the team began with a thorough assessment of the current needs within the global healthcare system.

In collaboration with NSHA they were able to design a face shield that met infection prevention and control



standards, and were able to trial their 3D printed product with front-line care workers who would be wearing the device.

“3D printing is a useful technology because you can quickly make changes and adjustments to your product and then turn it into a working prototype that can be used by a customer,” says Johnston. “We have a group here in the Faculty of Engineering who really know how to prototype as part of a user centric design process.”

In addition to a shortage of face shields around the globe, materials used to manufacture the device, including the clear plastic shield that protect a user’s face, are also in low supply.

“When we looked at the process for rapid manufacturing, this global shortage of supply materials started to come up. So, we had to look at what common materials would be comparable,” says Johnston. “What we came up with was injection molding the headband and a transparent clear report cover that you can buy at Staples for the shield. That’s when Robert Warner’s expertise really came to the table because he’s a design-for-manufacture expert, especially when working with plastics.”

Tweaking their design, the team was able to accommodate for the instillation of the new materials. “We needed something easy and we needed quick and dirty prototyping. We needed something that can be done on the fly,” says Johnston.

“3D PRINTING IS A USEFUL TECHNOLOGY BECAUSE YOU CAN QUICKLY MAKE CHANGES AND ADJUSTMENTS TO YOUR PRODUCT”

— DR. CLIFTON JOHNSTON

TEACHING THE NEXT GENERATION OF INNOVATORS

Dal’s innovative work is a key example of the creative brilliance within the Faculty of Engineering.

With a strong focus on design productivity, innovation and entrepreneurship, engineering students are provided extensive hands-on learning throughout their academic degrees and beyond. Addressing each stage of product development, programming within the Faculty allows students and faculty to explore and harness their creative abilities.

“We also impart that knowledge and teach that knowledge to our startup companies participating in the Emera ideaHUB,” says Johnston who is also the Academic Director of the Emera ideaHUB, the IDEA Sandbox and the MakerSpace. “We’re also working to formalize and teach that process as part of our BUILD Program. It’s all about building better products faster.”

Now set to produce thousands of units to meet the needs of local hospitals and beyond, a local manufacturer has been tapped to produce the face shields for NSHA. Bouctouche Bay Industries (BBI) has sourced material and is now manufacturing the face shields at a rate as high as 30,000 per week.

When needed, the face shields will be in the hands of front-line healthcare workers.

HELPING SLEEP APNEA PATIENTS BREATHE EASIER

HAMED HANAFI (PHD'16) IS THE

President and Director of research and development at NovaResp Technologies, a start-up company that invents software and hardware to help sleep apnea sufferers breathe easier and lead healthier lives.

Often a potentially serious sleep disorder, sleep apnea is a condition where a patient's breathing repeatedly stops and starts resulting in a lack of oxygen to the brain. The condition raises the risk of heart attacks, strokes and other medical problems.

"The current gold standard of therapy are CPAP machines," says Hanafi who is also an adjunct professor in the electrical engineering department at Dalhousie University. "These are bulky machines with a tube and mask to apply pressure to the airway throughout the night and

keep the airway open. But they are extremely uncomfortable, and patients complain about receiving too much or too little air."

Stationed out of Dal's Emera ideaHUB, Hanafi and his team of eight have developed a product called cMAP™ (Continuous Management of Airway Pressure) that will help regulate a patient's breathing while asleep.

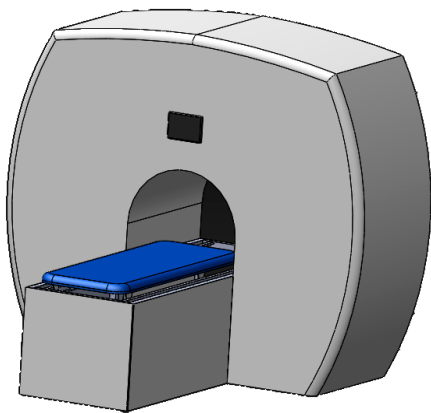
"Every patient has a unique pattern of breathing. However, apnea events demonstrate visible and invisible signs 30 to 60 seconds prior to the apnea. We use machine learning and artificial intelligence to detect those signs and send a signal to the positive airway pressure (PAP) machine to prevent the apnea to come," says Hanafi. "Current machines only react to events 10-20 seconds after an apnea event."



The technology can be installed on any PAP machine. However, Hanafi says his predictive algorithms will also give his team the opportunity to design new machines that are not as large and uncomfortable for patients.

"As the founder of NovaResp, I look forward to the day when patients can actually comfortably use our technology and breathe easier during sleep," says Hanafi. "We have a platform technology that could also help any person who requires breathing assistance including asthma, COPD, patients on mechanical ventilators in the ICU, or anesthesia machines in the operating room."

ENGINEERING STUDENTS HELPING CHILDREN CONQUER FEAR OF MRIs



LOUD NOISES, CRAMPED SPACES

and a frightening environment can make it challenging for young children getting an MRI (Magnetic Resonance Imaging). The experience is often so frightening that many are given anesthesia before their procedure.

Now four Mechanical Engineering students from Dalhousie University – Jonathon Betteridge, Daniel Monk, Benjamin Parmiter and Michael Smith – have teamed up with the IWK Health Center in Halifax to develop a new MRI simulator to help children conquer their fear of getting an MRI.

"Our MRI simulator seeks to replicate the conditions of the actual MRI as closely as possible," says Betteridge, whose team is working on the project as part of their Capstone Design Course.

"To accomplish this, we made the bore of the simulator as close in size to the actual MRI machine, added a sliding bed that the MRI technicians can use to demonstrate to the kids, and added a tablet interface that allows kids to choose various sounds the MRI makes to play through a set of headphones."

Although the MRI will be similar

to ones available in children hospitals in Montreal and British Columbia, Betteridge says it will have a very different look.

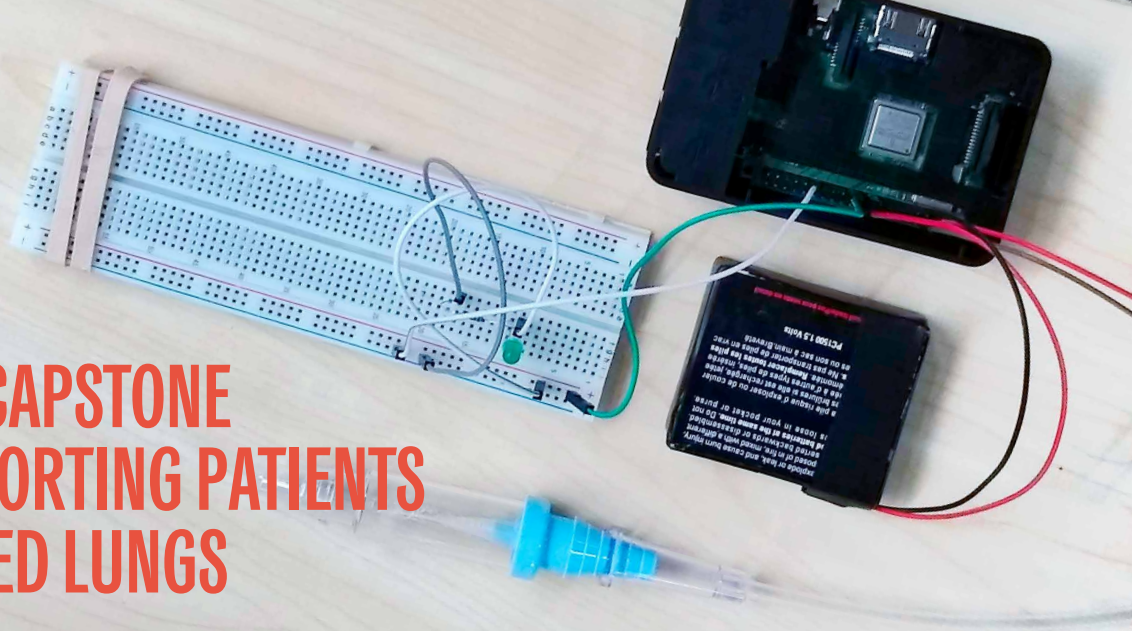
"We had the entire shell and bed created out of fiberglass to try and replicate the sheer size of the machine relative to the kids which simulators like the one in Montreal Children Hospitals fail to accomplish."

"The biggest challenge we ran into while working on the project was coming up with a way to lock the bed easily while it is being rolled back and forth."

Betteridge says his team is anxious to see if their new design will bring any extra comfort to children scheduled for an MRI.

"It is very fulfilling to know that our work on the project could go on to help kids better deal with the scary task of getting an MRI done."

ENGINEERING CAPSTONE PROJECT SUPPORTING PATIENTS WITH COLLAPSED LUNGS



A GROUP OF STUDENTS FROM

Dalhousie's Department of Mechanical Engineering are developing a novel device to aid patients who have experienced a pneumothorax, also known as a collapsed lung.

The medical condition can occur when air leaks from the lungs and enters the pleural cavity. As air builds up, it causes the nearby lung to collapse on itself.

Treatment options can include removal of the air from the pleural cavity with a needle and syringe or inserting a hollow plastic chest tube between the ribs and attaching it to a suction device. The tube is designed to continuously remove air from the pleural cavity until the lung has re-expanded and healed. This may take several days, and patients are often discharged from the hospital during that time and asked to return at a later date to remove the tube.

The problem, says Dylan Ormiston, a senior year mechanical engineering student, is that when patients return to the hospital to have the tube removed, the pressure inside the pleural cavity has not yet normalized.

"Right now, the only way to verify that the chest tube is ready to come out is to take an x-ray and confirm that the lung has re-expanded, which can be very time consuming and costly for a hospital," says Ormiston. "The decision of when to remove the chest tube is an inexact science. Logistically, this poses a challenge for surgeons. Should the patient stay and occupy a hospital bed, or should they be sent home and for how long? It's not uncommon for returning patients to be sent home again because it's too early to remove the tube."

"SHOULD THE PATIENT STAY AND OCCUPY A HOSPITAL BED, OR SHOULD THEY BE SENT HOME AND FOR HOW LONG?"

— DYLAN ORMISTON

To combat the problem, Ormiston has teamed up with three of his classmates, Laura Flick, Carli Spears and Brian MacGillivray, to create a device that will accurately measure expelled air from a patient's pleural cavity, signaling to surgeons when they can safely remove the tube from the patient's chest. It's the first of its kind around the world.

The project is part of this year's Dalhousie University Capstone Design course; an opportunity for senior year students within the Faculty of Engineering to collaborate with local industry partners on real-world problems.

Working alongside Dr. Kevin Spencer, President and Founder of KDS Medical Engineering Inc., and an Emergency Medicine Physician at Dartmouth General Hospital, Ormiston and his team consulted with thoracic surgeons to get a better sense of the challenges they face in dealing with current practices pertaining to patients with a collapsed lung.

"We've created a device that can measure the air pressure leaving a patient with an alert system ready in the event of a dangerous increase in pleural cavity pressure, known as a tension pneumothorax," says Ormiston. "One of the biggest challenges thus far has been getting a sensor sensitive enough to detect the desired pressure changes."

He says that the other issue is determining the appropriate pressure ranges that will cue the device to signal when the chest tube can be safely removed or when a potentially severe pressure buildup has occurred.

"The air pressure can be very different between individuals, so it's challenging to decide what range is appropriate," says Ormiston. "We're measuring the pressure of the pleural cavity, and there are no universally-accepted values for it. So, we're basing our numbers on what we estimate is normal for a healthy lung and creating a range of pressures that apply to most individuals."

Ormiston's teammate, Carli Spears has experience with the challenges patients face with chest tubes.

While in high school, her older brother suffered a collapsed lung, requiring the insertion of a chest tube.

"He was in the hospital for a little over a week. When they thought it (the lung) was healed, they proceeded to take the tube out and the lung re-collapsed" says Spears. "So he had to have surgery done to fix that."

She says the struggle of not knowing if the lung has healed and if the chest tube should be removed can cause a lot of stress and anxiety for patients, and hopes her team's new device can help alleviate some of those challenges.

NEW CENTRE ENHANCING THE LIVES OF ENGINEERING STUDENTS

A NEW STUDENT CENTRE ON

Dalhousie's Sexton campus is filling a crucial gap in the academic success of engineering students.

In the fall of 2019, the Faculty of Engineering opened the Melda Murray Student Center, a space designed to enhance student experience by facilitating learning and reducing some of the barriers previously encountered when trying to access university services.

The Centre is dedicated to providing academic and non-academic support to students by offering a variety of services including mental health support, career support, academic assistance and international student advising.

"The student feedback has been overwhelmingly positive. It seems as though before the Centre, the students

were feeling almost left behind," says Brooke Edwards who was hired as the new Coordinator of the Centre. She says prior to implementing the new space, engineering students were paying for a variety of services that were only accessible on the university's main Studley campus.

Made possible through a generous donation by Richard Murray (BEng '66 NSTC), the Centre is named in memory of his late wife Melda, who Edwards says, was very passionate about the idea of supporting and guiding students.

Edwards says her goal is to do everything she can to continue to help students. "I am a firm believer that when you are creating services that are aimed to reach a certain audience, then the audience you are trying to reach should



have a say in what that looks like."

She says so far, students have identified a need for increased career support and more assistance for international students.

"We now offer a resume and cover letter review service, along with interview prep," she says. "This is for all students, but it especially aims to support the students who are not in co-op."

Edwards adds that students also identified a gap in mental health services on campus and is happy to announce that same-day counselling is now available on Tuesdays.

She says at the moment her main goal is to continue to increase visibility of the Centre and develop more programming that directly addresses the gaps on Sexton campus.

CELEBRATING STUDENT LEADERS



FARAJ SHAHRSTAN IS A BUSY MAN.

Aside from being in the final year of his Civil Engineering degree, he's also taken on a multitude of extracurricular activities on campus including past President of the Civil Engineering society, past Vice President of Communications for Dalhousie Engineering society and the founder and current President of the University's first American Concrete

Institute (ACI) Student Chapter; just to name a few of his hobbies outside the classroom.

For Shahrstan, representing the Faculty of Engineering has always been just as important to him as his academic success.

"I'm very keen on wanting to bring people together. I think that's part of my personality," he says. "If people see, people will follow, and I like being able to bring everyone together for a common goal."

When it came to founding Dal's ACI Chapter, Shahrstan says it's been one of the most rewarding experiences of his university career. Launching the initiative in 2018, he says it took an entire year to build the student chapter. Since that time, he's been able to grow his team to 30 members and compete at international competitions where they've ranked in the top 5 out of 50 teams.

In recognition of Shahrstan's outstanding work, he was recently named to the Faculty of Engineering's Dean's Leadership List. The acknowledgement was introduced in the Fall of 2019 to celebrate the co-and-extra-curricular leadership initiatives of students.

"It's wonderful that the Faculty now honours the hard work and efforts of students outside the classroom," says Shahrstan. "Students are typically only recognized for their academic achievements, but for me, good grades with extracurricular initiatives is the path for a well-rounded university experience. As an engineer, I'm trying to showcase to the world who I am and what I'm able to contribute to society."

Eight students ranging from various disciplines and years of study were named to this year's Dean's Leadership List.



CELEBRATING DAL ENGINEERING'S FIRST FEMALE GRADUATE

**“SHE WAS SO DETERMINED,
SHE DREAMED ABOUT
BECOMING AN ENGINEER,
AND SHE WAS NOT TO
BE DISSUADED.”**

— BILL FLUHMANN

WHILE RIDING A CITY BUS,

Norma Ann Marion Eddy (BEng'58), was approached by a couple of young men and questioned about her iron ring. In Canada, iron rings are presented to individuals who have graduated with their university degree in engineering.

The men insisted the iron ring belonged to Eddy's boyfriend. It didn't.

The year was 1958; a time when very few females pursued post-secondary education. Eddy however was different. Driven by her love for math, she had just graduated from the Technical College

of Nova Scotia (now Dalhousie's Faculty of Engineering) with a degree in Chemical Engineering. Her achievement left an important mark in Dal's history as the first female to graduate with a degree in engineering.

“She was so determined,” remembers Bill Fluhmann (BEng'58), Eddy's husband. “She dreamed about becoming an engineer, and she was not to be dissuaded.”

Originally from Bathurst, New Brunswick, Eddy was fiercely independent. Enrolling at Dal in 1953, Fluhmann says Eddy knew exactly what she wanted despite the fact her chemistry professor insisted she not pursue a degree in engineering.

“That upset her,” says Fluhmann. “She was determined to go to school. She was of her own mind to do her own thing. Once she made up her mind, that's what she would do.”

Of the 250 students enrolled in the engineering program, Fluhmann said Eddy was the only female on campus.

Although many of her male classmates competed for her attention, it was Fluhmann who won her heart. Also enrolled in the Chemical Engineering program, the two were paired as lab partners at the time.

“At the end of the school year there was a tech ball, and Norma and I went together as a couple in our final year,” recalls Fluhmann. “Unfortunately, I hardly had a chance to dance with her because all of the other students in the class wanted to dance with her.”

Following graduation, the couple married and re-located to Montreal where Eddy began working at Johnson & Johnson Inc. Shortly after, they welcomed their first child and Eddy left her position with the company to raise their growing family at home.

Although she passed away in 2001, she has left a lasting impact on Dalhousie's Faculty of Engineering. Last fall, she was honoured in a street naming ceremony on Sexton Campus.

Two streets, which intersect next to the new Emera IDEA Building and connect the campus to Barrington and Morris Streets were named after Norma Eddy and Mathieu DaCosta, who is considered the first named African in Canada.

Fluhmann says he's extremely honoured and proud that his wife has left a lasting impression on the engineering campus, and says he hopes her memory will inspire all future female engineers who enroll at Dal.



▲ In November of 2019, Dal's Faculty of Engineering teamed up with the Faculties of Computer Science and Science to host the Women in STEM (Science, Technology, Engineering and Mathematics) Networking and Panel in Halifax. The annual event aims to celebrate women working in STEM related fields, build networks and generate support for women in the workforce.



▲ It was a big year for Dalhousie University's Women in Engineering Society (WIE). For the first time ever, the society was honoured with their first Dalhousie University IMPACT Award in the category of "Most Impactful Social or Environmental Justice Society." The awards recognize the outstanding individuals and students groups that impact the community. In the last year, WIE has become one of the most successful and impactful societies on Sexton campus.



◀ Congratulations to Dr. Noreen Kamal from Dal's Department of Industrial Engineering and Dr. Paul Gratzner from Dal's School of Biomedical Engineering. They have been awarded funding by the Canadian Institutes of Health Research (CIHR) Project Grants. The funding helps researchers gather the kind of information they need to make real improvements to clinical practice, health service delivery, and public health policy.



▲ Last November, Dal's Emera ideaHUB, in collaboration with the Faculty of Engineering, DALINNOVATES and the Halifax Innovation District, hosted the inaugural IDEA Speaker Series. The event showcases innovation leaders in Atlantic Canada, exposing students, alumni, startups, and ecosystem partners to opportunities for growth in their careers. The first event featured three top leaders in Atlantic Canada: Chris Huskison, Pat Ryan (BEng'83) and Dal Robertson (BEng'78).

▼ It was a big night for the Faculty of Engineering at the 2019 Discovery Awards. Gragam Gagnon, Associate Vice-President Research, NSERC Industrial Research Chair in Water Quality and Treatment and the Director for the Centre for Water Resource Studies was honoured with the Professional of Distinction award. Barret Kurylyk, Assistant Professor of Civil and Resource Engineering and Canada Research Chair in Coastal Water Resources received the Emerging Professionals Award. The Discovery Awards honour individuals and companies in Nova Scotia making outstanding contributions in the fields of Science & Technology including inventions, innovative studies, or dedication to the promotion of science and technology.



SUPPORTING STUDENTS THROUGH COVID-19

IT'S DURING TOUGH TIMES THAT A LITTLE HELP CAN GO A LONG WAY.

You can support students by making a gift to Dalhousie's COVID-19 Student Relief Funds:

- Student Emergency Relief Fund
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Learn more or make your gift today at projectdal.ca



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