Keeping in Touch with Alumni Fall 2015

U OF A ENGINEER

Growing up FAST

ONEC Engineering's emphasis on integrating teams is paying off

Canada's Forrest Gump

The dancing engineer

Cosmic photography

A career on the leading edge of IT

MOVING FORWARD IN A YEAR OF CHANGE

Another school year has begun and the Faculty of Engineering has been going through important changes. As I settle into my new role as Dean of Engineering, our departments and almost all our professors have moved into the new Donadeo Innovation Centre for Engineering. Before year-end, most of our graduate students will also be in the building, which will house approximately 1,400 people.

It's a large number. Our faculty ranks in size among the top five per cent of more than 400 engineering schools in North America, with about 4,300 undergraduate and 1,600 graduate students. We are consistently recognized as one of the best engineering schools in Canada and the world. The 2015-16 QS World University Rankings list the Faculty of Engineering in the top 100 universities in chemical engineering and civil and structural engineering.

Teaching is our priority. This is reflected in the fact that during the last 10 years our professors have won five APEGA awards for Excellence in Education, three Engineers Canada Medals for Distinction in Engineering Education, seven U of A Rutherford Teaching Awards for Excellence in Undergraduate Teaching and four U of A Provost's Awards for Early Achievement of Excellence in Undergraduate Teaching.

Our faculty is also a powerful research centre, with 16 NSERC Industrial Research Chairs—we have more of these prestigious research chairs than any other entire university in Canada. We are home to one Canada Excellence Research Chair, 14 Canada Research Chairs and 11 endowed chairs and professorships.

This strong community of teachers and researchers is working together to provide our students with the best educational experience possible, and to remain at the forefront of research.

Our students excel academically and in regional, national and international competitions. The FSAE, Eco-Car, Great Northern Concrete Toboggan teams and others compete on par with student teams from around the world. Our students in Engineers Without Borders, Engage North and DiscoverE serve diverse communities while developing valuable professional skills.

Your role as engineering alumni is to serve as our ambassadors, friends and supporters. You are the best judge of the impact the Faculty of Engineering has had on your own lives. We trust that you'll consider helping our students in any way that you are able. Thank you for your continued support!

Fraser Forbes PhD, PEng
Dean of Engineering

Vision To be one of the largest and most accomplished engineering teaching and research centres, a leader in North America.

Mission To prepare top-quality engineering professionals, to conduct world-leading research and to celebrate the first-class reputation and outstanding accomplishments of alumni.

Values Dedication, integrity, professionalism and excellence in teaching, research and service to the global economy and community.

U OF A ENGINEER
Fall 2015 Issue 38

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UNIVERSITY OF ALBERTA
FACULTY OF ENGINEERING

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ON THE COVER ONEC Engineering principals David Kwok, Ian Park, Shaun Jones and Denis Wiart value integrated teamwork. See story, page 30. Photo by Demetri Giannitsios.

ENGG NEWS

ARVP team members Randy Derbyshire and Michael Bonot put their vehicle, Aqua-Ursa, to the test before heading to an international competition.

Demetri Giannitsos

Run silent, run deep...

This year at the RoboSub 2015 competition, the Faculty of Engineering's Autonomous Robotic Vehicle Project (ARVP) placed eighth out of 40 international teams. "ARVP has reached a milestone this year in clinching a top-10 spot. We came within only a few points of a spot in the finals and RoboSub 2015 has inspired all our members, knowing how close we were in taking a major leap for our student project," says team leader Alvin Ly, a mechanical engineering student. "I can speak for all my teammates in saying that this is one of the greatest engineering experiences; ARVP has allowed all of us to design and promote practical robotic applications, collaborate with students in different disciplines and faculties, and work on a project that's similar to engineering work experience. We're all enthusiastic for next year and will continue developing the robot and our knowledge of robotic technologies."

Solar energy will power new building

There are many environmentally friendly attributes to the new Donadeo Innovation Centre for Engineering—the building is expected to be rated gold LEED standard. And the cherry on top, in a manner of speaking, will be a solar photovoltaic system installed on the roof.

Two engineering alumni are playing key roles in the project. Michael Versteege (Mechanical '99) the U of A's energy management program manager, is working with Gordon Howell

Cool research on ice

Alberta experienced one of its hottest summers on record, but two engineering professors were awarded research funding for projects rooted in the cold clutches of Old Man Winter.

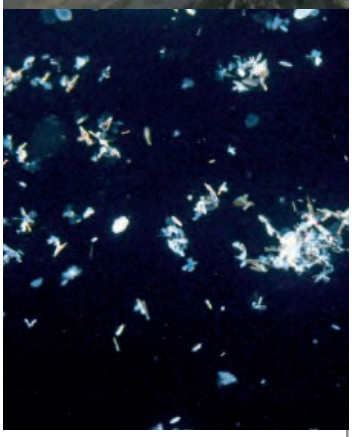
Department of Civil and Environmental Engineering professors Mark Loewen and Yuntong She have received funding from the Natural Sciences and Engineering Research Council to support their research into how ice forms on rivers and how we can predict its behaviour. In all, 52 Faculty of Engineering professors were awarded a total of $6.5 million in NSERC Discovery and Discovery Accelerator Grants announced earlier this year.

Research conducted by Loewen and She examines different ends of the river ice spectrum.

Loewen studies the formation and evolution of frazil ice—the smallest ice crystals that form when river water begins to freeze. She, on the other hand, is studying the behaviour of rivers and ice when ice covering rivers begins to break up, potentially causing floods or damage to homes and public infrastructure.

Loewen is working with B.C. Hydro along the Peace River to understand conditions leading to the formation of ice. Water released by dams is too warm to allow ice to form for hundreds of kilometres downstream. But knowing where the ice will form can help the utility manage river ice more responsibly.

How river ice behaves is the focus of research conducted by She. Her area of study is a complex combination of thermodynamics, hydrodynamics, and solid mechanics. Her research includes modelling ice and water flow through deltas, such as the Mackenzie River Delta or the Hay River Delta, in the Northwest Territories. The model will serve as a tool for predicting ice jam events, providing information on water level, flow, ice thickness, and velocity.



It's cool work. PhD student Vincent McFarlane sets up the research team's ice-cam just below the frigid waters of the Kananaskis River in southern Alberta. Below: Loewen and his research team capture images of the smallest ice crystals as they form, just below the surface in supercooled turbulent water. At the smallest end of the scale, the crystals measure a mere 50 microns (0.05 mm) in diameter.

(Electrical '75), a principal in Howell-Mayhew Engineering Inc. as a lead consultant.

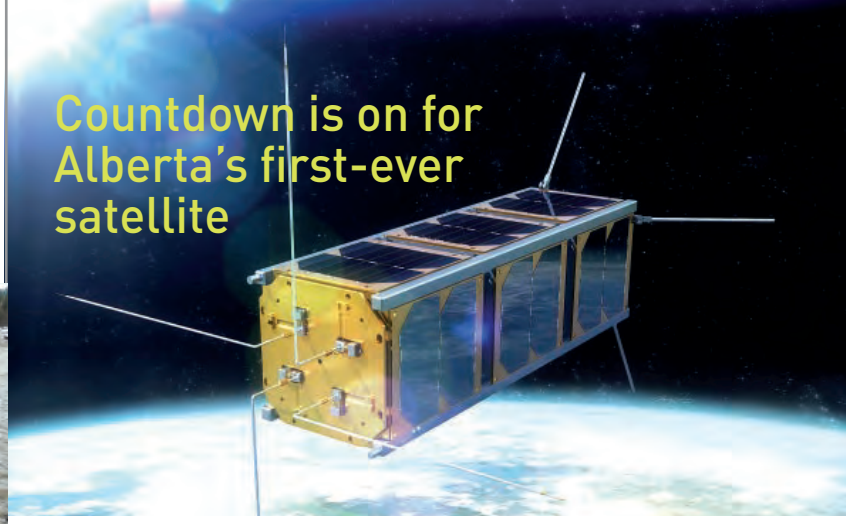
The idea for a solar energy site began with plans to place the panels on the roof of the Chemical and Materials Engineering Building and grew from there.

"We were talking about putting panels on top of the CMEB, then there was mention of ICE and we thought 'Let's make this one big solar facility that spans both buildings,'" says Versteege.

When the project is complete, the panels will be in plain sight from the lineup at Tim Horton's in the John and Barbara Poole Family Atrium in ETLC.

Costs for the project are being shared between the U of A Department of Facilities and Operations and the Faculty of Engineering.

Howell says there will be approximately 260 solar PV modules on the rooftop.



Countdown is on for Alberta's first-ever satellite

It's all systems go for the 2016 launch of a satellite designed and built by the AlbertaSat student team at the University of Alberta. ExAlta1, the first satellite ever built in Alberta, will be part of QB50, a project mounted by the European Commission to simultaneously launch 50 cube satellites built by university students from 28 countries into the Earth's lower thermosphere.

The satellite is designed and built by a team of some 60 undergraduate and graduate students, with support from research associates, technicians and academic experts at the U of A's Institute for Space Science, Exploration and Technology (ISSET). The QB50 satellites are scheduled to launch in the summer of 2016, and the U of A team hopes its satellite remains in orbit for nine months.

"The learning curve is very steep as far as how to do this—there's not a lot of previous expertise [in Alberta]," says Charles Nokes, an engineering physics student who is project manager for ExAlta1. "There's a challenge in learning and ensuring we have the knowledge and expertise in place to do the development, and the rest is procuring the systems we need and ensuring we have the resources we need to build and test everything."

Nokes says having access to professors and their leading-edge research labs is the key to success for the Ex-Alta project.

"We need to use a shake table, and the Department of Mechanical Engineering has three," he explains, adding that the team also conducted an accelerometer test using a massive centrifuge at the Department of Civil and Environmental Engineering's Geomechanical Reservoir Experimental Facility to expose the satellite to a constant force of 10 Gs. Using an anechoic chamber in the Department of Electrical and Computer Engineering, the team can better understand the satellite's own electromagnetic characteristics. And using a thermal vacuum chamber in the Thin Films Lab in the Department of Physics, the team can expose the satellite to severe temperature ranges, from -40 C to 50 C in a vacuum, to ensure it can withstand the conditions it will face in orbit.

ExAlta1 is a cube satellite made of three smaller modules that, together, are about the size of a loaf of bread, weigh only a few kilograms, and will carry sophisticated equipment to gather data about space weather and characteristics of re-entry.

U of A physics professor and Canada Research Chair in Space Physics Ian Mann, who has been instrumental getting the AlbertaSat team onboard for the QB50 mission, says the project is just one small step toward a bold future for aerospace education, research and commercialization in Alberta.

Mechanical engineering professor Carlos Lange, who is one of five Faculty of Engineering supervisors for the AlbertaSat team, says the project demonstrates the potential for a made-in-Alberta aerospace industry.

"There is already a large, global economy based on the use of space resources, but this is just the very beginning of it. The ExAlta1 student-built satellite will not only pioneer a new industry in this province, but it is also the birth of a new generation of professionals trained at the U of A with specific skills required by this high-tech industry," Lange says.

"This is one thing we have already started, we are doing it, and I think the province should recognize the economic potential. The time is now."

Smart roads + smart cars = safe streets

By Aalyssa Atley

Richard Cairney

Vehicles of the future will be "more like computers," according to civil engineering professor Tony Qiu, scientific director of the Centre for Smart Transportation. Qiu worked with the City of Edmonton to install sensors on the Whitemud Drive that can determine when traffic is becoming congested and advise motorists well ahead of time to adjust their speed; by doing so, bumper-to-bumper traffic jams would not form.

You're driving back into town just as the evening rush hour is swelling and freeways are starting to become congested. And it's been snowing all day—for the past three days. You're white-knuckling it down the centre lane when your car notifies you of a crash three kilometres up the road. You take the next exit and still manage to make it home safely and on time.

Connected vehicle technology has the potential to save lives; it can warn drivers about traffic jams, hazardous road conditions and lane closures, as well as accidents that have just occurred. It can also suggest alternative routes to help drivers avoid traffic congestion, dangerous situations and potential collisions.

The ACTIVE-AURORA Test Bed Network, a unique and innovative project to advance connected vehicle technology, has been established through the Faculty of Engineering's Centre for Smart Transportation. This new partnership among government, universities and the private sector helped launch the first connected vehicle road in Canada.

The network provides a platform for investigating and implementing connected vehicle technologies, which enable roads and vehicles to share critical, real-time information with other vehicles and surrounding infrastructure via wired and wireless networks.

The test beds are being built and operated in Edmonton and Vancouver. The Centre for Smart Transportation is leading the research on the Edmonton component, which includes two on-road test beds and a transportation and traffic data management centre. Civil engineering professor Tony Qiu is the lead researcher.

Qiu says that vehicles of the future will be "more like computers" that will be connected to each other and the Internet. Wireless infrastructure installed along roadways will allow cars to communicate road and traffic conditions in real time, he adds.

The research program is using sections of Whitemud Drive in Edmonton to test the wireless technology. Qiu's research findings could also help form regulations and policies dealing with wireless automotive technologies.

This initiative is a $3.6-million partnership among the University of Alberta, University of British Columbia, Transport Canada, Alberta Transportation, the City of Edmonton and industry.

"This technology holds great potential to make our roads and highways safer and more efficient—further supporting our economy by getting Alberta's goods to markets across Canada and in the United States," Wayne Drysdale, transportation minister in the previous Alberta government, said in an announcement earlier this year. "Being at the forefront of innovation helps us maintain a high quality of life and a healthy environment for all Albertans as we strive to meet growing urban and regional transportation needs."

> "Wireless infrastructure installed along roadways will allow cars to communicate road and traffic conditions in real time."

WELCOME TO POP QUIZ

Pop Quiz is your chance to revisit the lessons you learned while at university. It doesn't matter how long ago you graduated—math and the laws of physics still haven't changed. With a little work, you'll be able to answer these questions.

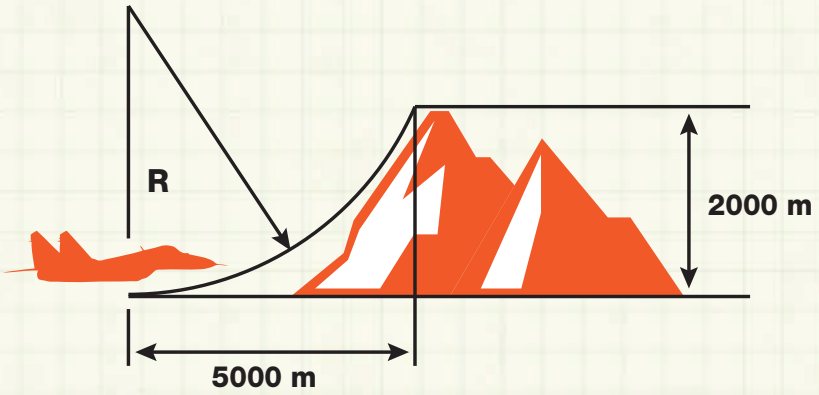
If you ever studied in one of mechanical engineering professor Pierre Mertiny's classes, this should be a snap, because by all accounts he's a great teacher. He has won both the SAE International Ralph R. Teetor Educational Award and the APEGA Excellence in Education Award.

We asked Mertiny for questions his students might find on a mid-term and he came up with these gems. They're tricky, but we're confident you can solve these problems!

If you have any questions, visit our Pop Quiz website: **engineering.ualberta.ca/PopQuiz**

1. A low-flying jet aircraft is travelling at poor visibility of 5000 m with constant speed of Mach 3 (1000 m/s), when the pilot sees a mountain range appearing. The jet, which can only sustain an acceleration of 9g, has to climb 2000 m to avoid the obstacle.

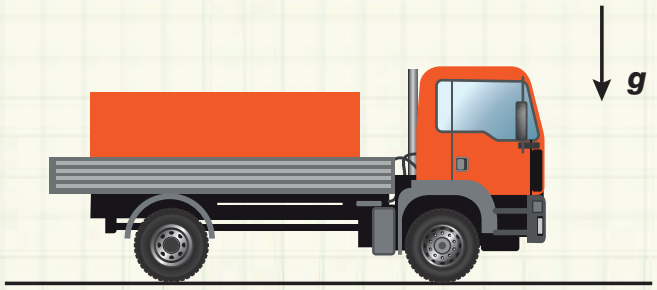
   Will the pilot be able to avoid a crash? Assume a circular flight path.



2. A concrete block of mass m is being transported in the cargo box of the truck shown. The truck is driving in forward motion on a straight road with speed v_0 = 60 km/h. The truck shall be decelerated with a constant a_0 to 0 km/h in as short a distance as possible without the load starting to slide. The coefficient of static friction μ_s between the concrete block and the floor of the cargo box is 0.3.

   a) Draw the FBD and KD for the concrete block

   b) Determine the stopping distance for the maximal possible deceleration



Answers appear on page 33

Reservoir geomechanics chair supports industry with education, discovery and technology transfer

By Vivian Giang

Hope Wells

Left to Right: Senior research engineer Gilbert Wong, Foundation CMG Endowed Chair in Reservoir Geomechanics Rick Chalaturnyk and research associates Gonzalo Zambrano-Narvaez, and Nathan Deisman in the GeoREF lab.

The Faculty of Engineering and Foundation CMG have joined forces to foster discovery and transfer of cleaner, more efficient techniques to bring unconventional hydrocarbon sources to markets. They also aim to educate a new generation of engineers with specific knowledge and skills to support responsible resource development.

Rick Chalaturnyk, a professor in the Department of Civil and Environmental Engineering, has been appointed as the inaugural holder of the Foundation CMG Endowed Chair in Reservoir Geomechanics. The endowed chair program is an integral component of a new $15-million research program aimed at developing technologies to optimize the economic and environmentally sustainable recovery of unconventional resources in Canada. The research program is part of the Foundation CMG Industrial Research Consortia, which supports 14 research chairs at universities around the world.

Chalaturnyk describes the consortia as "a positive mechanism" that brings together multiple industrial sponsors and partners to discuss and focus research on challenging issues. "The program provides an ideal framework and creates a critical mass for researchers and industrial partners to collaborate," says Chalaturnyk.

The consortia receives support through an NSERC Collaborative Research and Development grant with industrial and government partners Athabasca Oil Corp., BP Canada Energy Co., Brion Energy, CMG Reservoir Simulation Foundation, Canadian Natural Resources Limited, Cenovus FCCL Ltd., ConocoPhillips Canada, Nexen Inc., Shell Canada Ltd., Suncor Energy Inc., Alberta Innovates – Technology Futures, and Alberta Innovates – Energy and Environment Solutions.

According to the Conference Board of Canada, unconventional production had become Canada's dominant form of energy production in 2009. While global demand for energy rapidly increases, Canadian producers are running up against the limitations of current technology to convert natural resources to marketable energy supplies while ensuring a cleaner environment. Recent steam and bitumen release events in Alberta have highlighted the reservoir-geomechanical challenges associated with the sustainable development of these resources. As several major oil and gas production companies are now creating reservoir geomechanics research groups among their personnel, the chair program will be a major hub for knowledge sharing and technology development for industry.

Duke Anderson, president and CEO of Foundation CMG, says he's "thrilled" with Chalaturnyk's appointment. "The petroleum industry is faced with many geotechnical challenges, and Rick and his team are world-class researchers in this area. We provide support to professors such as Rick, and grad students in areas of computer numerical simulation of oil and gas recovery processes with collaboration and technology transfer with the industry."

Chalaturnyk leads the Faculty of Engineering's Reservoir Geomechanics Research Group (RG)2, a team of 39 graduate student researchers and technical staff investigating the properties and behaviour of various unconventional resources, including oil sands, shale caprocks, bitumen carbonates and more recently shale gas, during the recovery process. To conduct this research, Chalaturnyk also spearheaded the establishment of the $4.3-million CFI/ASRIP Geomechanical Research Experimental Facility (GeoREF), which features a high-temperature/pressure testing facility, Western Canada's only beam centrifuge facility and a state-of-the-art 3D sand printing machine. Over the next five years, the program is expected to train more than 50 highly qualified personnel in the latest technologies and applications in the reservoir geomechanics field.

"Collaborative partnerships such as this research chair, supported by Foundation CMG, are the most effective approach to developing the most responsible methods of resource development," former Dean of Engineering David Lynch said, during a formal announcement earlier this year. "This combination of real-world challenges and scientific rigor is required to come up with innovative new technologies and advances for the benefit of not only industry, but for the next generation of engineering professionals who will have the opportunity to work closely with industry partners to find solutions to engineering challenges."

“This place rocks!”

By Richard Cairney and Vivian Giang

Ward Wilson brings his expertise in mining waste to a new research position aimed at reducing environmental impact.

Richard Cairney

Ward Wilson, centre, is internationally renowned for his work on handling mine waste—he brings valuable industry experience to his role as the NSERC/COSIA Industrial Research Chair in Oil Sands Tailings Technique.

The combined footprint for Alberta’s oil sands is 130 square kilometres. But the industry’s ability to manage the waste from these processes is critical in ensuring responsible resource development.

One of Canada’s top researchers, renowned for his understanding of challenges presented by mining waste, has been awarded an Industrial Research Chair by the Natural Sciences Engineering and Research Council of Canada.

Professor Ward Wilson of the Department of Civil and Environmental Engineering, with the support of the federal and provincial governments and industry partners, is leading research aimed at reducing the environmental impact of mine tailings, such as the oil sands tailings.

Wilson has been appointed to a five-year term as the NSERC/COSIA Senior Industrial Research Chair in Oil Sands Tailings Geotechnique. The chair is supported by Canada’s Oil Sands Innovation Alliance’s Tailings Environmental Priority Area (COSIA Tailings EPA) and Alberta Innovates - Energy and Environment Solutions. This research program will provide Alberta’s oil sands industry, its regulators, and consultants with new technologies to measure the effectiveness of tailings remediation efforts, new and innovative processes for reducing post-production tailings, and simulation models to help industry with tailings planning and management.

With 25 years of industry experience and a strong international reputation as a researcher and academic, Wilson is “one of the few people worldwide who is qualified” to hold the chair, according to Pamela Moss, NSERC research directorate’s acting vice-president.

Importantly, she says, Wilson’s graduate student researchers will play a key role in solving challenges presented by tailings.

During an event to formally announce the appointment, former Dean of Engineering David Lynch said industry involvement in this research is vital.

“What works in one oil sands deposit will not necessarily work in another oil sands deposit,” he said, adding that the fact that the COSIA members have all shared their intellectual property and research to work together on tailings helps Wilson and his team, and industry, “follow the most productive path possible.”

Wilson, who acknowledged the work of his predecessors in the Faculty of Engineering, says his research program is running at full steam.

“We have a long way to go, but we’re up and running.”

Wilson added that the program’s past, present and future are something to be proud of and should be celebrated.

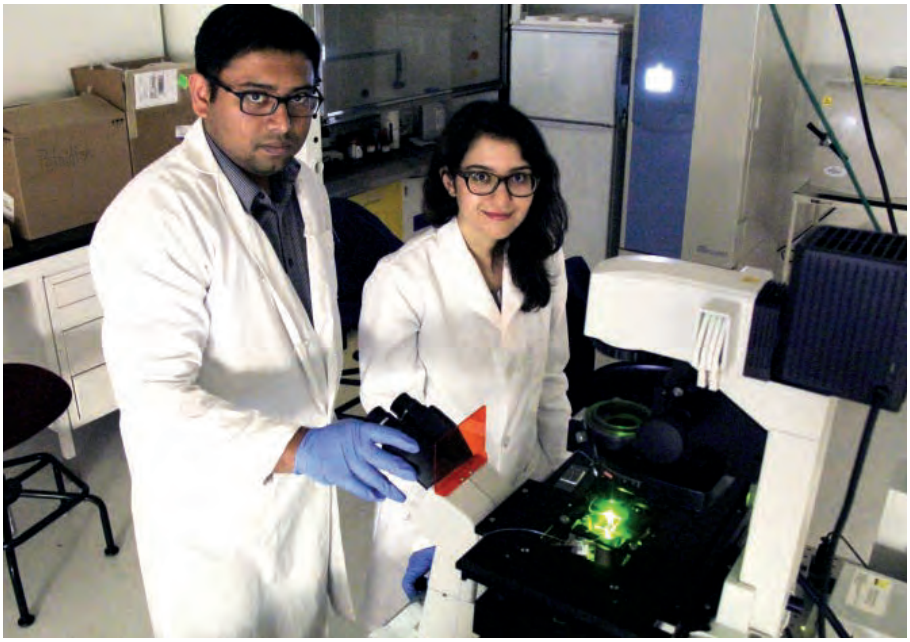
“Albertans don’t think highly enough of themselves,” he told a crowd at his formal research chair announcement. “This place rocks!”

The research program is being funded for five years with a possibility of renewal. Wilson’s program is valued at nearly $4.9 million, including a $1.9-million award from NSERC, $1.9 from COSIA Tailings EPA (along with an additional $390,000 of in-kind support) and $500,000 through Alberta Innovates – Energy and Environment Solutions.

Bug Buster

How nanotechnology is being used to battle bacteria

By Wanda Vivequin and Richard Cairney



Richard Cairney

Aloke Kumar, working in his National Institute for Nanotechnology lab with PhD student Mathab Hassanpourfard, has been appointed to a prestigious Canada Research Chair position. His research has important impacts on health and medical devices.

A Faculty of Engineering professor is addressing public health issues, using nanotechnology to battle bacterial infections that can wreak havoc in hospitals.

Aloke Kumar has been appointed as the Canada Research Chair in Microfluidics for Biological Systems. His research focuses on bacterial biofilms that grow on wet artificial surfaces like plastic tubes used for catheters or water cleaning filters, posing a risk to human health. The complex nature of these bacterial communities makes them a challenge to control, so researchers are working on ways to discourage growth. Frequently impossible to see with the naked eye, bacterial films resemble a layer of algae, Kumar says, and serve as a coating that protects bacteria from antibiotics, protozoa that feed on bacteria and even from mechanical shearing or scraping used to remove them.

"These aren't even the superbugs. These are normal bacteria that will respond to antibiotics, but once they have formed this film they have a protective coating," says Kumar.

Commonly used medical devices such as catheters and implants are prone to being colonized by bacterial biofilms, which can lead to chronic infections in patients. Acute infections caused by biofilms compromise the well-being of patients and create a substantial burden on health-care systems worldwide.

Biofilms also affect industrial processes, including water filtration systems.

> "I'm able to make a chip out of the same material as a catheter, then run blood through it, or feed the bacteria certain doses of antibiotics. You're able to manipulate it and observe it in real time."

Kumar's biomicrofluidics research looks at the viability of using electrical fields to prevent or disrupt the formation of biofilms on different surfaces. Traditionally, bacteria biofilms have been studied in petri dishes, but by creating miniature microfluidic platforms (lab-on-a-chip technology), Kumar is able to see how the biofilm grows on different materials and under different conditions.

"I'm able to make a chip out of the same material as a catheter, then run blood through it, or feed the bacteria certain doses of antibiotics," he says. "You're able to manipulate it and observe it in real time."

One intriguing phenomenon researchers have discovered is the fact that applying an electrical field to the biofilm halts its growth.

"The electrical field seems to somehow disorient the bacteria and throws the gears off its ability to form biofilms," he said, adding that researchers don't completely understand how or why this happens.

The new research chair appointment will enable Kumar and his research team, which includes collaborators in the medical sciences as well as his own graduate students, to understand biofilms more clearly and devise ways to prevent or eliminate them.

"It will hopefully help me attract more research funding, and it definitely helps when I am interacting with other professors and researchers," Kumar says. "It's a vote of trust in me as a capable scientist. It's really an honour."

Al-Terra Engineering Ltd. has been hiring U of A engineering co-op students since the program's earliest days. Kelly Alsmo and Dana Leithead benefitted as students working for Al-Terra and participate in the program today as employers.

Meet your future employees

There are many benefits to hiring U of A engineering co-op students. They're equipped to help your company complete special projects or get through busy periods, providing high-quality work over four- or eight-month placements. Giving future engineers real experience and a chance to prove themselves is an investment in the future – and a great way to find new long-term employees.

No matter what size your company or projects are, engineering co-op students can help. Find out how by calling:
Edmonton: 780-492-5152 | Calgary: 403-718-6393

Or email: **engineering.co-op@ualberta.ca**

FACULTY OF ENGINEERING

UNIVERSITY OF ALBERTA

In the know.

What's the best part about keeping tabs on the Faculty of Engineering?

You'll discover what today's students are up to, you'll learn about breakthrough research findings and new technology developments – you might even find a way to partner with our students and researchers.

Keep informed **www.engineering.ualberta.ca**

Ginette Conrad (née Dubé) (Materials ’12), started her company, Direct Alloys, while she was still an undergraduate student.

Entrepreneurial engineer experiences the ups and downs of oil and gas

Nerves of Steel

When Ginette Conrad (née Dubé) (Materials '12) was in her final year of materials engineering studies, she felt she had to come clean to her professors, to let them know why she had seemed inattentive and missing classes. She and her business partner had co-founded a new company, Direct Alloys, and Conrad had been travelling around the world inspecting steel manufacturing plants the company was purchasing steel from.

The professoriate was impressed. After graduating, Conrad was able to put all of her energies into building the company.

U of A Engineer featured Conrad in a brief article shortly after graduation, and we caught up with her recently to follow up and see how things are progressing.

It has been a while since we last spoke. What are some of the major developments with you and your company?

Our Nisku office and shop was built in 2013. We've got 5,000 square feet of shop space, 1,000 square feet of office space, and maybe two acres of yard space. This is where our orders are processed and distributed. We also have a yard in Millet that holds surplus inventory so there's always room to grow.

How has the drop in oil prices affected Direct Alloys?

Well, we do have room to grow but right now the only way we will is if oil prices and the oilpatch pick up—but otherwise we're quite happy. Unfortunately I don't control oil prices, and right now it's difficult. We're going to make it through this, but we had certain plans and visions of where we were going and because of the current economic state, it has changed our business objectives.

Maybe there's a silver lining. Maybe this is giving us time to focus on the R&D side of the business. Sometimes we're just so busy we don't have time to focus on the core corporate aspects, like making sure we have the best accounting system and inventory software. In the long run I might look back on this period as a good thing, as a time that was helpful. But right now? I just wish it was busy.

Aside from completing your building and shop, what other notable milestones have you reached?

We've been accredited with ISO 9001:2008 Certification. It ensures quality at every level, from the method the steel is manufactured to our freight, our cutting, our delivery—everything. It assures clients that we have a quality product every step of the way. It isn't that one batch of steel has great mechanical properties and another doesn't. It ensures everything is manufactured to the same standard following the same procedures yielding consistent results.

Another important change is that we've sourced new suppliers from Europe, so we're diversifying from Asia. The advantage for us is that it allows us to shop for better pricing, quality, and delivery times. Considering our economic situation, with everything being slow around the world, it gives us an edge, something to negotiate with.

When you started the company you were still an undergraduate student. But you travelled around the world to inspect steel manufacturing facilities, ensuring that you were importing quality steel. Are you still touring plants personally? Is language ever an issue?

Yes, but my engineering education serves as a common language that's understood between different cultures around the world. I'm able to apply my knowledge on a daily basis, whether it be to develop my own material specification and quality certificate, or audit a new manufacturing facility, or simply explain material concepts and test procedures/results to customers to further their understanding.

When I travel, everyone's aware that I am a materials engineer. That's made clear from the very beginning. When I first started Direct Alloys and first started going to these facilities I wasn't calling myself a materials engineer and they'd go into less detail about their manufacturing procedures and they'd omit some information. But now, they have no problem showing me every corner, every nook and cranny of their operations, and telling me everything I need to know.

My degree establishes a certain respect. It opens the lines of communication for a really good business relationship.

You were recently nominated for a 2015 RBC Canadian Women Entrepreneur Award. What did that mean to you?

It's an honour! Over 5,000 women were nominated this year and nearly 200 applications were internally audited, including my own, and that places me in approximately the top three per cent. The award is presented by the Women of Influence, which is an absolutely amazing group of women, so it was an honour even to be nominated by one of my colleagues in the oil and gas industry.

What advice would you have for students who are considering an entrepreneurial path?

The only thing I actively advise people in regards to starting their own company is to follow your gut; if something doesn't feel right, don't do it. I say that because in the long run whether your gut was right or wrong you are going to be happier with yourself at the end of the day. There are so many struggles with everything else that you shouldn't be struggling with yourself.

Demetri Giannitsios

The Eye Witness

Tom Morimoto grew up with legends of the North—and his engineering degree took him everywhere else

By Rick Pilger

John Ulan

Tom Morimoto, with his wife Kim during a visit to campus, has led a colourful life, meeting and befriending some of Canada's true heroes. He grew up in the North (Morimoto is front and centre as goalie on his hockey team in the N.W.T., page 3). As a radioman during the Second World War (opposite page), he took part in the D-Day invasion. Following the war he earned his engineering degree and embarked on a fascinating global engineering career.

In the 1994 movie *Forrest Gump*, the title character finds himself at the heart of many of the iconic events of 20th-century American history. In that respect, Tom Morimoto, (Chemical '49, MSc '52) might well be described as a Canadian Forrest Gump.

Born in 1918 in Edmonton, Alberta, Morimoto has had a front-row seat to much of the march of history in Western Canada and beyond. He grew up in Fort McMurray during the last years of the steamboat era, and his earliest heroes were the men of the river: larger-than-life characters celebrated for the ability to pilot craft through the perils of the Athabasca River, chop mountains of wood to feed the steamboat fires or carry enormous loads—sometimes more than 200 kilos—on portage.

During Morimoto's childhood, a pantheon of the eccentrics, adventurers and notables who would make their mark on the development of Canada's North would gather in McMurray, waiting for spring breakup to continue their journeys to higher latitudes. Among those Morimoto recalls meeting on his community's streets were two governors general and Alfred King, the Mountie shot by "Mad Trapper" Albert Johnson.

Eventually, the colourful rivermen would be supplanted in Morimoto's imagination by new heroes: the dauntless flyers and resourceful aero-engineers of the bush pilot era. One of Morimoto's first jobs was serving as a radio operator with Canadian Airways' northern operations, where he encountered legendary pilots such as Punch Dickins and Wop May, with whom he continued a long friendship.

Morimoto's radio expertise would later lead him to involvement in Bob Fitzsimmons' pioneering commercial attempt to unchain the wealth of the Athabasca oil sands. While Fitzsimmons' International Bitumen Company did manage to produce quantities of asphalt and distillate, the abrasive sand quickly wore out the plant's equipment and the effort was abandoned. (Because there was no money to pay the workers, Morimoto and others unable to afford riverboat passage had to wait until freeze-up to make the 87-kilometre trek home.)

A later adventure would take Morimoto to Yellowknife, N.W.T., where he was part of the 1930s claims-staking frenzy that erupted with the gold discoveries that led to the Giant, Negus and Rycon mines. Following misadventures staking claims in the bush and washing dishes at the Wildcat Cafe, Morimoto found work in the Negus Mine, where he sampled the rock at the mine face and supplied dynamite to the miners.

When the Second World War began to intensify in Europe, Morimoto was determined to enlist. Thanks to some judicious "oiling of the wheels" by a lieutenant desiring his skills as a radio operator, Morimoto's diminutive build magically increased to the five-foot-four minimum, and the doctors decided there were grounds for overlooking his weight deficiency. ("I heard one of them say that I was from way up North and I probably hadn't had enough to eat," recalls Morimoto.)

As a radio operator with the Third Canadian Division, Morimoto took part in the D-Day landings—he is believed to be the only person of Japanese descent to have done so—and was with the Allied forces that pushed back the German army until its surrender.

After the war and following his studies at the University of Alberta, Morimoto went on to a distinguished career in engineering and was part of the coming-of-age of the Canadian energy industry. He would later be prominent in the first wave of Canadians taking their energy expertise around the globe.

Now 97 years old and living in Kelowna, B.C., Morimoto received an Alumni Honour Award from the University's Alumni Association, in recognition of his lifetime of accomplishments.

A modest man, Morimoto is quick to acknowledge the role of good fortune in his life. "I was very fortunate in all the choices I made," he says. "I didn't regret any of them—I am very fortunate in that respect." But he also worked hard, and he had the determination necessary to overcome obstacles in his path.

When the Second World War ended Morimoto decided to study engineering. "I was always wanting to take engineering," he recalls. "Ever since I met a chemical engineer, I had thought that was something I would like to do." However, at "rehabilitation sessions" designed to prepare soldiers to return to civilian life, efforts were made to discourage Morimoto from his goal of attending university—these were at least partly based on his ethnicity. In his memoir *Breaking Trail: From Canada's Northern Frontier to the Oil Fields of Dubai*, Morimoto recalls his response to the young lieutenant adamant that it would be wrong for Morimoto to attempt to enter university: "I had discovered during my time in the service that you could say almost anything to an officer as long as you follow it up with 'sir,' so I replied, 'I don't give a damn what you say, sir. I intend to go to university.'"

Morimoto had earned outstanding marks at Eastwood High School in Edmonton before his northern adventures, and he found himself welcomed at the University of Alberta, where he completed both an undergraduate degree and MSc in chemical engineering. During graduate school, Morimoto became acquainted with Karl Clark, the head of the university's mining engineering program. Morimoto recalls that once the professor learned he was from Fort McMurray, Clark, who developed the basic method still used for extracting oil from the oil sands, took a special interest in him, becoming a "friend and valued mentor."

"I had discovered during my time in the service that you could say almost anything to an officer as long as you follow it up with 'sir,' so I replied, 'I don't give a damn what you say, sir. I intend to go to university.'"

After university, Morimoto worked on the construction of the Canadian Celanese plant in Edmonton. From there, he went on to earn recognition in positions at Polymer Corporation in Sarnia, Ont., and then at Brown and Root in Calgary, Alta., before becoming chief process engineer at a new company—Mon-Max, a joint venture of Fred Mannix's Calgary-based construction company and Montreal Engineering, Canada's largest engineering firm.

Mon-Max was established with the goal of breaking into the field of engineering and building gas plants in Western Canada. Because the practice of routinely awarding design contracts to American firms was firmly entrenched, it was tough going initially, but hard work and perseverance paid off. Mon-Max began to win more and more contracts and Morimoto's reputation for his engineering design skill grew.

Morimoto cultivated that reputation further as a consultant after leaving Mon-Max. In 1977 he was invited to join a project in the then little-known Arab emirate of Dubai. Canadian oilman Angus Mackenzie had convinced the rulers of the emirate they could profit from the natural gas being flared from their oilfields and had established Scimitar Oil as part of a joint venture—the Dugas Project—with the Dubai government. Originally brought on as a consultant to oversee the design of the Dugas plant, Morimoto soon became a vice-president of Scimitar with responsibility for overseeing the plant's engineering and operation.

"We were in Dubai at the peak of production for the oilfields," says Morimoto. From the associated natural gas flow, Dugas produced about 30,000 barrels a day of propane and butane—most of it shipped by tanker to Japan—and 150 million standard cubic feet of dry gas. "With production like this, we soon paid off all the debt from the foreign loan, and from then on the profits rolled in for the government and Scimitar Oils ... The Dugas Project and Scimitar Oils became the darlings of the financial world," writes Morimoto in *Breaking Trail.*

Looking back, Morimoto, who has kept active since retiring from Scimitar in 1987, treasures most the friendships he made, as well as the varied experiences of his life. His advice to young engineers is to "get all the experiences you can—learn all you can about all aspects of engineering." And then, who knows where hard work and good fortune might take them? Maybe even as far as Tom Morimoto's life has taken him.

Pete and the Amazing Technological Dream Job

Mashable editor has a backstage pass to all things tech-y

By Mari Sasano

When a young Pete Pachal (Engineering Physics '96) was considering his career options, he turned to a childhood role model: Lieutenant-Commander Montgomery Scott of the *USS Enterprise.* It was obvious—he was going to be an engineer.

"It sounded cool. It seemed like a good idea at the time," he says. "I kind of thought it would be more like *Star Trek*, you know Scotty is always solving problems and he's pretty cool and I thought that's the kind of thing that I'd like to do."

Pachal enrolled in engineering at the University of Alberta. And as young people tend to do when they strike out on their own, Pachal wanted to get the most of his university experience. He started volunteering for the student newspaper, the *Gateway*. There, he found himself among passionate fellow student journalists who shared his love of words. Writing challenged him creatively, and rules of English and structured storytelling fed his technical appetite.

After graduating with a degree in engineering physics, he got a job at an engineering firm—but not as an engineer. "They had me doing their communications, so I was leveraging both things, my degree and my work at the *Gateway*."

Soon, he set his mind on journalism and earned his bachelor of journalism degree

at King's College in Halifax. In the process, he served about a month-and-a-half-long internship in 1998 at *New York* magazine and fell in love with the Big Apple. After graduating, he returned to Edmonton to regroup during the summer of '99 working as a freelance writer and scheming to get back to New York.

He made the return trip in the fall of that year and pounded the pavement searching for work. He landed jobs at *Sound & Vision* magazine, *Dvice* (a now-defunct online tech news and review website) and the Sci-Fi Channel. He was doing the work he loved in a place that invigorated him. Things really seemed to be coming together.

He was starting to transform *PC Magazine* when an apparent misfortune turned into another life-changing opportunity.

"The guy who hired me wanted me to reinvent their news coverage because it had gone all online about a year earlier and they were kind of struggling with competing with blogs like *enGadget*, *Gizmodo*, the *Verge*. They needed someone to blogify their news coverage."

Then his editor left. Pachal, feeling a bit set adrift at *PC*, followed him to *Mashable* in 2011. A younger, more nimble up-and-comer, *Mashable* is an online news site founded in 2005. Its focus is on technology and social media, but because of the pervasive influence of both tech and social media, it covers everything from business and entertainment to food and fashion.

Now a married father of two living in Brooklyn, Pachal says *Mashable* feels like home.

"One of the things about the *Gateway* was the people, the energy of the place. All my jobs since have never really replicated that, but the closest thing I've had is *Mashable*. It's hard to describe, but the energy is great. Everyone is very positive and supportive. It's mainly younger people under 30, but they're all coming there to do great work and they do it in such a collegial way."

With a front-row seat to new technologies and the goings-on at the high-tech companies responsible for producing them, Pachal has accumulated terabytes of information on the high-tech industry. As *Mashable's* tech editor, he is frequently called upon by U.S. national newscasts to offer expert insights on industry happenings and new technologies. His job gives him first crack at gadgets like Google glasses and other wearable tech, and access to geek culture. That means meeting celebs like the 11th Doctor, Matt Smith—quite a perk for the lifelong fan of the BBC series *Doctor Who.*

He gets a broad view of everything that's happening, can identify trends, and is among the first to hear major announcements and news. It puts him in position to be able to see what the next big thing might be.

"Matt Smith is great! I don't know if he'd remember me. I've met him three times, and Peter Capaldi (now playing the Doctor), briefly."

Pachal's engineering education gave him the groundwork to be able to talk about many of the tech concepts with some authority, and though he didn't know it at the time, he had a sneak peek into the future.

"There were a few fields that were nascent when I was in engineering school that have since grown into full disciplines. One of my professors called it integrated optics. And now that's a whole discipline of chip research called photonics," he says. Photonics is now getting attention from places like IBM and Intel in an effort to push against Moore's Law.

Though he put away his calculator years ago, he's still got a better-than-average vantage point for what's on the horizon.

"It's hard to know, there are so many "next" things coming in so many different ways. You can definitely get a sense of the more specific things in terms of tech and concepts. But it's not just tech that affects it—it's regulation and attention from Silicon Valley."

Because he's in charge of the entire tech section, he gets a broad view of everything that's happening, can identify trends, and is among the first to hear major announcements and news. It puts him in position to be able to see what the next big thing might be. At the moment, he speculates that transportation will transform substantially in the next few years.

"Ultimately, there's enough support for electric cars and alternative fuels on both sides of the political aisle that it's an idea that can't lose." The logical next step is self-driving electric cars.

"That's going to have a huge impact on our day-to-day lives and what our relationship with the environment is like."

Although he isn't working in the engineering profession, Pachal is grateful for what his U of A degree gave him.

"My engineering degree has definitely helped in terms of having a slight leg up on what people are talking about so I can kind of parse technical subjects a little better," he says. And as fast as technology advances and changes—Pachal came of age during the beginning of the Internet age—he's learned that it's not the gadgets that make life satisfying.

"It gives me perspective, but I would never hold it up in a, 'In my day, we used to . . . ' grumpy old man way. Tools are tools; it's really the people that matter."

Who's that? Pete Pachal, emerging from a Dr. Who TARDIS (facing page) and with former Doctor Matt Smith.


starry sta
nigh

Warren Finlay keeps his eyes on the skies

By Philip Mail

It's the middle of the night, and Warren Finlay (Electrical '83, MSc '84) is leaning over the edge of his canoe, arms plunged into the murky, frigid waters of a tiny Alberta lake, fishing about for a remote control.

To Finlay, a mechanical engineering professor at the University of Alberta, this is all part of the fun. He's indulging in his hobby—astrophotography—pursuing the perfect shot that will capture the magnificence of the Milky Way hovering over him and his canoe on Black Nugget Lake, about 70 kilometres southeast of Edmonton. His nocturnal activities produce an eerie, awe-inspiring photo, one of many the award-winning amateur photographer has caught in the lens of his Canon 6D.

At the university, Finlay directs the Aerosol Research Laboratory, exploring the physics of inhaled pharmaceutical aerosols like the ones used in the treatment of asthma. But on weekends, he can often be found scouring the back roads of Alberta, scouting sites for his next photograph.

Like many of his photos, the one at Black Nugget Lake didn't come easily. "It took me about an hour to get the

Mechanical engineering professor Warren Finlay begins setting up for a photo in New South Wales, Australia (above). Page 18 – 19: *Runway to the Heavens* shows the Milky Way as photographed at an airstrip in Queensland, Australia.

At left, *Western Milky Way* shows our galaxy overhead and a pumpjack, near Tofield Alta., in the foreground.

Right: the northern lights and a starry sky are featured in *Abandoned Prairie Homestead*, photographed near Mundare, Alta.

composition and equipment all set up." He positioned his camera onshore, setting the shutter to open for 1 ¼ minutes to allow the faint light of the Milky Way to enter the camera. The canoe in the foreground, however, needed the illumination of a quick flash. In his rush to get into the canoe, paddle to the right spot and trigger the flash remotely, the remote went flying into the water.

"I thought, 'Oh no, that's it—I'm not going to get the photo.' " Luckily, he saw where it fell, fished it out and tried again, and again, until he had things just right. The result is a work he calls "Lone Paddler," one of two photos the Art Gallery of Alberta sells with Finlay as the consigned photographer. His work has been published in magazines, including the Canadian astronomy publication *SkyNews*, which awarded him its 2014 Grand Prize for an otherworldly nighttime photo taken on a remote runway in Queensland,

All photos: Warren Finlay

Australia. Another couple of photos found spots in this year's calendar of the Royal Astronomical Society of Canada.

Traditional astrophotography just captures images of galaxies and nebulae. "My interest is more in using the night photography to comment on the human experience and make statements about what I think of our place in the world," he says.

That interest produced "Western Milky Way," a striking image of a blurred, moving pumpjack drawing ancient oil from the ground to fuel the energy of present-day Edmonton. The city glows on the distant horizon, and overhead is the massive Milky Way, billions of years old. "It makes you realize what kind of lifespan we have, compared to all the other things in the universe," Finlay says during an interview in his fifth-floor office in the Mechanical Engineering Building. "It's interesting to think about. It puts it in perspective."

Ania Sleczkowska, manager of art rentals and sales at the Art Gallery of Alberta, is impressed with Finlay's images: "Warren's evolving compositional strategies help balance each image. You can see it in his landscape as well as in the presentation of sky."

Finlay has written a book called *Concise Catalog of Deep-Sky Objects: Astrophysical Information for 550 Galaxies, Clusters and Nebulae*. He is self-taught in astronomy and photography.

Outside of work, he also plays oboe and bagpipes. Drawn to isolated locations, the setting for much of his late-night photography, he enjoys backpacking, canoeing and mountaineering. How does he find time for it all? "One: I don't need much sleep . . . so being out at night is not a big deal." And two: he calls himself hyper. "I generally just like to be doing something"—even if that "something" is hunting for a lost remote in the murky waters of a lake in the middle of the night.

"My interest is more in using the night photography to comment on the human experience and make statements about what I think of our place in the world."

TAKE A CHANCE ON DAN

Birkley Wisniewski didn't let the economic downturn of 2008 get him down. Instead, he literally kicked up his heels.

By Mifi Purvis

There are more men here than I expected. Young ones, too. Before the 70 minutes is up, I'll have danced with all of them, and a couple of women.

Right now, our crowd of 24 is standing in an alternating man-woman circle in a former church in Edmonton's Old Strathcona district, ringed around dance instructor and studio owner Birkley Wisniewski (Electrical '04) and Krystal Moss. Wisniewski and Moss are explaining the history of the 1920s ballroom classic, the Charleston, and demoing a few of the basic steps. I eye the guy next to me. Heavyset and T-shirted, he gives me an encouraging nod and broad, welcoming smile.

"It's my first time here," I tell him as we shake hands. "I'm Mifi."

Demetri Giannitsios

Kicking up their heels: Sugar Swing Dance founder Birkley Wisniewski leads his competitive dance team in a rehearsal.


NCE
ballroom

With Moss, the whip-thin and bespectacled Wisniewski leads the group. They are equal parts impresarios, gurus and cheerleaders. After the group's first few tentative attempts at the basics, Wisniewski and Moss add some steps, progressive in complexity, and change up the circle so that I find myself shaking hands with another partner.

"It's a curious note and I don't think I have figured it out, but in a room of swing dancers, no matter where you go, engineers are disproportionately overrepresented."

The minutes tick by, the steps compound and everyone is smiling, rosy-faced. I meet my seventh partner. "I'm James," he says, extending his hand.

"Hi James," I say, "I'm hopeless."

It's true, I am a little hopeless, but nobody seems to mind. Bookended by me and a few crack dancers, the bulk of the group comprises eager learners and quick studies, most of them in their 20s and 30s.

In 2008, Wisniewski was working as a consulting engineer for a firm then called FSC Engineering. He'd been in the field for nearly four years before the global economic downturn. Work dried up and Wisniewski found himself trying to stay busy with tasks like assembling Ikea furniture at the office. One of the more recent hires, he was also one of the first to go.

At first, he thought of it as a little break. He got a job at a coffee shop and continued working on what he called "a hobby business" that he'd started in 2005 with a partner: teaching a couple of social dance classes a week in the swing style. Pretty soon he had bumped up the class offerings to four times a week, then five. He left the coffee shop to focus on the dance business. Dance was the kind of fun that reminded him of his days as a student—he'd partaken in Swing-Out Edmonton's social dance events on campus as a student, and you don't grow up in Hairy Hill, Alta., of Polish-Ukrainian stock without having pretty much nailed the polka.

These days, Wisniewski's Sugar Swing Dance Club offers tap, Charleston, swing and more, depending on the availability of instructors. Student dancers range from self-described beginners, like some in my four-week Charleston class, to dancers who want to ramp it up. Wisniewski has three part-time employees and 12 contractors. In September 2014, Sugar Swing offered 14 classes to 150 students. These numbers had doubled by the beginning of 2015. He also caters to team-building events, parties and other functions. And he builds his studio's success—and the popularity of social dance—by offering Thursday, Friday and Saturday social dance nights at the Sugar Foot Ballroom, Edmonton's church of swing.

"We're moving from one old church location to another near Whyte Ave soon," he says. "Churches offer great spaces, high ceilings and often hardwood floors," he says. Sugar Swing also recently happened upon a great studio space downtown, and Wisniewski opened a second location there in January.

While it might seem as if engineering and social dance are odd partners, it's not so. "It's a curious note and I don't think I have figured it out," Wisniewski says, "but in a room of swing dancers, no matter where you go, engineers are disproportionately overrepresented." He speculates that maybe they are drawn to that intersection of the technical and the artistic.

And engineering has stood Wisniewski in good stead setting up a business. "There's process and there's problem-solving," he says. "There's logical thinking and there are efficiencies to be captured. I built my registration software system from the ground up. To make the club a success, I have had to build and administer better ways to manage clients."

So far, he seems to have the steps in the right order.

DANCE/LIFE ETIQUETTE TIPS
FROM SUGAR SWING

Avoid grabbing a partner and yanking him or her onto the dance floor.

Apologize if you bump into someone or step on someone's feet.

Don't try air steps, lifts, drops and so on. They aren't appropriate for social dancing.

Don't accept an invitation to dance to a song after declining an invitation to the same song by someone else.

Don't stare at your partner, but make proper eye contact.

Dance to your partner's level if he or she is less experienced than you.

Don't criticize or teach your partner on the dance floor.

Thank your partner after finishing a dance.

Try to remember the kind of September...

Honorary degree recipient has fond memories of school that changed his life

By Geoff McMaster

Richard Siemens/University of Alberta

Guaning Su (Electrical '71) was granted an honorary doctor of science degree during convocation this spring. Su has had an incredible impact in his homeland, Singapore, leading military defence research and becoming president of a university.

Faculty of Engineering alumnus Guaning Su (Electrical '71)—who made immense contributions to military defence in his home country of Singapore and later became president of Nanyang Technological University—urged engineering graduands this spring to seize the moment and take advantage of "tectonic shifts" between East and West.

Reflecting on changes that have taken place in both Alberta and Singapore since he graduated, the honorary degree recipient observed that the global economic centre of gravity has moved eastward and the "rise of Asia is here to stay."

At one point in his convocation address, Su turned wistful and broke into song, seizing his own moment to resurrect a popular hit of the '60s—"Try to Remember" from the musical comedy *The Fantasticks*, which he said reminded him of his first "green and gold" September on campus. He had just arrived from Singapore, a developing nation with an average annual per capita income of US$600, full of dreams for a bright future.

And while proud of his engineering degree, he says it was the people he met during his undergrad days that made the deepest impression, endowing him with lifelong friendships.

"My four years as an undergraduate in Edmonton were the best years of my life," Su told the engineering class of 2015. "Young and full of energy, we dreamt big dreams and strived to succeed. Some of my best friends were made during these four years.

"My Alberta experience was deeply etched in my consciousness, not just because I built a solid foundation in engineering here, but most of all, this was where lifelong friendships were forged."

After graduating, Su joined Singapore's defence ministry, where he remained for 30 years as a research engineer. He created a top-level research and development organization—Defence Science Organization National Laboratories—while teaching at the National University of Singapore.

In 2003, he became the second president of the Nanyang Technological University in Singapore. Under his leadership, the university expanded its academic programs and established new schools in humanities and social sciences, art, design and media, as well as a school of physical and mathematical sciences. In recent years he also served as an adviser to former U of A president Indira Samarasekera on the university's water initiative.

> "Draw on the strength of your loved ones, where the fires of September are burning for you, not just yesterday, not just today or tomorrow, but in eternity."

Remembering his student days, he recalled asking a friend to show him life on an Alberta farm. Su was hired as a farmhand, spending six weeks hoeing sugar beets in Vauxhall.

"It was back-breaking work," he said. "We became very dark under the hot sun. We made friends with Native Americans and were even mistaken to be natives ourselves."

Su stressed that what matters most in life's journey are the people who help us along the way, those who "open up your horizons and help you solve the world's problems."

"Dream big dreams, venture out, tackle grand challenges, explore the global village, slay mighty dragons and achieve world peace. But always remember the people who made this possible and cherish the memories of the University of Alberta and of home.

"Draw on the strength of your loved ones, where the fires of September are burning for you, not just yesterday, not just today or tomorrow, but in eternity."

Degrees of Change

Bruce McGee says a graduate degree is the key that opened doors to opportunities he never knew existed.

By Kathleen Cameron

What if you allowed yourself to go wherever your curiosity and interests led you? What if, during times in your career when jobs were scarce, you invested in yourself by learning? The approach has worked wonders for Bruce McGee (Electrical '80, MEng Electrical '84, PhD Electrical '98). He's the founder of McMillan-McGee Corp. (Mc2), a company specializing in using the Electro-Thermal Dynamic Stripping Process for remediating contaminated sites. Mc2 has completed more than $1 billion worth of remediation projects and has 23 active projects worldwide.

"We're in a very exciting time with McMillan-McGee. "The growth of the industry is 20, 30 per cent per year. The remediation industry today is about a $75-billion-a-year industry, not including China. China says they're going to spend $100 billion in remediation by 2020."

McGee has built a number of successful companies and holds the patent for ET-DSP, a process used for oil extraction and soil remediation in which electrical current is passed between electrodes placed in soil. This heats the oil or soil contaminants, allowing them to flow into a reservoir for extraction.

The path to McGee's success as an entrepreneur, business owner and passionate engineer has been long and winding. His engineering career and, critically, the time he has invested in himself in graduate school, have been influenced by the rise and fall of oil prices over the decades.

McGee has four engineering degrees (three at the U of A, one from Calgary) under his belt and credits much of the hard work and time spent in research labs for his career success.

"The value of going back to university, whether it's night school or full-time university, is that when get your degree, you have a real understanding of your market potential and where you fit into the market," McGee says.

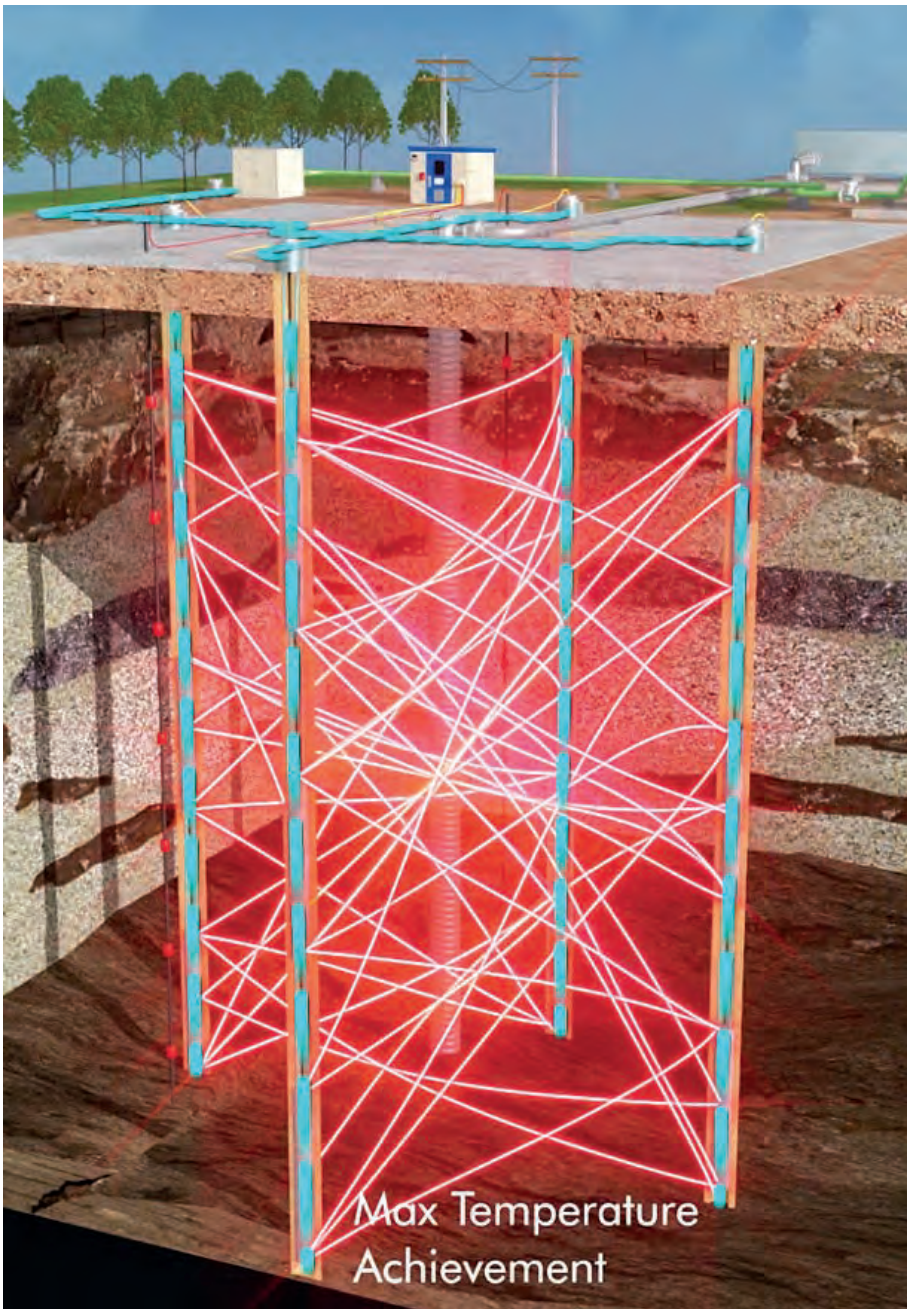
When he first graduated with his bachelor's degree in electrical engineering in 1980, he went to work in the oil industry.

"I went to work for Shell, and it was a very exciting and busy time," he recalls. "I had the opportunity to work for a really large company at a very young age, and appreciate the kind of training they can give you."

But the excitement wasn't enough to keep the pull of graduate studies from his mind.

"When I reviewed my options of going back to university, I knew that (professors) Steve Chute and Fred Vermeulen were working on electrical heating of oil sands at the U of A," McGee says. "That caught my attention on a number of levels."

He decided to return to school to pursue a master's degree in electrical engineering.



The technology Bruce McGee developed uses electricity to heat the ground to extract bitumen or contaminants.

After graduating in 1984, McGee experienced the reality of low oil prices affecting the energy industry.

"When I graduated, it was very tough to get a job," he says. "It was with pure persistence and absolute tenacity that I was able to get a job with British Petroleum.

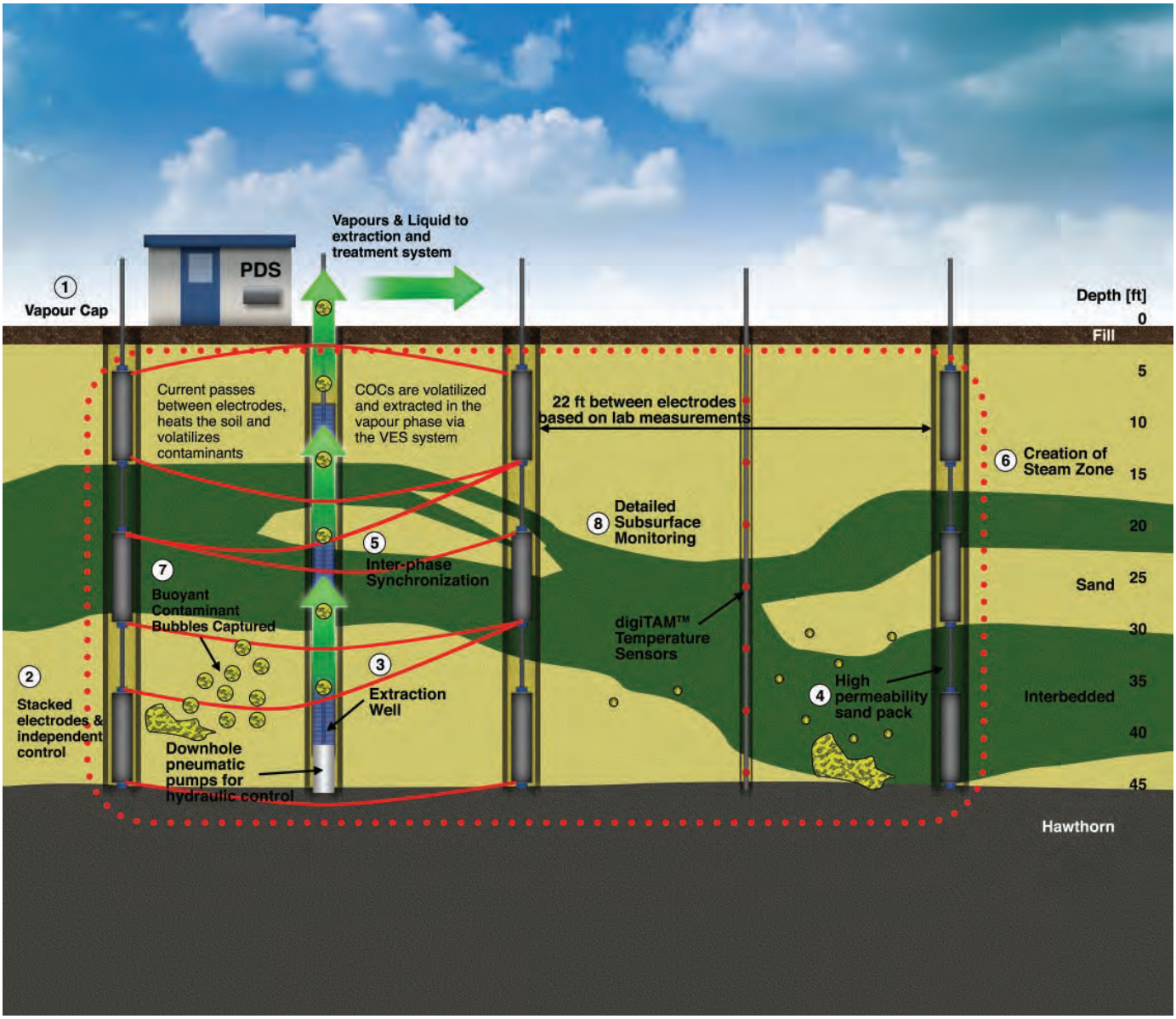
"I quickly recognized that what I was doing at BP needed a better understanding of reservoir engineering. I took night courses and completed a thesis-based master's degree in chemical engineering at the University of Calgary, while working as an electrical engineer."

McGee's time with BP exposed him to the core of the oil industry: producing and selling oil. This exposure directly influenced his next steps.

"I became an executive in an energy service company at a young age. I started my own company before I was 30 and then sold it. After I sold the company, the price of oil crashed. At that point, my options were few and far between."

McGee decided to capitalize on hard times in the oil industry by focusing on his studies. He returned to the U of A to complete a PhD in electrical engineering under Vermeulen's supervision. Once again, he was drawn back to the electrical heating of oilsands.

"I'm a passionate person. When I see something I really love, I go at it pretty rapidly and I throw everything into it," McGee says. "When I went into the electrical heating of oilsands, I was more interested in doing research and having fun with the technology than I was trying to find somebody who would ultimately hire me. I saw a real value in working on this problem. I really didn't have a sense of whether the price of oil was going to



A McMillan-McGee illustration details the process the company employs in oil extraction and the cleanup of contaminated soil.

go up or down, I just thought this was an interesting technology."

Little did McGee know, a call from California would alter the path of his PhD, and ultimately, his career.

Vermeulen was approached by the University of California Berkeley to work on a project in which they were electrically heating contaminated soil. Vermeulen sent McGee. "I went to California, walked into their labs and worked with a really exciting group of people. They were developing this technology for heating dirty dirt and cleaning it up by extracting out these vapours."

McGee applied his technique for electrical heating of oilsands (now referred to as ET-DSP) to the contaminated soil. The project was a success. McGee's work using ET-DSP for soil decontamination played a big part in the success story.

"Twenty per cent of the cost was associated with the electrical heating, but it was responsible for taking up 80 per cent of the chemical contaminant. It demonstrated itself to be a very, very effective technology."

After an article on the success of the project was published in *Scientific American*, cleaning up dirty dirt became an important part of people's business.

"All of the sudden, people in the industry were asking me to build power supplies and electrodes for them, and I did," McGee explains. He founded McMillan-McGee Corp. and hasn't looked back.

Though the excitement of a booming business can be blinding to some, McGee didn't forget his passion, electrical heating of oilsands.

"I started another company called E-T Energy Ltd., which focuses on the use of electric heating of oilsands for oil extraction. It's essentially the same technology used in soil reclamation but applied to the oil sands."

With ET-DSP now patented, E-T Energy is focused on the next iteration of commercial field tests to prove the technology is viable on a commercial scale.

"The ET-DSP story is becoming more and more interesting because of its environmental and economic advantages in the oilsands."

Field-testing of ET-DSP in the oilsands has produced a number of promising findings:

Oil heated using this process had a 75 per cent recovery factor.

The process creates no emissions.

ET-DSP can produce oil from a resource that is too deep to mine and too shallow for a steam-assisted gravity drainage (SAGD) process, which accounts for two-thirds of the oil in the Athabasca oilsands.

It does not require treated water.

Bruce McGee says he took advantage of economic downturns to advance his education. He says his postgraduate studies enabled him to explore areas he was interested in and led him to exciting new opportunities.

"Some would say they don't want to take on the risk of going back to school, quitting a job and not knowing the outcome of their effort. For me, that was never a question. I recognized that someone would always hire an engineer."

The process can start and stop on demand, meaning little down time and an ability to run the system when electricity is less expensive.

McGee is thankful for the twists and turns his career has taken. He fondly remembers his time in graduate school, and his experience as a working engineer made that time all the more worthwhile.

"Engineering experience is incredibly valuable because it gives context to what your interests are if you decide to go back to university," he says.

The decision to return to graduate school is not easy.

"Engineering is such a financially rewarding career. Graduating, getting a good job and becoming comfortable in a lifestyle makes it hard to go back to university," he says. "If you're married, you have to share that decision and make sure everyone's on the same page. It's a real commitment.

"Some would say they don't want to take on the risk of going back to school, quitting a job and not knowing the outcome of their effort. For me, that was never a question. I recognized that someone would always hire an engineer. For me, it has really paid off."

GROWING UP FAST

ONEC Engineering's emphasis on integrating teams is paying off

By Richard Cairney

Talk to anyone in almost any endeavour who seems suddenly to be getting recognition and accolades for their achievements, and you'll quickly learn that there is no such thing as an overnight success. When ONEC Engineering, a company operated by a group of five University of Alberta alumni, appeared on the *Alberta Venture* magazine list of the province's 50 fastest-growing companies, it had more to do with years of planning and work invested in building a company rich in interdisciplinary skills and a truly integrated approach to work.

Last year, ONEC saw a 20 per cent increase in staff, which resulted in a staggering 50 per cent increase in revenues. A true design-build company, ONEC has about 85 staff members dedicated to the engineering and design side of things and about 120 (roughly 90 employees and 30 contractors) whose focus is on construction.

Among the company's University of Alberta principals are general manager Denis Wiart (Mechanical '93), civil-structural engineering manager Ian Park (Civil '87), mechanical engineering manager David Kwok (Mechanical '01), electrical engineering manager Shaun Jones (Electrical '98) and chief financial officer Ken Blake (BCom '01). (Other founding members include Kirk Gilmar, now retired, and Chris Coburn, who is starting to reduce his workload with the company.)

The company began in 2000, when the engineering firm that the partners were working for was being bought out. The group had been talking among themselves about striking out and forming their own company, and the corporate takeover was the catalyst they needed to get the ball rolling on their own company. Wiart joined 16 months after startup so he could complete a major project he'd been working on, but recalls the start had its shaky moments. When Wiart came on board, the company was still in that phase in which it was, in a sense, deciding what it was going to become.

Without a stable of established clients, half the battle was selling themselves.

"At the start, we were our own commodities," Wiart says. "We didn't have any past projects—we were selling ourselves and our services. Chris went up to Fort McMurray and I farmed myself out to Raylo Chemicals (now Gilead Sciences). Opportunities would come up on sites

The ONEC Engineering team: Ian Park, Shaun Jones, Denis Wiart and David Kwok. ONEC has been named one of the fastest-growing companies in Alberta, and leverages interdisciplinary knowledge and integration of engineering disciplines and trades.

where they needed design support, and we grew it that way."

Among the group's strengths is the diversity of engineering disciplines. This played a major role in the company's development. Integrating different disciplines proved to be a shrewd plan. Originally called ECO-Technica, the company concentrated on engineering work and later established a second company, Oncore Services, to handle the building and construction side of things.

"We like the team approach. We have a key owner in every discipline: electrical, mechanical and structural. We saw growth in each area and we grew as a group. In the first four years, we built smaller teams and then we added the construction side, using the same kind of approach."

The two companies began taking on small to mid-sized projects. They found success through integrating not only different engineering disciplines but also construction.

"We have integrated construction into engineering and vice versa," Wiart says. "It's something that's fraught with challenges because you're integrating different cultures. There has always been a natural wall between engineering and construction. Historically, they are different companies, each wanting to pass blame to the other for drawing errors or construction issues. It's the white-collar workers who never leave the office against the guys in the field who get dirty and fix problems with the drawings. We wanted to break down that wall."

"We have integrated construction into engineering and vice versa. It's something that's fraught with challenges because you're integrating different cultures. There has always been a natural wall between engineering and construction. Historically, they are different companies, each wanting to pass blame to the other for drawing errors or construction issues."

In 2014, Oncore and ECO-Technica merged into a single entity, ONEC, to further dissolve the line between disciplines. ONEC's south Edmonton office features a busy shop and yard filled with any number of projects underway. ONEC's jobs and clients are as varied as the engineering disciplines its principals practise. As a result, the company has been relatively unscathed by the drop in oil and gas industry activity. Its projects span broad categories including infrastructure, power generation, chemical and pharmaceutical production, metals and mining, and oil and gas. ONEC also stretches itself creatively by designing, building and marketing products such as a mobile emergency shower. The company is nimble enough to undertake design work for clients who want to add new equipment or systems, often completing this work during shutdowns.

Notable projects have included the design and building of mobile water treatment plants for the Northwest Territories government and major upgrades at the Edmonton Waste Management Centre. The latter, a $15-million project, helped the city produce a more marketable soil additive from sewage waste. The job included improvements to centrifuges to dewater sludge, the addition of a new centrifuge, and building an improved system to pipe the product to a facility where it's loaded onto trucks for agricultural and industrial clients.

The company has a number of U of A engineering alumni on staff. It also stays connected to the Faculty of Engineering in other ways that are beneficial to engineering students and to the company. Adding to the company's bench strength, Wiart says, are engineering co-op students the company has hired and mentored. These students, he says, "seem to be up for anything," and the co-op program is "a good way to test out some future employees." The company also stays involved with the Faculty of Engineering by taking part in capstone projects, acting as a "client" to teams of students who conduct research on ONEC products that are still in the research and development stage.

"I think probably the big story for us is in integration—there are very few companies our size like that."

Denis Wiart

Ian Park

David Kwok

Shaun Jones

FACULTY OF ENGINEERING

1. Will the pilot be able to avoid a crash?

$$\vec{a} = \vec{a}_n + \vec{a}_t = \frac{v^2}{\rho}\vec{e}_n + \dot{v}\vec{e}_t$$

Assuming $v = const \Rightarrow \dot{v} = 0$

Hence, $\frac{v^2}{\rho} = \frac{\left(1000\frac{\text{m}}{\text{s}}\right)^2}{\rho} = 9\left(9.81\frac{\text{m}}{\text{s}^2}\right) = 88.29\frac{\text{m}}{\text{s}^2}$

$$\Leftrightarrow \rho = \frac{\left(1000\frac{\text{m}}{\text{s}}\right)^2}{88.29\frac{\text{m}}{\text{s}^2}} = 11326\text{m}$$

From geometry, $(R - 2000\text{m})^2 + (5000\text{m})^2 = R^2$

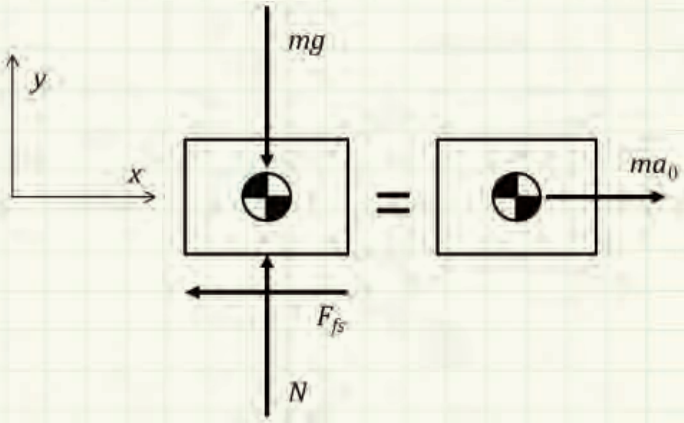
$$R^2 - 2R2000\text{m} + (2000\text{m})^2 + (5000\text{m})^2 = R^2$$

$$R = \frac{(2000\text{m})^2 + (5000\text{m})^2}{4000\text{m}} = 7250\text{m}$$

Since $\rho > R$, the plane will crash.

2a. Draw the FBD and KD for the concrete block

Given: $\mu_S = 0.3, a_0 = const, v_0 = 60\frac{\text{km}}{\text{h}} = 16.7\frac{\text{m}}{\text{s}}, g = 9.81\frac{\text{m}}{\text{s}^2}$



2b. Determine the stopping distance for the maximal possible deceleration.

Equations of motion: $\overset{+}{\rightarrow}\sum F_x = -F_{fs} = ma_0 \qquad \uparrow \sum F_y = N - mg \Rightarrow N = mg$

Friction force (static): $F_{fs} = \mu_S N \qquad \Rightarrow -\mu_S mg = ma_0 \Leftrightarrow a_0 = -\mu_S g = -2.94\frac{\text{m}}{\text{s}^2}$

For motion with constant acceleration: $v^2 - v_0^2 = 2a_0(s - s_0) = 2a_0\Delta s$

$$\Rightarrow \Delta s = \frac{v^2 - v_0^2}{2a_0} = \frac{0 - \left(16.7\frac{\text{m}}{\text{s}}\right)^2}{2\left(2.94\frac{\text{m}}{\text{s}^2}\right)} = 47.4\text{m}$$

Answers to questions from page 7

First-generation computer engineer lives on the leading edge

By Suzanne Harris

On the job at his Calgary office, Bruce Johnston (Computer '83) has always been at the leading edge of something new, from his education to his career.

Bruce Johnston (Computer '83) likes being there at the beginning of things. "I like to do new things, make new mistakes—hopefully successes too—and learn via the process," he says.

Growing up in Calgary during the 1960s, he busied himself building crystal radios, train sets and "weird and wonderful" things out of Meccano. In high school during the '70s, he designed stage lighting and sound effects for drama productions and made evening trips to a nearby high school that had a computer that he learned to program. At the time, only selected schools got a computer. Johnston attended Ernest Manning High School, a technical high school, and it didn't have one. But nearby Viscount Bennett High School, designated as an academic high school, did. It was a cool 12-bit PDP-8 produced by Digital Equipment Corp., the first successful commercial minicomputer. Microsoft and Apple didn't even exist yet.

"I had a friend who went to Bennett, so he had access to the computer. I'd bike over and meet him there in the evening and we'd work on it." They used paper tape to load the program once written.

After graduating from high school, Bruce followed his tentative interest in electronics to the Southern Alberta Institute of Technology (SAIT), where he earned his diploma in electronics engineering technology, and then went to work for Digital Equipment, the makers of that PDP-8 computer he had marvelled at in high school. Now certain of his love of electronics, he wanted to do and learn more, so in 1980 he enrolled in engineering at the University of Alberta, specializing in electrical engineering. "They didn't have computer engineering back then," he recalls.

Because of his experience at SAIT, Johnston was accepted directly into the second-year electrical engineering program, but even better news was to come: "I received a letter from the university inviting me to apply for a new program called computer engineering that they were going to be offering that fall," he explains. "Since I'd been working in the computer industry and I thought this was pretty cool stuff, figured this was the way of the future, I applied. It was great!"

They were a small group of 11 students, and they called themselves the prototype computer engineering class.

"I really liked the approach the university had because they took a good balance between electrical engineering courses and the computer science courses and came up with this hybrid," he says.

The faculty then included the students in further developing the program.

"Being new, it had a few bugs, but Dr. James, the chair of electrical engineering, was very participative in inviting feedback from us. He met with us every semester to ask us what was going right, and wrong, with the program. We got to help evolve computer engineering from its inception."

Being part of the prototype class and among the program's first graduates was not without risk: there was a chance they might not qualify as "real" engineers when they graduated.

"We were so new that the Canadian Engineering Accreditation Board wouldn't accredit the program until after they saw what kind of jobs we landed after we graduated, so they could be sure we were really considered 'engineers,' " he says. "That was a bit stressful, to think we would finish the degree not being certain it would allow us to apply to become Professional Engineers. But it was a great class, we all got suitable jobs, and the program did become accredited."

His career path took him to Bell Northern Research, and later to teaching at SAIT, where he was part of a team that established two new programs there: computer engineering technology, and later an applied degree in information systems. Here, his practical experience as a student in the prototype computer engineering class served as a useful model.

In 2000, he was presented with a very different opportunity to get in at the beginning of things. A friend was launching a company called Ideaca, and asked Johnston to join. It was the first time he would be involved in building a company from the ground up.

"We were going to be the company that engineered all the back-end stuff for all the dot-com successes," says Johnston. "The problem was that we started the company at exactly the time the dot-com bubble burst, so about 30 days after the launch of the company we were saying, 'Uh, I think we need a new business plan.' "

"We were so new that the Canadian Engineering Accreditation Board wouldn't accredit the program until after they saw what kind of jobs we landed after we graduated, so they could be sure we were really considered 'engineers.' "

He credits his engineering education and its robustness for allowing him to roll with the punches and adapt to a changing landscape.

"It was a good ride," he says. Ideaca evolved from a small group of about 15 people at the outset 15 years ago to around 300 today. The company was acquired in 2013 by Hitachi and now operates as Hitachi Solutions, Canada Ltd. Today, Johnston holds the position of vice-president, technology, with Hitachi Solutions Canada.

"I like to be in at the beginning of things because of the opportunities for exploring new ideas and approaches and to see what potential they may have. That's probably why I like education too: it affords the opportunity to help the learner to explore their own potential and discover their own possibilities."

In 2012, Johnston made a generous pledge of $30,000 to establish the Bruce A. Johnston Scholarship for Engineering and Leadership. This endowed scholarship will award $1,000 annually to a third- or fourth-year computer or electrical engineering student, based on academic standing and leadership potential as demonstrated through extracurricular activities, work experience or community involvement.

"I thought a scholarship would be a good thing as it may give someone a chance to focus on developing their potential—rather than having to worry about where grocery money might come from."

It's helping others with their own beginnings. And may it be a good ride.

The David and Joan Lynch School of Engineering Safety and Risk Management

Together WE CAN...

The history of the Faculty of Engineering is one of service to society through its exceptional graduates, transformative research and commitment to its many communities.

— DAVID T. LYNCH, PHD, P.ENG

In 1910, William Muir-Edwards, Alberta's first engineering professor, ended a typhoid outbreak by identifying a problem in Edmonton's water treatment facilities. In 1918, he died on his 39th birthday while tending to sick university students during the Spanish flu epidemic.

In 1925, engineering professor Karl Clark used a household washing machine to separate oil from sand. Clark's "hot water" method unlocked the Alberta oilsands, and ushered in a new era of resource development for the province and the nation.

Professors Muir-Edwards and Clark epitomize the ingenuity and dedication to service at the heart of the Faculty of Engineering at the University of Alberta. Whether bolstering the economy or developing safer homes and industries, the students, graduates, teachers and researchers of the faculty make a difference in people's lives. That legacy is the foundation of future growth, innovation and achievement.

Engineering Safety and Risk Management

The Faculty of Engineering is continuing its growth in order to prepare students for the challenges of modern society. One of the key areas of expansion is the field of Engineering Safety and Risk Management, which is focused on the development of enhanced safety procedures and awareness, and the continuous reduction of risk to people, the environment, facilities and operations.

From pipelines to railroads, from bridges to refineries, safety and safe operations are increasingly critical, particularly as the complexity of industrial processes and systems continues to grow.

Canadian Leadership

For the past 25 years, the Faculty of Engineering has been a leader in developing and offering its Engineering Safety and Risk Management (ESRM) program — the only one of its kind in Canada. The positive impact of the ESRM program is felt through the work of engineering graduates with enhanced ESRM skills, and through the outreach of ESRM professors to corporations and industries.

The faculty is now embarking on a major expansion of its ESRM activities. Education, research and outreach in safety and risk management are fundamental to continued growth in construction, production facilities, and industrial and business operations.

The David and Joan Lynch School of Engineering Safety and Risk Management

The University of Alberta proposes to establish the David and Joan Lynch School of Engineering Safety and Risk Management, to provide a dramatic increase in ESRM education, research, service and outreach.

Central to the success of the "Lynch School" will be the creation of a $15-million "Lynch School Endowment Fund for Engineering Safety and Risk Management." The fund will help recruit additional ESRM professors, ideally with industrial experience, who will develop and teach an expanded ESRM curriculum.

Through the establishment of the School and the Fund:

- By 2016-17, all 1,000 engineering graduates each year will have completed in-depth ESRM courses.
- By 2017-18, a course-based Master of Engineering degree program in Engineering Safety and Risk Management will be offered both on and off campus.
- By 2018-19, new research-based MSc and PhD programs in ESRM areas will be offered in order to develop new knowledge and best practices.

Join the University of Alberta and the engineering community in honouring David Lynch's legacy with a gift to the David and Joan Lynch School of Engineering Safety and Risk Management. To date, we have raised $4 million toward our ultimate goal of $15 million. Gifts may be made directly to the Lynch Fund or through the creation of separate named endowments or funds in support of ESRM student activities, Industrial Fellows, Professorships and Chairs.

Two Decades of Accomplishments and Growth

During his 21 years of leadership as Dean of the Faculty of Engineering, David Lynch successfully oversaw spectacular growth through his focus on:

- recruiting outstanding students and faculty,
- providing outstanding facilities to support exceptional engineering education and research, and,
- connecting the Faculty of Engineering to its many communities by building partnerships with industries, governments, universities and alumni.

The last 13 years have seen the addition of more than 1.5 million sq. ft. of new and renewed teaching and research space, and over the last 20 years more than $900 million in philanthropic, governmental and partner support for the Faculty of Engineering.

Faculty of Engineering growth from 1994 to 2015

FACULTY
93 to **205 Professors**

STUDENTS
2,900 to **6,000 Students**

RESEARCH FUNDS
$8 to **$66 Million**

To make a donation, visit uab.ca/lynchfund or contact Nena Jocic-Andrejevic, Faculty of Engineering:

780-492-8969 | jocic@ualberta.ca

UNIVERSITY OF ALBERTA

Gifts of any amount are welcome and appreciated and may be provided over time. A charitable tax receipt will be issued by UAlberta for eligible donations.

Remembering Grant Fisher

Grant Fisher, a former chair of the Department of Chemical Engineering and a pioneering researcher of international renown, died July 25, 2015. He was 81.

Fisher was a committed educator and a visionary in the field of real-time computer process control. His research record and influence on his field of study are profound. Through his teaching and research, he is credited with bringing the subject of process control to the mainstream of engineering education.

He was also an ordained minister of the Baptist Church and enjoyed square, round and ballroom dancing.

Fisher set the standard for how computers would be used in research and teaching, and he continued to improve that standard throughout his career as technology advanced.

At his university retirement in 1996, accolades flooded in from some of the world's most eminent process control and chemical engineers.

Fisher was born in Winnipeg in 1934. He attended the University of Manitoba from 1951 to 1953 and then transferred to the University of Saskatchewan, where he earned his undergraduate degree in chemical engineering in 1955 and his MSc in 1958. After graduation, he joined Union Carbide and in 1960 became leader of the polyolefins design group. The next year, he started working on his PhD at the University of Michigan. He graduated in 1965 and joined the University of Alberta, where he was appointed a full professor in 1970. From 1972 to 1975, he served as chair of the Department of Chemical Engineering.

During the late 1960s, Fisher provided leadership for one of the first real-time, sensor-based computer systems in a university research environment—the IBM 1800. He spearheaded the creation of the Data Acquisition, Control and Simulation Centre in the Department of Chemical Engineering—the first facility of its type in the world.

He supervised more than 50 graduate students and 27 research associates (most postdoctoral fellows) and held visiting professorships in China, Japan, Australia and the United Kingdom.

Fisher wrote or co-wrote more than 100 journal publications and many more conference papers, and co-wrote (with D.E. Seborg) a textbook entitled "Multivariable Computer Control: A Case Study."

Fisher is survived by his wife LaRie, daughter Lynn (Frank), son Doug (Beth), grandchildren Rosemarie, Jenelle, Patrick and Kye, great-grandchildren Kelsey, Megan and Justin, sister Barbara (Jim) and brother Larry (Karen). He was predeceased by his parents Don and Ruth.

In his memory, donations may be made to the MDS Foundation Inc., 4573 South Broad St., Suite 150, Yardville, N.J. 08620 or online at mds-foundation.org.

"He was an explorer by temperament."

Louis Grimble was bold in his personal and professional lives By Richard Cairney

Engineering alumnus Louis Grimble (Civil '42) died July 7, two days after his 95th birthday.

Known for his attention to detail and ability to envision new technologies and new ways of doing things, he was equal parts adventurer and entrepreneur, co-founding the engineering firm that became Stantec and later working around the world as a consultant.

Louis's family and close friends gathered at Alumni House on campus Sept. 13 for a celebration of his life.

"It was a great spot to meet," says his son, Don, one of four of Louis and Dorothy's children. "University was obviously an important part of his life and he was very active going to class reunions—he really enjoyed them."

Alumni House also provides an outdoor space, and Louis "very much gravitated to the outdoors."

"On family trips we used to travel all over to explore potential roadways in Alberta. We were part of the group of families in the David Thompson Highway cavalcade, which was an effort to promote the David Thompson Highway, to demonstrate that you could drive the route.

"But there was no road there, we just drove along trails … My mother was a very patient person."

After graduation, Louis was hired by the federal roads bureau to work on the Alaska Highway. In March 1944, he joined the Royal Navy Air Fleet, trained as a pilot and was stationed in England. After the war, he returned to Edmonton and became chief bridge engineer for the province of Alberta. During that time, he earned his master's degree at the University of Illinois. In 1954, he took a job with Burns and Dutton as a construction engineer and a year later established the engineering firm Stanley Grimble Roblin, which today is the global engineering firm Stantec.

In 1963 he started L.G. Grimble and Associates, consulting for the World Bank.

"He was an explorer by temperament," Don says. "His first big job was in Somalia and there was a civil war going on. Mom went with him."

But this work wasn't undertaken simply to satisfy wanderlust—Louis immersed himself in professional challenges and wasn't afraid of new ideas.

"In 1968, he developed a system called the guided automatic individual transport system. He designed a system for the City of Edmonton built around the whole idea of cars that would drive themselves. He was 40 years ahead of the current thinking on driverless cars."

That kind of visionary thinking was instilled early in his life.

"Our grandparents—his parents—weren't wealthy but they placed a very high value on a university education, and during the Great Depression, our grandfather saved money so Dad could go to school. Growing up, Dad assumed that he would go to university and he emphasized that to all of us, that education was his priority, and in every way, shape or form he demonstrated that, I think, by participating as much as he could as an alumnus."

IN MEMORIAM

The Faculty of Engineering sincerely regrets the passing of the following alumni and friends.

Anderson, Red Everett, Mining '45, in May 2015
Bollinger, Kenneth E., Professor Emeritus, in June 2015
Braithwaite, Thomas Robert, Mining '49, in August 2015
Campbell, Thomas Scott, Mechanical '83, in June 2015
Chinneck, Charles Glenn, Petroleum '52, in May 2015
Chomyc, Ron, Electrical '76, in June 2015
Cranston, Donald Norman, Mechanical '70, in July 2015
Dewis, Marty, Electrical '40, in May 2015
Dozzi, S. Peter, Professor Emeritus, in July 2015
Edinga, Kent Johnson, Chemical '72, in May 2015
Feir, James Elmer, Civil '50, in March 2015
Ferguson, Ralph Mccleery, Civil '46, in August 2015
Fisher, D. Grant, Professor Emeritus, in July 2015
Fulcher, Terry Lynn, Civil '88, MEng '13, in May 2015
Grimble, Louis George, Civil '42, in July 2015
Joseph, P.V., Civil '78, in June 2015
Kercher, Edward John, Civil '79, in June 2015
Leung, Jacqueline Ying W., Petroleum '82, in April 2015
Mather, George Reckly, Electrical '46, in August 2015
McClennon, Larry Lorne, Petroleum '63, in July 2015
McConnell, Edward Walter, Mining '49, in April 2015
Moore, Dale Ronald, Electrical '68, in August 2015
Moore, Nicholas Alexander, Eng Physics '15, in August 2015
Mulligan, John Michael, Civil '63, in May 2015
Neuss, Wayne Douglas, Civil '63, in June 2015
Newbert, Judith Diane, Mechanical '71, in June 2015
Nuttall, Norman James, Civil '68, MSc '70, in May 2015
Peacock, Harold Aylmer, Electrical '84, in August 2015
Penner, Darren Edward, Electrical '92, in June 2015
Sacuta, Alan David, Electrical '77, in August 2015
Scott, Donald Strong, Chemical '44, MSc '46, in April 2015
Serra, John William, Mechanical '64, MSc '66, in April 2015
Szojka, Frederick Kornel, Electrical '57, in July 2015
Szymanski, Jozef K., Professor of Mining Engineering, in June 2015
Vester, Denis Neil, Mechanical '68, in May 2015

The Faculty of Engineering was recently made aware of the passing of the following alumni more than a year ago:

Cuthill, J. Ivan, Petroleum '55, in May 2014
Sattin, Graham, Chemical '64, in June 2008

KUDOS

TAKING PRIDE IN ACHIEVEMENT

ABOURIZK, SIMAAN PEng

Has been inducted as an Honorary Fellow of the Canadian Academy of Engineering. A professor in the Department of Civil and Environmental Engineering, AbouRizk has significantly advanced the field of construction engineering, particularly construction simulation modelling and analysis. He holds the NSERC/Alberta Construction Industry Senior Industrial Research Chair in Construction Engineering and Management. AbouRizk is internationally acknowledged as a leader in project planning, productivity improvement, constructability, risk analysis and uncertainty modelling. He is also recognized for his ability to transfer research and development into construction practice. He has published over 300 papers and supervised over 100 graduate students, while balancing his academic endeavours actively consulting on projects focusing on risk analysis and assessment of management systems. He has received wide recognition including election as Fellow of the Royal Society of Canada and the National Academy of Construction.

ARDAKANI, MASOUD PEng

Has won the University of Alberta Rutherford Award for Excellence in Undergraduate Teaching. A professor in the Department of Electrical and Computer Engineering, Ardakani is a previous recipient of a Faculty of Engineering Undergraduate Teaching Award. Ardakani teaches two undergraduate courses: Probability Theory for Electrical Engineers and Introduction to Communications Systems.

BAYAT, ALIREZA PEng

Has received the 2015 Trent Ralston Young Trenchless Achievement Award. The North American Society for Trenchless Technology has established this award to recognize a young professional who has demonstrated excellence in the early career stages and who has made a valuable contribution to the trenchless technology industry. Bayat is director of the Consortium for Engineered Trenchless Technologies and the Ralph Haas/Stantec Fellow in Civil Engineering. The award also serves as an acknowledgement of great vision, ingenuity and leadership. A professor in the Department of Civil and Environmental Engineering, Bayat's mentorship skills and dedication to advancement of the trenchless industry are seen in the revival of the NASST Student chapter at the U of A which, under his guidance, won the 2012 student chapter of the year award. In 2011, Bayat established the Consortium for Engineered Trenchless Technologies to connect faculty and graduate students with industry partners.

FAWCETT, DAVID PEng

(Mining '74)

Has won the 2015 Coal Association of Canada Award of Distinction. The award recognizes an outstanding leader in Canada's coal industry and is presented to individuals who have a lasting impact on the industry. Fawcett is widely acknowledged for his visionary leadership in reviving the coal industry in northeast British Columbia. During his 40-year career in the coal industry, Fawcett held a broad range of responsibilities, from early stage geology and exploration, regulatory and permitting, to operations, management and executive positions for several major, intermediate and startup companies. He previously received the Coal Award from the Canadian Institute of Mining, Metallurgy and Petroleum (2011) and the E. A. Scholz Award for Excellence in Mine Development from the Association for Mineral Exploration of British Columbia (2012).

MARQUEZ, HORACIO PEng

Has been inducted as an Honorary Fellow of the Canadian Academy of Engineering. Marquez is a world-class expert in robust and non-linear filtering and control. His research has been recognized internationally and has made an impact in the oil and gas industry. During his leadership as Chair of the Department of Electrical and Computer Engineering, the department grew to one of the largest research intensive ECE departments in the country. He has provided effective service as president of the Canadian Chairs and Heads of Electrical and Computer Engineering, and the U.S. ECE - Department Heads Association, and Chair of NSERC Grant Selection Committees. He is a Fellow of the Engineering Institute of Canada and IET.

MORGENSTERN, NORBERT PEng

Has been inducted as an Honorary Fellow of the Canadian Academy of Engineering. He has consistently produced internationally award-winning research that shaped the civil engineering field, specifically in dam design, slope stability studies and major natural resource development. He has been invited to contribute his expertise by research institutions, multinational companies and governments in over 30 different countries on six continents. He has given a significant number of keynote addresses at major international conferences and symposia, and has had 330 manuscripts published in technical journals, conference proceedings and books—an impressive and rare feat for many scholars. An inspiring educator for over 50 years, Morgenstern has transformed geotechnical engineering as it is taught and practised in Canada and abroad. Through his leadership and reputation as an international authority on geotechnical engineering, he established one of the leading geotechnical schools in North America, attracting top specialists and talented graduate students from around the world. This award is in recognition of his exceptional contributions and outstanding productivity in education, research and consulting that have profoundly influenced geotechnical engineering practice worldwide, and in recognition of his service to the civil engineering community in Canada and internationally through numerous committees and task forces that have assisted government and professional societies at all levels.

SAUVAGEAU, DOMINIC PEng

Has won the University of Alberta Provost's Award for Early Achievement of Excellence in Undergraduate Teaching. The award recognizes many different levels of teaching, from lectures and labs to interdisciplinary teaching collaborations and work professors do with student groups. Sauvageau has made an impact in all areas of teaching. Working with colleagues in the Faculty of Science, he played a vital role in helping develop a web-based application that simulates a large-scale bioreactor that enables students to simulate in minutes or hours experiments that would take two to three days to complete. He also led an interdisciplinary group of engineering and science students to a scientific breakthrough and first-place at an international competition.

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