Keeping in Touch with Alumni Spring 2016

U OF A ENGINEER

she will

Bearing gifts, Titilope Sonuga returns to her homeland

Helping Fort McMurray

Remembering Slave Lake

Fighting bugs with bugs

Building better targets

A PROUD, CARING COMMUNITY

As I write this, Fort McMurray has been evacuated for several weeks due to a massive wildfire. Fort McMurray and the Regional Municipality of Wood Buffalo are home to a large number of our students, alumni, and industry partners, and many U of A Engineers have had a strong connection to the area. We are truly grateful to our co-op employers for taking care of the nearly 100 Engineering Co-op students who were evacuated safely from the area (see story on page 6). The response from the people of Edmonton, of Alberta, and indeed all of Canada has been heartwarming. On campus, a special disaster relief bursary has been established (an article appears on page 8). Lessons learned from the 2011 Slave Lake fire will be instrumental in guiding residents and rebuilding what has been lost. Just as U of A Engineer Brian Vance played a key role in Slave Lake's reconstruction (see story on page 30), we know U of A Engineers will be leading the way in Fort McMurray's comeback and the Faculty of Engineering will assist in any way we can.

The way our faculty, alumni and partners are coming together to overcome these challenges is one of the reasons I'm honoured to have been selected as the new dean of the University of Alberta Faculty of Engineering. Over the past 20 years, our faculty has grown enormously in pretty much every way – a 75% increase in undergraduate student enrollment, a 215% growth in graduate student enrollment, a 92% increase in number of faculty members, a 700% increase in our endowment and a 676% increase in external research funds. Thanks to the efforts of former dean David Lynch, we're better positioned than any other engineering school in Canada – and probably in all of North America – to take advantage of the opportunities that come with being in the top 5% of all engineering schools in North America in terms of size. Now that we have this critical mass, my goal is to shift our focus to becoming great.

As dean, my priorities will be to innovate in education and research, continue hiring exceptional people, engender excitement and strengthen engagement in all that we do, sustain existing relationships and build new ones, diversify and expand our funding channels, and create exceptional spaces for teaching and research. With the hard work of our faculty, our staff and our students – along with the support of our alumni, donors, and industry partners – we can do all these things and more. The challenges that lie ahead of us are not small, nor are they all known to us at this time, but I'm looking forward to overcoming them with your 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
Spring 2016 Issue 39

U of A Engineer is the Faculty of Engineering alumni magazine. It is published twice a year by the Dean's Office and is distributed to Faculty of Engineering alumni, friends, students and staff.

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Publications Mail Agreement No. 40051128

Return undelivered Canadian addresses to:
U of A Engineer
9-201 Donadeo Innovation Centre for Engineering
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FACULTY OF ENGINEERING

FSC LOGO

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ON THE COVER Titilope Sonuga (Civil '08) is a poet, actor, engineer, and a Intel's Nigeria role model for young women interested in engineering and technology. Photo by Kosol Onwudinjor.

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Seeds of safety were sown in 1983

Your article fascinated me in that it brought me up to date in the progress of teaching Engineering Safety and Risk Management at U of A, and Professor Winkel's vision for tomorrow's engineers. The seeds were first sown in 1983.

For the 11 years prior to that date, I was employed by Alberta's Energy Resources Conservation Board to lead a team of mining engineers in advising the board on the issue of permits and licenses for the rapidly expanding coal-mining industry. We worked alongside the mines inspectorate in the board's Calgary headquarters. Its chairman was Dr. George Govier, former dean of engineering at U of A, and the vice-chairman was Dr. Norbert Berkowitz, a world-eminent leader in coal processing.

I had informed the board of my intention of retiring on Aug. 25, 1983, my 55th birthday. Earlier that year, in Warsaw, I was elected chairman of the 10th International Coal Preparation Congress, to be held in Edmonton and Vancouver in September 1986.

However, in 1982, the Mining Department of U of A had lost its accreditation. To regain it, the university had invited Dr. Berkowitz and Dr. Jerry Whiting, a distinguished American mining engineer, to join the department in September 1983. In turn, Dr. Berkowitz and Dean Peter Adams asked me to join the team. The Dean had been at one of my lectures as a Distinguished Lecturer of the Canadian Institute of Mining and Petroleum Engineering (CIM) and had invited me to give additional lectures, particularly in the Dean's course 101 (now 201). I accepted his invitation, with his knowledge of my voluntary post of chair of the 10th ICPC.

I initiated a course on Mine Safety Engineering. My qualifications were holder of a First Class Mine Manger's Certificate of Competency in both Alberta and British Columbia, and a Captain's Certificate in Mine Rescue. One of the features of the course was the Friday afternoon "lab" which was devoted to:

- visits to industrial sites such as the tunnel to extend Edmonton's LRT,
- research laboratories,
- a refinery,
- presentations by senior officers of industry, government and WCB, and
- 'hands-on' rescue training.

The department's accreditation was restored in 1984.

Prior to the academic year 1986/87, Dean Fred Otto attended a meeting of North American Deans of Engineering. Proposals for new courses to prepare engineering students for their career were discussed. Dean Otto invited Dr. Whiting and me to outline new courses for final year students. He considered that my Mine Safety course could be expanded, and that it should also be offered to final year business students to help balance final year engineering students taking business courses towards an MBA. Hence the course would be titled "Safety Engineering Management".

The response to advertising was such that the course was taught Monday, Wednesday and Friday at 9 a.m. in the Chem/Min building, and again at 12 noon in the Business building. Each student received a lecture outline and references. Any student missing a lecture would be handed a copy from my office.

In April 1988, I informed Dean Otto that I wished to retire after my five wonderful years. He gave me names of possible successors, one being Laird Wilson, a chemical engineering grad from the University of Glasgow (my degree was from U of Edinburgh). I spent a Saturday afternoon and evening on campus with Laird and his wife, after which he accepted the Dean's offer. Stage two of the "Sowing of Seeds" began. It was followed by Gord Winkel's appointment in 2010—stage three.

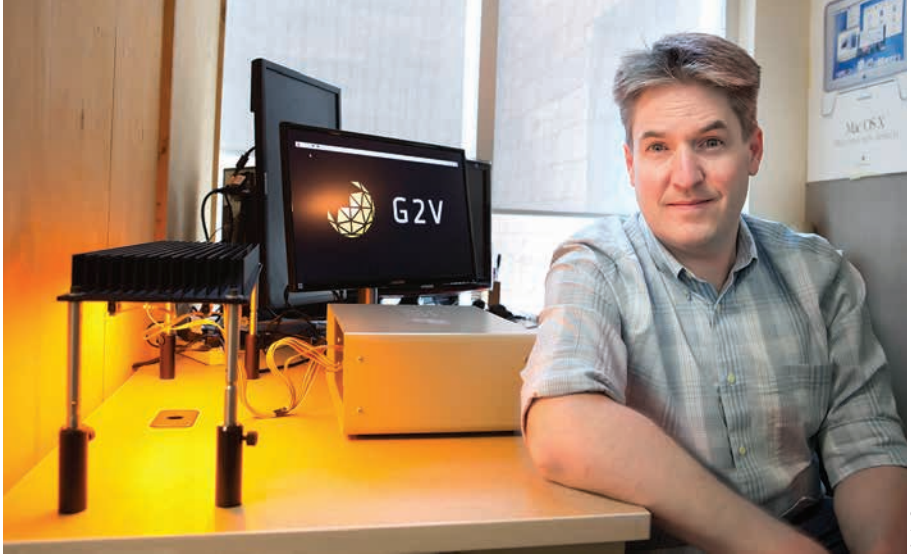
At the close of my time at U of A, I received a bronze plaque signed by the Chancellor, the President, and the Dean "with appreciation for outstanding assistance, support, and enhancement of the goals of the Faculty."

I was appointed an Adjunct Professor till June 1997.

Neil J. Duncan

(Editor's note: Another major player in engineering safety was Douglas McCutcheon, who co-authored the text Industrial Safety and Risk Management (U of A Press, 2003) with Laird Wilson. He also served on the U of A Board of Governor's Board Safety, Health and Environment Committee from 2000 to 2011.)

Lighting up the sky –indoors



Carla Dawes Photography

Michael Taschuk has developed a U of A spinoff company, G2V, which provides lighting for indoor agriculture operations.

Michael Taschuk is taking his lighting systems to the growing vertical farming industry

By Grecia Pacheco

In the next 50 years, food producers worldwide will be facing challenges, and Michael Taschuk believes he has a possible solution to the food supply problem—engineered sunlight.

"Population worldwide will be nine billion by 2040, and in order to feed that population, we'll need to increase food production by 70 per cent," says Taschuk, who earned his undergraduate degree in engineering physics at the U of A in 2000 and his PhD in 2007.

Compounding the challenges of feeding nine billion people is the fact that worldwide, arable land is decreasing.

Taschuk has founded a U of A spinoff company, G2V, providing lighting systems for the growing movement toward indoor "vertical" farming.

His journey from student to entrepreneur started as a research project in nano structure and thin films, which led him to work on solar simulators. Years later, the project became much bigger.

"I got frustrated with what we were obtaining at the lab, then I started using light-emitting diodes (LEDs) and found that it could mimic sunlight," Taschuk says. "Using LED meant that we could be in front of the next generation of solar simulator."

This is how his company was born and Taschuk's lifestyle changed. "My day-to-day work at the university was spent supervising graduate students," he says, adding that running a company was a new experience.

"It has surprised me how much extra work this was. There were many things I didn't know existed, such as setting up a company, or the daily requirements that sales generate."

G2V carries two products: solar simulators and the G2V Sunbeam.

The G2V Sunbeam provides plants with the light they need for any time of day, any time of year, in any location in the world. The G2V Sunbeam will potentially increase yield and improve vegetable nutritional value and taste.

Taschuk believes G2V can make an impact on vertical farming. "Lettuce and micro greens can be grown in large quantities, with less water use or chemical use," he says. "Vertical farming has control advantages."

For vertical farmers this means more efficiency and safer products in larger quantities.

To go from a lab to commercialization, Taschuk had the support from professor Michael Brett, the U of A Nanobridge Program, and the National Institute of Nanotechnology. He has also received support from Venture Mentoring Servies, run out of the U of A Alumni office. He says forming the company wouldn't have been possible without such support. These programs helped him with the funding to prove the concept, a key step in business development.

Now that he has proven the concept, Taschuk is continuing to develop the business and improve the products.

He says business is a discipline that has significant structures and it's important that he gets the opinions of experts. He is working with a group of advisers and mentors who help him see the industry from a different perspective. For Taschuk, the key in business development relies on being patient.

The U of A is supportive of these kinds of initiatives. On campus, there are many groups that guide students develop their business. EHub provides guidance and a network during those initial steps, and TEC Edmonton guides spinoffs during commercialization.

"I never thought I'd be working in this field," says Taschuk. "But many skills in engineering are transferable."

> **"Lettuce and micro greens can be grown in large quantities, with less water use or chemical use. Vertical farming has control advantages."**
>
> – MICHAEL TASCHUK

ENGG NEWS

EcoCar wins in Motor City, qualifies for world championship in London

Alice, the U of A EcoCar team's new hydrogen fuel cell-powered vehicle, trounced the competition at the Shell Eco-marathon Americas this spring. The team now advances to another international competition, in the U.K.

A first-place victory for the U of A EcoCar Team at an international competition in Detroit has been sweetened with a berth at the world eco-car championship in England this summer.

The Faculty of Engineering team won top spot at the Shell Eco-marathon Americas with the hydrogen fuel cell car it designed and built. The win qualifies the team to compete at the Shell Eco-marathon Europe and the Drivers' World Championship in London, June 30–July 3.

The team was required to complete a specific course using the least amount of energy possible. Final calculations haven't been done yet, but in previous years, with a different vehicle, the team has completed the course using the energy equivalent of 618 m.p.g. (0.1 L/100 km).

This year the team failed on two of six attempts to complete the entire lap, still leaving the competition in the dust.

The win continues a string of victories for the team after a year of intensive work on the car. An online crowd-funding campaign held for the team in March raised more than $11,000—thanks in no small part to the faculty's Spirit of George Ford Endowment Fund, which contributed nearly half the amount through matching donations.

But the team isn't taking future success for granted. Team leader Nik Viktorov, a third-year chemical engineering co-op student, says the team will be fine-tuning Alice before departing for London.

"London is going to be very interesting. We're looking at making some efficiency improvements based on what we learned in Detroit and how the car ran. This was the first time we tested it for a very long period of time. We'll hopefully shed some weight and better optimize the fuel cell. We're not doing huge systematic changes but small changes here and there. We think we'll be facing off against some very, very good teams, especially the European teams." You can follow the team's progress on Twitter: @UofAEcoCar.

Andrew Buchner

Co-op students safely evacuated from Fort McMurray

When wildfires swept into Fort McMurray on May 3, 94 Faculty of Engineering co-op students—some of whom had just arrived in the city—were safely evacuated.

Many flew to Edmonton or Calgary, found refuge at evacuee stations or managed to drive home. Some continued to work.

Two of the co-op students, Derek Friend and Andrew Buchner, say the situation in Fort McMurray was surreal.

"This was my third day in Fort McMurray—not the greatest of starts," Buchner said in an e-mail interview from the Syncrude Mildred Lake site, where he found refuge.

When he arrived in Fort McMurray, the fire was "just a nuisance." By Tuesday noon, "all that changed." The Thickwood area of the city was under evacuation order and Buchner, who is unfamiliar with the city, jumped in his car at 3:30 p.m. to get gas.

"This was a mistake," he said. "I found myself caught in traffic that ended up with us gridlocked on Thickwood Boulevard. Traffic wasn't moving, and the smaller fire on the southwestern end of town was growing, moving north. At one point, I could see flames in my rear-view mirror. This was around 4:45 p.m. Water bombers and helicopters soared right over our cars, nearly constantly."

Traffic finally began moving, but Buchner's car was still low on gas and he wasn't sure where the flow of traffic would take him. "I U-turned into downtown, where visibility was only a few hundred feet in thick, yellow smoke, and began driving north to reach one of the work camps that had been open," he said. "Syncrude had tweeted that any employees and their families were welcome to stay at Mildred Lake, so I eventually reached the site at some time after 8:30 p.m., through bumper-to-bumper traffic."

The events unfolded differently for Friend, a fourth-year mining engineering student who began his co-op placement with Shell at the Albian Sands site in February.

Working a night shift, he and his colleagues heard there were some evacuations underway in the city. Workers began preparing to leave the job site so they could go home if they had to evacuate. "That's when we got the call that there was no more traffic going south," he said.

The plan was to stay at the work site in housing built for workers. With families showing up, Friend checked out of his room. "I figured someone else needed the room more than I did. I can sleep on a cot."

He was impressed with the way the crisis was handled.

"It was pretty hectic when we were heading to Shell's airport. There was a lineup of vehicles with residents seeking shelter in the camp, but there were a lot of people helping. One guy was going around making major announcements, the security people were organizing vehicles, people and their belongings.

"It was busy, but Shell and the rest of the oilsands industry deserve a lot of respect—and so do the volunteers and first responders like the firefighters and police who are working 24 hours a day. We need to praise them for doing their jobs."

Wound dressing inventor wins inaugural Governor General's Award

The chair of the Department of Biomedical Engineering has won a new national innovation prize for an invention that transformed wound care around the world.

Rob Burrell, who holds the Canada Research Chair in Nanostructure Biomaterials, is one of six recipients of the inaugural Governor General's Innovation Awards. The awards recognize "exceptional and transformative work" that has helped "shape our future and positively impact our quality of life."

Burrell invented Acticoat, a new wound dressing that uses nanocrystalline silver to fight bacteria and inflammation in wounds. He invented it while working for Westaim Biomedical, later Nucryst Pharmaceuticals. Burrell joined the Faculty of Engineering in 2002.

The dressing was the world's first therapeutic use of nanotechnology and has saved thousands of lives and limbs, transforming the treatment of burns and wounds.

Burrell has received well-deserved recognition for the invention, including the 2006 BioAlberta Award for Scientific Achievement and Innovation, the 2006 MEDEC Award for Medical Achievement, the 2008 World Union of Healing Societies' Lifetime Achievement Award for contributions to wound healing around the world, the 2009 Manning Innovation Award, the 2009 ASM Engineering Materials Achievement Award, the 2010 ASTech Awards Outstanding Leadership in Alberta Technology prize, and the 2010 Jonas Salk Award—a lifetime achievement award presented annually to a Canadian scientist, physician or researcher who has made a new and outstanding contribution in science or medicine to prevent, alleviate or eliminate a physical disability.

He says the Governor General's Innovation Award is different.

"This is an inaugural award, so you're up against everything that has been seen as highly innovative in the past 20 or 30 years, everything in recent memory. It makes you feel very good."

Cirque du Sleigh

The Great Northern Concrete Toboggan team sleighed competing teams in several categories this year, including—you guessed it—costumes. Costume designer Amanda Fremmerlid held many sewing bees in the ETLC atrium, and the hard work led to a first-place spot. The team's engineering design was also impressive. It took third place in superstructure and braking design and finished fifth out of 24 teams in overall theoretical design.

The art of volunteering

When you're studying engineering in university, most people agree, you don't have time for much more than studying, studying and then studying.

That was the case for Marwyn Vernon (Chemical '13), who decided this year to make up for lost time by leading the Engineering Art Show committee.

This spring, for the fifth year running, engineering students, alumni, faculty and staff showed off their creative side in exhibits of visual and performance art as part of National Engineering and Geosciences Month.

Vernon, who was looking for opportunities to gain leadership experience, jumped at the idea of leading the organizing committee.

"I did a little bit of volunteer work for Engineers Without Borders from time to time, like working at the Fair Trade Fridays coffee table," Vernon recalls. "But with engineering, you're swamped with coursework and can't do everything you'd want to. So it was nice this year to get involved again and see what's happening on campus—it's so dynamic."

The committee helped renew or secure funding from sponsors like DIALOG, Nunastar, the U of A Alumni Association and the Faculty of Engineering. It also took up the task of co-ordinating volunteers to collect art submissions and organize a rich palette of events.

Vernon, who works as an EIT at Cosyn Technologies, says his volunteer experience was rewarding. One of the perks was seeing amazing artistic creations and performances by engineering students.

"It was really nice too when people expressed their appreciation for these events," Vernon says. "One person who came up to me was really happy that we were breaking down these stereotypes of typical engineers—that we're all just sitting around doing calculations. It's nice to give students an outlet to do creative things."

Down but not out in Fort McMurray

Alumni are supporting students from Fort McMurray through a new disaster relief bursary

By Niall McKenna

Ryan Whitefield / University of Alberta

Civil engineering student Imad Bazzi had returned home to Fort McMurray to begin a co-op placement when the city was evacuated—and his family's house was lost.

The destruction from the fire in Fort McMurray could threaten the studies of about 500 current and prospective students at the University of Alberta. But the university and its alumni have come together to help these students by creating a new Disaster Relief Bursary, raising more than $12,000 in just four days.

U of A students who could benefit from the new bursary include Imad Bazzi. A couple of weeks before the fire, the 20-year-old had finished his second year of civil engineering. One day before the fire, he started an eight-month co-op placement back home in Fort McMurray.

The next day, his family home, his entire savings—and possibly his co-op—were gone.

It was Tuesday, May 3, 2016, and Bazzi had returned from lunch on his second day of work. In the car, Bazzi heard the mandatory evacuation order over the radio. With no time to spare, he filled up with gas, bought some bottled water and food, then searched for his brother, sister and mother.

Along with almost 90,000 other people—in the largest evacuation in Alberta's history—the family took a bumper-to-bumper drive north. After spending the night at a work camp, they headed back south to Edmonton. On the way, Bazzi stopped at a police barricade and appealed to police to let him see the street where he lived. When Bazzi and the officer arrived, all they saw were water pipes and the legs of some lawn furniture.

"All the houses were gone," Bazzi said. "The officer was, like, 'Is this where you live?' I said yeah. He said, 'I'm sorry, man.' "

As the family drove south, his sister and mother sobbing in the back seat, it dawned on Bazzi what he'd lost: a laptop with all his school files; quite possibly the family cat, Oliver; and $5,000 cash he was saving to pay student debt.

"This disaster, I wouldn't want this to be a reason I don't go back to school."

Bazzi is one of some 500 current and prospective U of A students from Fort McMurray who now face uncertain futures. Like Bazzi, some students have lost their jobs and have to look elsewhere to pay for tuition and living expenses.

> "This disaster, I wouldn't want this to be a reason I don't go back to school."
>
> — Imad Bazzi

"We're seeing students and families who no longer have the financial resources they expected, and who have lost both job prospects and resources such as textbooks and computers," says Lisa Collins, university registrar and vice-provost. "This new bursary will provide assistance so students and prospective students can continue, or start, their studies."

The University of Alberta Disaster Relief Bursary is open to undergraduate and graduate students and does not need to be repaid. It is based on financial need due to loss or unforeseen costs related to a natural disaster.

The bursary will be distributed by Student Financial Support within the Office of the Registrar. It will provide additional financial support in conjunction with established bursary programs at the university.

You can help. Give to the University of Alberta Disaster Relief Bursary and help students get their studies back on track. Visit www.uofa.ualberta.ca/giving/projects/disaster-relief-bursary for details.

Building up to blast-off

Students design and build Alberta's first satellite

By Richard Cairney

The first made-in-Alberta satellite will be launched into space this summer. ExAlta-1 has been designed and built by students in the Faculty of Engineering's AlbertaSat student group.

ExAlta-1 is one of 50 cube satellites that will work together as part of an international mission to study the thermosphere—a region we don't know much about. Tentatively, all 50 satellites will be launched later this year and shipped to the International Space Station. Several weeks later, they will be released into low-Earth orbit.

So, whose idea was this? It started when a small group of engineering students entered a Canadian satellite design competition in 2012. When members of the group heard about the international QB-50 mission, they focused their efforts on launching a satellite.

The team is almost entirely engineering students; other members include students from Physics and the Faculty of Education—who are developing curriculum to teach children about cube satellites and space exploration—and others from the School of Business and the Faculty of Medicine & Dentistry.

The team aims to help build an aerospace industry in Alberta. Its satellite hasn't been launched, but it's already forming a company that will design and build cube satellites for clients.

"That has been the goal since Day 1," says Chris Robson, a mechanical engineering student who served an eight-month engineering co-op term as the ExAlta-1 project manager.

The team is already getting recognition. Earlier this year, Sylvain Laporte, the president of the Canadian Space Agency, spoke about Robson and the AlbertaSat team during a keynote address to aerospace industry executives at a conference organized by the Canadian Space Commerce Association. He urged them to meet with the U of A team.

"I honestly had a little heart attack when he said that," says Robson, who had earlier met with Laporte for a couple of hours.

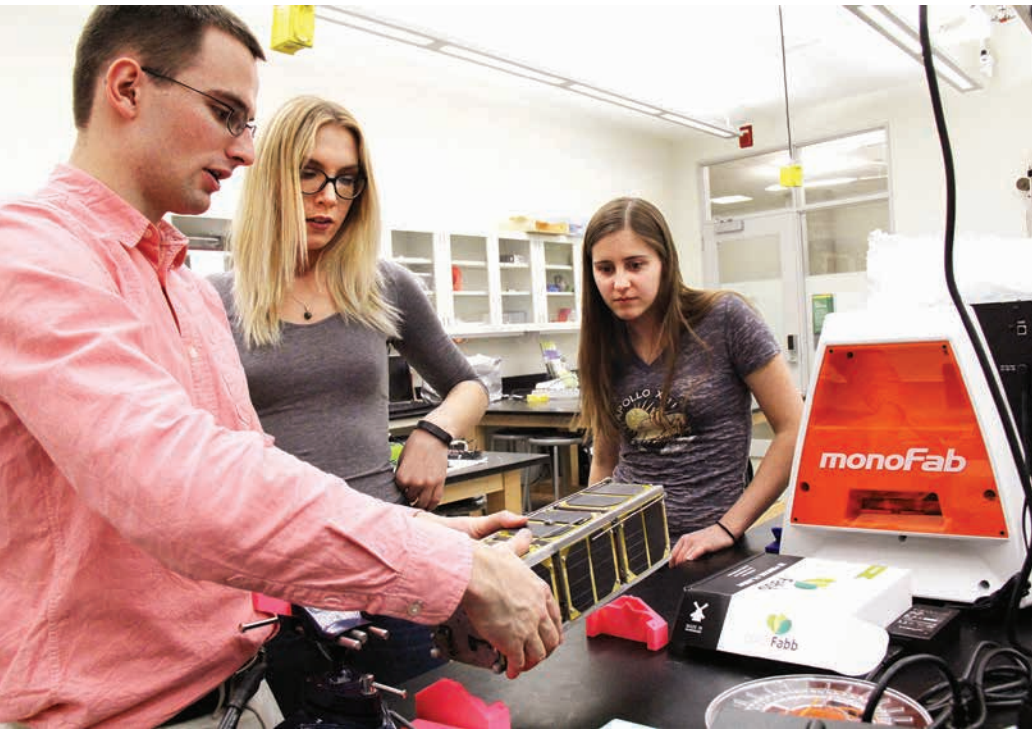
Both Robson and Charles Nokes, the team's current project manager, are continuing their education through graduate degrees. Nokes is taking the team and ExAlta-1 down the home stretch, running final tests before this summer's launch. As exciting as the launch will be, Nokes is anxiously awaiting data the satellite will send.

The mission will deliver valuable information about a region of the atmosphere that is poorly understood—especially as it relates to solar storms. These "coronal mass ejections" pose a threat to electrical and electronics infrastructure valued in the trillions of dollars.

"Studying the thermosphere gives us insight into how we can perhaps better design equipment on the ground or ways we can mitigate the effects of a large coronal mass ejection," Nokes says.

The students are entering a major industry. Canada has the fifth-largest aerospace industry in the world. It generates $22 billion in annual revenues, employs a workforce of 66,000 and exports 80 per cent of its output. Aerospace is the second most research-intensive industry in Canada. Globally, the civil aerospace market is predicted to be worth $4.5 trillion a year by 2031.

Watch for team updates at engineering.ualberta.ca, and follow the team on Twitter (@AlbertaSat) and on Facebook (facebook.com/AlbertaSat).



Members of the AlbertaSat team are putting in double time getting ExAlta-1 ready for launch.

The mechanic engineers

Two chemical engineering graduates are starting a revolution in the auto repair industry

By Richard Cairney

Something's wrong with your car. That sound from under the hood is getting louder. And finding time to make an appointment with a mechanic—if you have one you trust—is proving to be a challenge of its own. A pair of chemical engineering alumni are putting their problem-solving skills to the test in an intriguing company that's bringing a new twist to the auto repair industry.

In a nutshell, Asem Alsaadi (Chemical '12) and Uzair Ahmed (Chemical '12) will send a mechanic to you.

Problem solved.

Formed in February 2015, their company, InstaMek, connects a stable of mobile mechanics with customers. It's proving to be a win-win. In less than a year, the company has begun operating in Edmonton, Calgary, Lethbridge, Toronto and Vancouver. So far, InstaMek has connected clients with 50 mechanics who have done more than 3,000 calls. Client needs vary from pre-purchase inspection of used cars to regular maintenance and minor repairs.

The seeds of InstaMek were planted while the two were working as EITs. Working with clients in a booming oil and gas industry, Alsaadi struggled with the challenge of securing contractors. He and Ahmed came up with the idea of developing a platform where companies could pick and choose contractors in an online system that included qualifications and could handle invoicing.

They formed a company of their own, Skytrio Solutions Inc. "We worked at it for a year but we just couldn't get it going—there was a lot of red tape," Alsaadi explains.

It turns out the idea was more viable in a different sector.

"We decided we were going to take everything we learned out of that and leverage it to this new thing," Alsaadi said. "And boy oh boy, our learning curve was so steep, but we were able to accomplish a lot in a short period of time because we already made so many mistakes. We tested it out and a week later we had revenue."

"We find our mechanics through normal means—job posting websites and recruiters," says Ahmed. "They can be out-of-work mechanics or those with full-time jobs, but most of them have at least 10 years of experience and have a 'try-out' they go through under supervision. Plus we have customers rate them after every job so we keep track of their performance."

The two engineering alumni are building the company with the support of $500,000 from Edmonton investors, and they're moving quickly to establish market dominance before competitors emerge. Those investors aren't merely supporting a good idea—they're also investing in Ahmed and Alsaadi. Clearly, they've been impressed by the two, who have known each other since Grade 9.

Ahmed jokes that Alsaadi "kept following me" from junior high and high school, to engineering, into chemical engineering and, after graduation, into water treatment—Ahmed worked for Baker-Hughes and Alsaadi was with Buckman Chemicals.

In university, the two had mutual friends but often found themselves arguing different positions in conversations, Ahmed says. Alsaadi refers to their disagreements as "healthy conflict," because together they see many perspectives.

> **"We were able to accomplish a lot in a short period of time because we already made so many mistakes."**
>
> — Asem Alsaadi

And Ahmed says he's happy to work with Alsaadi.

"He was the only person I knew who is a doer—I want to be in business with someone who works hard, and he works hard. We think differently. We complement each other very well."

While running a business isn't strictly engineering, both agree that the education they received helped them develop tools to take on any number of challenges.

Demetri Giannitsios

InstaMek founders Uzair Ahmed and Asem Alsaadi.

"I talk about this to my friends a lot—that studying engineering made me the person I am today," said Alsaadi, who intentionally took co-op placement that offered him a wide range of experiences—and volunteered to handle finances for a year for the Engineering Students' Society.

Ahmed's trajectory was different. During his second year of studies, he was forced into a "dean's vacation" with a grade point average of just 1.5.

"I was going through the program aimlessly," he recalls. "When I was pushed to the edge, I was forced to clamp down and get moving. It was a launching pad. I've had a lot stronger drive since then."

Engineering "teaches you to really think and manage time and organize yourself," he adds. "We're applying all of those skills to our new field."

Computer engineering graduate students enter the ring in *BattleBots* season launch

By Richard Cairney

Supplied

(L-R) Electrical and Computer Engineering graduate students Andrew Mair and David Sloan, with Lucas Sloan and Graham Jordan had a brief but historic role in *BattleBots*.

They came, they saw, they got beat up

The robot awesomeness just never stops when you're talking to computer engineering graduate students David Sloan and Andrew Mair, members of an Edmonton team battling for glory on the wildly popular U.S. television series *BattleBots*.

The episode that aired May 10 was a complete twist: rather than starting the regular season, producers lined up three-way robot battles among 12 teams vying for the final four spots on the season's roster.

The MBS Robotics team, led by Sloan's brother Lucas, was ready to rumble with a mind-blowingly cool robotic tag team. If it isn't awesome enough that their robot Basilisc specializes in flipping and punching its opponents, it also has a weaponized drone sidekick named Afterbyte that's capable of landing on opponents, engaging a vacuum system to stick to them and then piercing their shells with a drill press—well, that's pretty much the cherry on top, right?

If you haven't seen *BattleBots* (calm down—some people just haven't!), it isn't for the faint of heart. Robots or groups of remote-control robots with a combined weight of 250 pounds (about 115 kilograms) use saw blades, flames, flippers and crushers of all kinds to disable or destroy one another. The fighting takes place inside a Plexiglas cage measuring 15 metres by 15 metres, protecting competitors and audiences from metal chunks sent flying from the bots in explosive battles.

The local team was battling a robot called the Blacksmith, armed with a flame-throwing hammer wielding about 3,000 lb. of force, and Gemini, a set of twin robots each weighing 125 lb.

The short version of the story? They came, they saw, they got beat up—and they're no longer in the competition.

The Blacksmith bot came out swinging, its repeated blows inflicting blunt-trauma injuries on the Gemini bots. Mair manoeuvred Afterbyte, trying to land it on one of the Geminis. The drone collided with Blacksmith and lay on the ground in ruins. Basilisc survived blows from Blacksmith but suffered a terminal mechanical failure in one of many high-speed ramming hits.

Somewhere in the chaotic battle, Basilisc also lost its "puncher"—a metal point that punctures an opponent's armour with more than 1,000 lb. of force.

"It's inside one of the other robots. We're not sure where it is," Mair said following the televised broadcast.

For David Sloan, who's working on his PhD in computer engineering, and Mair, who is working on his master's degree, being on the program was like a childhood dream come true. Both were big fans of the program when it first ran, about 15 years ago.

"I saw every single episode," said Mair. "I knew every one of the robots. It made me go out and buy a remote-control car. It had a huge influence on me."

The program "made robots cool," adds David. "Robots are inherently cool, but you'd watch the show and see people putting together relatively simple things and it made me realize that this is something that is not outside of the realm of possibility."

While Mair was messing around with remote-control cars, David was organizing sumo bot competitions at his high school in Peace River, Alta.

David and Mair joined Lucas and Graham Jordan for 12 days in Los Angeles for the taping of the entire season. Even after they lost the qualifying round, the team stuck around to watch the action. Backstage access helped them form strong friendships with other teams.

"It's like a giant geek convention," said Mair. "The robotics community is almost too nice."

"The camaraderie was stronger than in any competition I've ever been to," added David. "They're amazing people and they're all willing to help you."

That said, the team said they impressed themselves at the competition—and they're contemplating entering again next year.

"We were surprised that when we got there, out of the newer teams we were one of the best prepared groups. We were battle ready," said Lucas.

As well as designing and building their own robots, the team had to come up with sponsors. Princess Auto, Special Metal Fabricating, and Formlabs, a 3D printer manufacturer, played key roles in the team's development. Another supporter, PeaceFarms.green, will be using some of the technology the team developed, pneumatic valves they call "twitch valves," to support agricultural irrigation in Kenya.

The U of A Board of Governors has appointed chemical engineering professor Fraser Forbes as dean for a five-year term.

Taking the wheel

Fraser Forbes is appointed as the Faculty of Engineering's new dean

By Richard Cairney

The University of Alberta Board of Governors has appointed Fraser Forbes to a five-year term as dean of the Faculty of Engineering effective July 1, 2016.

The announcement comes nearly a year after Forbes was appointed as interim dean, while the faculty was moving into a new building and laying the groundwork for new educational initiatives.

"It has been an amazing year, and we've met or exceeded all of our goals," said Forbes. "This is Canada's finest engineering school, and it is a privilege and honour to be selected as dean."

Forbes ensured during the past year that the Faculty of Engineering didn't pause in pursuit of its goals—and he'll continue moving the faculty forward.

"During the next five years our focus will be on maintaining and, where possible, accelerating our momentum, hiring the highest-quality people, providing the

"We're going to focus on reigniting a culture of innovation and entrepreneurship in our students, and creating innovative new educational programs for undergraduate and graduate students, and for professionals."
— Fraser Forbes

highest-quality spaces to students and researchers, and continuing our long history of exceptional teaching and research programs," he said.

"We're going to focus on reigniting a culture of innovation and entrepreneurship in our students, and creating innovative new educational programs for undergraduate and graduate students, and for professionals," he said. "Our ambition is to create programs and partnerships with other faculties to the benefit of all University of Alberta students."

Steven Dew, U of A provost and vice-president (academic), says Forbes, who arrived at the university 20 years ago, has expertise in teaching, research and governance—including serving on the U of A's Chairs Council Executive and the President's Advisory Council of Chairs—that uniquely qualifies him for the dean's position.

"Fraser's focus on excellence in teaching and research, and his accomplishments as department chair and member of the university governance community, have had a strong impact on the University of Alberta," said Dew. "His leadership will undoubtedly move the U of A and the Faculty of Engineering forward—we congratulate Fraser and welcome him to his new role as dean of engineering."

Forbes was appointed chair of the Department of Chemical and Materials Engineering in July 2002. Under his guidance, the department has seen a number of successes, including the completion of three newly renovated floors of the CME building (which have been awarded LEED Gold standing); the establishment of a Canada Excellence Research Chair in Oil Sands Molecular Engineering, seven new Canada Research Chairs, five new NSERC Industrial Research Chairs and the renewal of four NSERC Industrial Research Chairs; the creation of a Campus Alberta Innovates Program Research Chair in Polymer Engineering for Oil Sands Processing; and the formation of three large research centres: the Imperial Oil Institute for Oil Sands Innovation, the Canadian Centre for Clean Coal/Carbon and Mineral Processing Technologies, and the Alberta Centre for Surface Engineering and Science. He has supervised the hiring of 39 faculty members. During his tenure as chair, the department experienced graduate student enrolment growth of over 250 per cent, along with a 200 per cent increase in undergraduate materials engineering students and more than 50 per cent growth in enrolment of undergraduate chemical engineering students.

As an educational leader, Forbes has a strong record of nurturing and empowering professors to continuously improve their effectiveness in the classroom, leading teams that have been awarded numerous prestigious teaching awards.

In teaching and learning, Forbes has supervised 30 master's and 14 PhD theses. He created or completely revised three undergraduate courses and one graduate chemical engineering course. He led the chemical engineering curriculum revision committee, drove the first major revision of the materials engineering undergraduate program in several decades, and ushered in new biomedical and nanotechnology options.

He earned his bachelor's and master's degrees in chemical engineering at the University of Waterloo and his PhD at McMaster University. Professionally, he worked as a process automation engineer with Dofasco Inc. from 1987 to 1989, and from 1983 to 2005 was a principal of Forbes-Barry Inc. as a consultant. In that capacity, his services covered a wide range of operations in the steel, petrochemical, forest products and agriculture/food industries.

Forbes' research is broadly based around the optimization of industrial operations, and his research findings have resulted in more than 145 refereed publications. As a principal investigator, his research projects have been awarded more than $2 million and he has been co-investigator on projects that have received more than $1.5 million in research funding.

Looking forward, Forbes says the Faculty of Engineering is developing exciting new opportunities for students and professionals, noting that the faculty is positioned for marvellous accomplishment, thanks to the work of former dean David Lynch.

"Over the past two decades, we have laid the foundation of our future success. In the next decade, we will build upon that tremendous foundation to emerge as Canada's leading Faculty of Engineering and one of North America's very finest."

Demetri Gianitsios

Kosoi Onwudinjor

he will

Bearing gifts, Titilope Sonuga returns to her homeland

By Malcolm Azania

You know that little voice inside your head that says you've bitten off more than you can chew? That you're out of your depth? Titilope Sonuga (Civil '08) doesn't have that.

As she climbs the stage during Nigerian President Muhammadu Buhari's inauguration ceremony, Sonuga feels nervous, but there's no self-doubt. In the distance, through the heat-rippled air, she sees the mountainous Aso Rock behind the presidential villa. Closer, bleachers are filled to capacity. As she walks toward the microphone, 5,000 people dressed in their finest western or Nigerian fashions come into view in Eagle Square, the heart of the capital city of Abuja. Sonuga strides to her mark onstage. At her feet, the nation's television crews are broadcasting the ceremony to the 180 million people living in Nigeria. Dignitaries from around the world are seated nearby in a VIP tent.

Silence clutches the crowd. Flags flutter. She draws a breath and delivers. As the verse she wrote reaches its crescendo, she is telling Nigeria and the world, "Remember the forgotten/the left behind/the left in the dark/the ones who carry the hope/of this country like a prayer/each individual pulse/of the heartbeat of this land/aching

for someone to believe in … this country belongs to us … we are ready."

Her words fade and applause falls like a storm.

"I sort of went into a time warp when I got up there," Sonuga says of the 2015 event. "But I never walk into a space and feel like I don't deserve to be there. I have no desire to be small."

Sonuga—her name is pronounced Tee-tee-LO-pay SHO-noo-ga—has lived on two continents, had an engineering career in Canada, co-founded the thriving Breath in Poetry performance collective in Edmonton, hit stages across the country, relocated to her family's home country of Nigeria, become an Intel spokeswoman and ascended to television stardom.

Above: Titilope Sonuga is working with Intel to inspire girls and young women to pursue education and careers in engineering, science and technology. Below: Sonuga, an accomplished poet, delivers a poem at the inauguration ceremony for Nigerian President Muhammadu Buhari.

Not bad for a 30-year-old University of Alberta-educated civil engineer.

Sonuga has a ready laugh—so ready, in fact, that every time you read the word "says" below, you can assume it actually means "says with a laugh." She's so relaxed you might not expect she'd scored a gig that few poets—let alone engineers—could ever imagine taking: performing at the presidential inauguration of one of the world's wealthiest and most populous nations, Nigeria.

Sonuga was "acutely aware" that much of Nigeria was watching the inauguration. "There was an overwhelming feeling of hope and nervous anticipation," she says. "It felt like we were on the cusp of something extremely important and potentially transformative."

She'd had a month to prepare, and while she memorized her new work, she refused to over-rehearse because she wanted it to be real. "Nothing I could have rehearsed would have prepared me for the moment when I was actually on that stage."

When she was a child, Sonuga, her engineer father and their family moved to Edmonton from Nigeria, a British Columbia-sized West African country running with an economy ranking in the world's top 25 by GDP. Being used to an old-school style of education, she was delighted that the Faculty of Engineering gave her the freedom to choose how to excel. During five years of studies, Sonuga found great value in the co-op program. "I also learned that in the real world, textbooks are just textbooks," she says. In the field, she explains, no one says, "Oh, let me check Chapter 5!"

Sexism never infringed on her aspirations. "I hadn't grown up in a household where I was told I couldn't do certain things," she says. Her father told her, "You have a knack for the sciences, and you can merge this love of design and see how far you can go." Nevertheless, she says, "I was always aware of the fact that I was—and I feel like this was my general Canadian experience, to be fair—the only 'something' in the room. I was typically the only black person in the room. There were lots of women in my program, but obviously there's a gap there."

But according to Sonuga, that isn't why she switched careers. She continues to prize engineering, which shaped her world view and approach to her second career … as a poet. "Because of my love of symmetry and clean lines and clarity, I write in a very systematic way. I need things to make sense."

Still, she needed a change. "I wanted to feel connected to something greater than myself, and art was the way to do that. I didn't know how to do that as an engineer. It was a crazy gamble. I left my job. I moved back to Nigeria."

While the "brain drain" from Africa's 55 countries is the cause of much lamentation—sending legions of doctors, engineers and other professionals to serve the West when they could be leading economic growth at home—Sonuga is part of the unheralded but very real "brain train," the expatriates moving back home with education, skills and networks they've gained abroad.

She's accomplished much since she returned. "Some of that was planning," she says. As to performing for the president? "Dumb luck." While she knew there'd be an inauguration on May 29, 2015, she hadn't considered there would be a poet, "because there had never been a poet before." She was at the Calgary Zoo when she got the unsolicited and unexpected call from her mentors, Nigeria's former high commissioner to Canada and the writer Nduka Otiono, advising her to expect an invitation to perform. Their advice? Just keep calm. Her reaction? "Nigeria in particular is a homeland of storytellers and poets and writers galore. Why am I being chosen for this? It was humbling and terrifying and exciting."

By the time she delivered her poem at the inauguration, Songua had already completed her first TV season of *Gidi Up*. The title arises from "Las Gidi," slang for Nigeria's New York, the cultural capital Lagos. After Sonuga was performing poetry at an event, *Gidi Up* head writer Jadesola Osiberu asked if she had ever considered acting, and she was offered an audition.

Again, that voice of doubt might have spoken up and if it did, Sonuga wasn't listening.

> "I have no desire to be small."
>
> —TITILOPE SONUGA

"Acting was so far out of what I thought my abilities were that I approached the audition as a fun thing to do. I had no expectation of getting the role so I just decided to do my best and save the experience as a story to tell." As the story goes, then, she won the role of Eki, a photographer. The show's writers later remixed the character to add poetry into her talents, and Sonuga's work appeared onscreen.

If being a TV star weren't enough, how about becoming spokeswoman for one of the planet's leading tech companies? According to Sonuga, Intel had conducted a study in 2013 revealing a huge online gender gap across the world. Across sub-Saharan Africa, there are 40 per cent fewer women than men using the Internet. To address the problem, Intel created an "Easy Steps" curriculum to help build digital literacy among women and tie it to entrepreneurialism. To deliver the program, it enlisted the help pf NGOs working with women and technology. Now, in her capacity as the Intel She Will Connect Ambassador for Nigeria, Sonuga is speaking with young women and girls to promote digital literacy and empower them to explore their potential though the power of communications technology.

"When [women] earn a new skill, they are very generous about passing that on to the community that relies on them," says Sonuga, echoing Malcolm X's 1964 remark, "If you educate a man, you educate one person. If you educate a woman, you educate and liberate a whole nation."

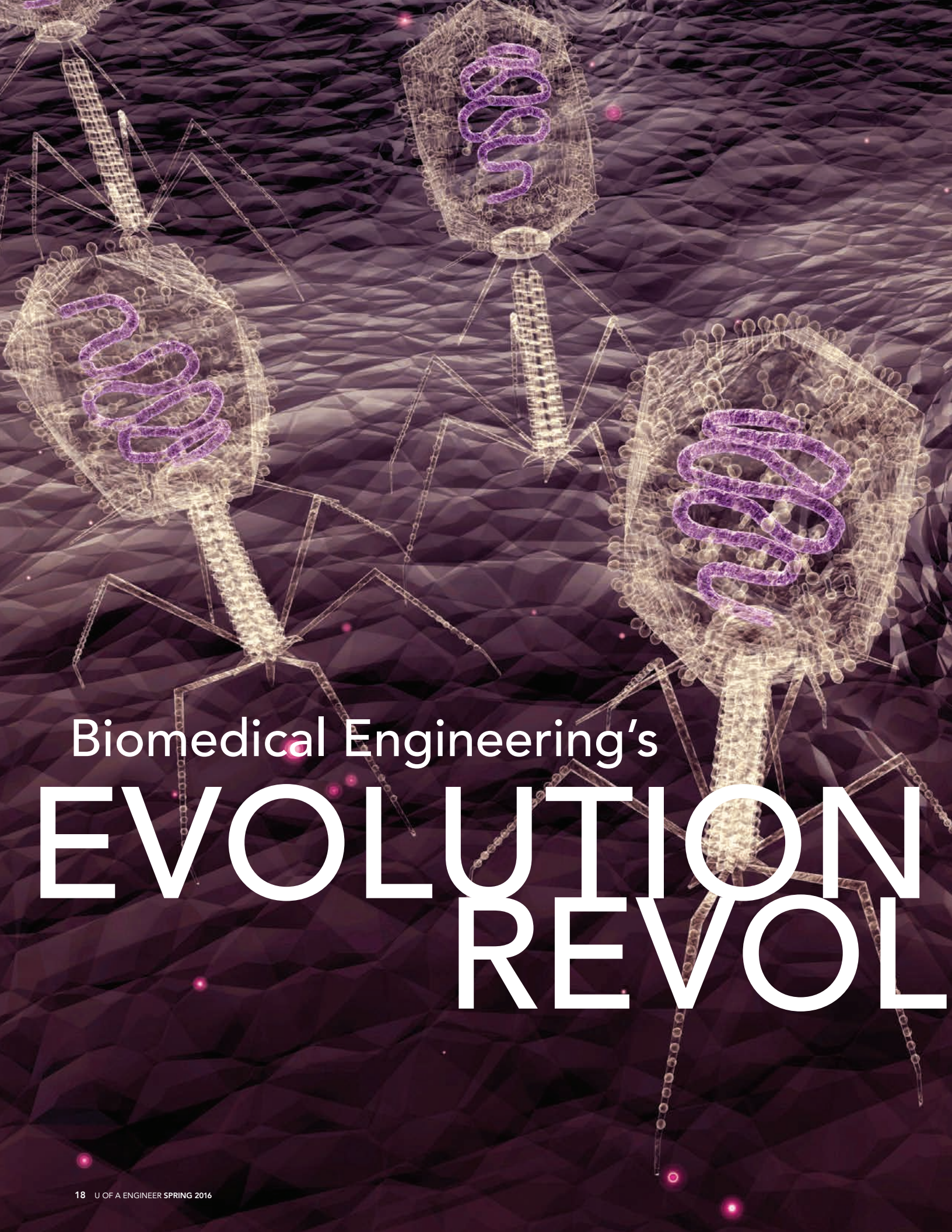
So why does Intel care? "They want to train five million women and girls by 2020," she says, adding that the hope is that those young women will join the swelling ranks of the continent's exploding tech sector. "Intel isn't typically a big PR company, but it was important to make sure the work had lots of visibility." Being an artist, performer and engineer made Sonuga a natural choice for the project.

And why does Sonuga care? All her life, she says, she has benefited from a strength that "comes from feeling empowered to do anything I wanted to do." Sharing that strength is simply the right thing to do. "Something in the message feels personal," she says. "I look like somebody that could be your cousin, your sister." When she speaks to young women, she tells them, "You could still have an interest in painting, but what if you had access to a laptop? You could open up a website and connect with people across the world."

As for her art, a new season of *Gidi Up* is out this year (you can find it online at ndani.tv). Sonuga continues to travel and perform across the country, and she's working on a collection of poetry

Sonuga emphasizes she never sought to be anyone's role model. "The most role-modelling I can do is say, 'This is me, in my flawed and confused and imperfect self. However, I want to do better. If that's what people are seeing and want to emulate, go for it."

While she's unsure what she'll do in the future, she doesn't rule out engineering. "I can't drive down the street and not think, 'What kind of material do we need to make this road a little more structurally sound?' There's something in my brain that won't give up on that!"



Biomedical Engineering's EVOLUTION REVOL

Researchers are leveraging evolution to stop deadly bugs

BY BRYAN ALARY

Over the span of billions of years, viruses and bacteria have waged a cyclical war, co-evolving to one-up each other. Bacteria evolve to prevent viral infections; viruses, in turn, counter to find a way to infect and kill bacterial cells. Mechanical engineering professors Warren Finlay (Electrical '83, MSc '84) and Reinhard Vehring have teamed up with U of A bacteriologist Jon Dennis to harness this co-evolution and defeat some of the deadliest antibiotic-resistant bacteria known. The emergence of antibiotic-resistant bacteria is a real and growing threat.

Finlay, who runs the Aerosol Research Lab of Alberta in the Department of Mechanical Engineering and specializes in improving the delivery of drugs to the lungs, teamed up with Dennis in 2007. Finlay and the ARLA routinely collaborate with researchers and companies around the world on developing inhaled pharmaceutical aerosols for diseases such as asthma.

One of their most recent collaborations involves bacteriophage therapy as a potential treatment for lung infections. Bacteriophage, which literally

"If academia doesn't do that work, who's going to do it? There is no other function of society that would take that. Even non-profit organizations can't do that."

– Reinhard Vehring

means "eater of bacteria," harnesses the evolutionary wizardry of viruses to destroy antibiotic-resistant bacteria.

The research team has introduced bacterial viruses, called phages—which are not alive but do possess genetic material that allows them to evolve—to a target bacterium. Once inside a bacterium's cell wall, phages use the bacterium's own energy sources to continuously replicate until the cell bursts open. Once that happens, this new generation of phages seek the next bacterium to invade and destroy until the infection is eventually cleared.

In effect, Finlay and Dennis are turning back the clock and taking a page from pre-antibiotic-era scientists to find solutions to antibiotic resistance.

French-Canadian scientist Felix d'Herelle co-discovered bacteriophages before the First World War and experimented with their use as a treatment for dysentery. (He even successfully treated a 12-year-old boy in 1919 after he volunteered himself as one of the test subjects to ensure it was "safe.")

d'Herelle would later manufacture several commercial phage therapeutics, as would others in the United States such as the Eli Lilly Co., which in the 1940s developed phage products targeting staphylococci and E. coli, among others, though the effectiveness was cast in doubt.

The former Soviet Union and Poland explored phage therapies into the 1990s, but the rise of antibacterial medications after the Second World War saw research into phage therapy largely ignored everywhere else.

That's starting to change, particularly with the rise of antimicrobial resistance—a broader term that includes bacteria, fungi, viruses and parasites able to resist medicines. The World Health Organization calls it a serious and growing threat to global public health, which puts "the achievements of modern medicine at risk."

Antimicrobial resistance is not a new phenomenon; bacteria have adapted to their habitat to find ways to survive for billions of years. Perhaps the earliest warning about resistance during the antibiotic age came in 1945, when Sir Alexander Fleming accepted the Nobel Prize for discovering penicillin. In his speech, Fleming warned that the "time may come" when penicillin is so readily available that it could be administered improperly, giving rise to resistance.

The intensive use of antibiotics during the last 70 years has both patients and physicians accustomed to turning to such treatments, whether or not they're the best option. In effect, we are helping bacteria become better at resisting.

In late 2014, Finlay and Dennis were awarded a U.S. patent for their phage composition and delivery system.

Dennis identified phages to target Pseudomonas and Burkholderia bacteria but lacked a mechanism for ensuring their delivery in the lungs. He supplied the phages in liquid form while Finlay provided the engineering know-how to essentially create a phage inhaler. Aerosolizing the liquid requires using fairly destructive methods, so care was needed to avoid destroying the phage samples, Finlay explains.

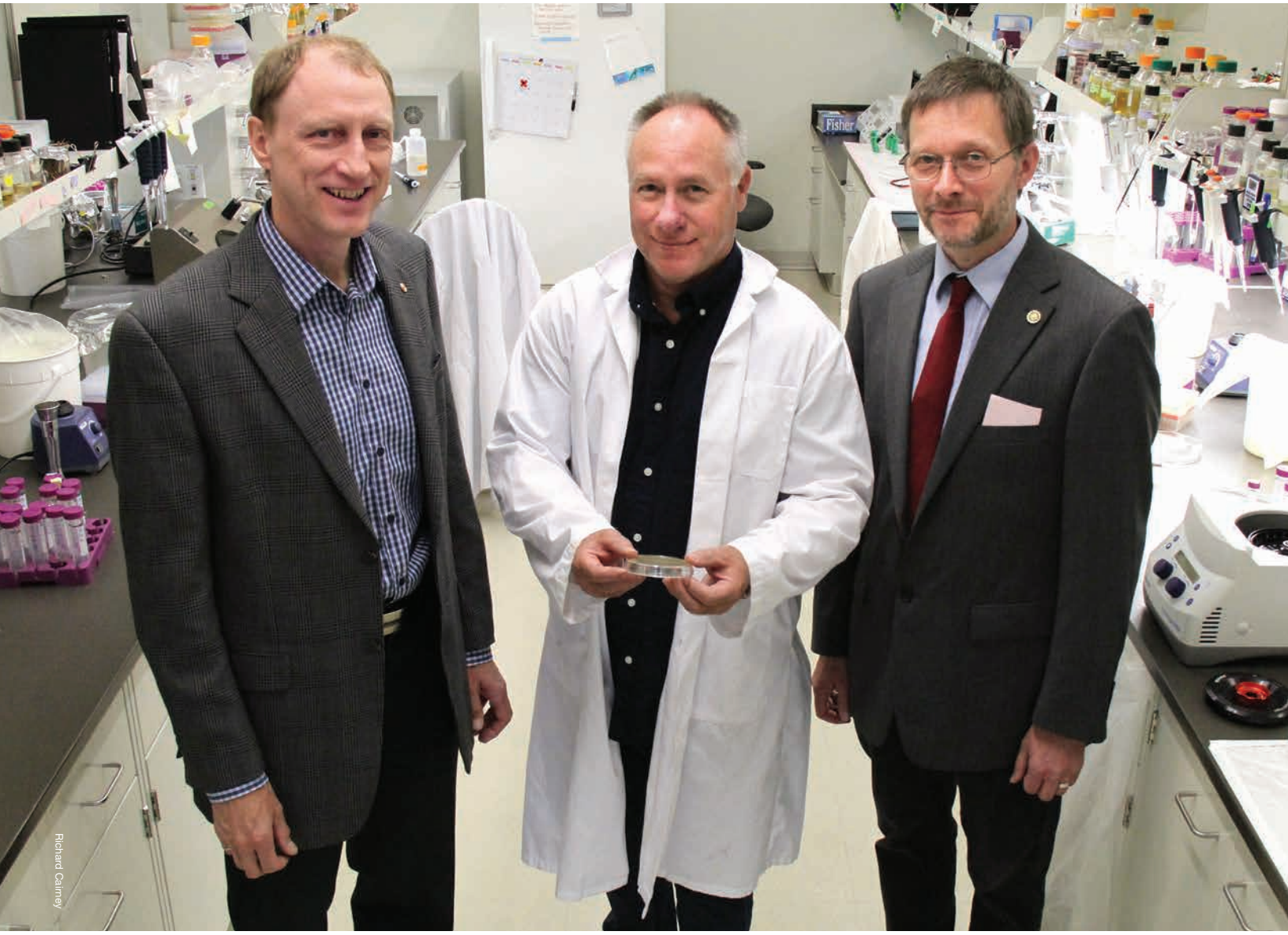
"We proceeded with several different approaches to aerosolization. Some worked better than others," he says. Eventually, they landed on powder inhalers, like the kind used to treat asthma. "To take this aqueous formulation and turn it into a powder—phages don't like being turned into a powder—trying to figure out how to protect them was a challenge."

Their colleague Vehring came to the Faculty of Engineering after decades in pharmaceutical engineering when he worked at several San Francisco-area companies developing aerosolized therapies such as the world's first inhalable insulin, Exubera, and the needle-free flu vaccine FluMist. As an engineer who designs microparticles that can be dispersed through aerosolization, Vehring says he admires phages.

"As an engineer, I see these things as highly sophisticated nanomachines in a way," he says.

Vehring says he turned to academia to work on challenges that fall outside the profit-driven interests of the pharmaceutical industry, and sees potential in phage therapy in treating respiratory infections such as multi-drug-resistant tuberculosis, which killed 1.5 million people worldwide in 2014.

"If academia doesn't do that work, who's going to do it? There is no other function of society that would take that. Even non-profit organizations can't do that," Vehring says.



Richard Cairney

Mechanical engineering professors Warren Finlay (L) and Reinhard Vehring (R) with bacteriologist Jon Dennis.

Research related to the engineering and use of phages is growing. Elsewhere in the Faculty of Engineering, chemical engineering professor Dominic Sauvageau is producing and analyzing phages for research Finlay and Vehring are conducting.

Sauvageau's PhD research at McGill University was focused on the development of a new type of process to produce phages. At the U of A, he's leading research into phage-based technologies, exploring how phages can be used as an alternative to antibiotics or how they can be genetically engineered for use in detecting bacteria.

In order to develop this technology, an understanding of the inner workings of cells and viruses is required. Sauvageau has always explored biological systems from an engineering perspective. For example, a phage's ability to recognize bacteria can be leveraged for use in diagnostics, he says.

"The funny thing is that when I am presenting this work, often the engineers will say it's science and the scientists will say it's engineering," Sauvageau says. "The research we are doing is at that interface between engineering and bioscience. In my mind, I don't disassociate the two areas—we practise engineering in the biological sphere."

Sauvageau's lab is playing a small role in Finlay and Vehring's research, developing phages for the mechanical engineering professors, then testing the phages after they've been prepared for use in an aerosol treatment.

"As you process biological molecules or phages there is a strain on them and often they will lose their efficacy. One thing that is important to understand is that as we are making this aerosol, are the phages still as potent as we want or expect them to be? How were they affected by the process?"

Though phage therapy offers great potential to help solve the antibiotic crisis, viable treatments are still years away. As is the case with developing chemical drugs, phage treatments need to go through multi-phase clinical trials—extensive and expensive

testing that regulatory agencies such as Health Canada require to prove a drug is safe.

With costs on the order of hundreds of millions, it's impossible for the U of A team to advance its phage research much further without sizable third-party investment. Though countries like the U.K. and Australia are funding this kind of basic research, that isn't the case in Canada.

"Canada has been very reluctant to fund this kind of research," Dennis says. "Until we get a drug company interested or a national funding agency puts out a call for either team grants or something related to basic research in phages, then really we're just spinning our wheels."

It's particularly frustrating for Dennis, who says he's regularly contacted by families affected by cystic fibrosis—and even some hospitals—inquiring about their technology.

"I'd dearly love to give them hope and medicine, and perhaps cure them or save them," he says, but adds it's clearly impossible without funding and regulatory approval. "I've seen many people die that, potentially, we could have helped. I'm not going to say we could have saved them outright, but perhaps phage therapy could have helped."

Though much progress has been made in understanding the scope of antimicrobial resistance, winning the war will require much greater vigilance and a united front among provincial health authorities and between countries.

And just as government has a role in changing behaviour, more can be done to ensure research discoveries actually translate from the bench to the bedside. Given the scope of what's at stake, Vehring says, government should step up by offering incentives to the pharmaceutical industry to take interest in developing less profitable drugs, or re-examine the regulatory approval process to bring drugs to market faster and reduce costs.

"If there's a global health emergency, you can't just say develop me a new drug in the next half-year. It's impossible. You have to be more proactive, and that is where I see the risk," he says. "We do have an issue here and it should be addressed."

—With files from Richard Cairney

A breath of fresh air

Mechanical engineering professor's new technology makes it to the hands of patients

By Robyn Braun

Mechanical engineering professor Reinhard Vehring and his collaborators at Pearl Therapeutics, a member company of AstraZeneca, recently celebrated the U.S. Food and Drug Administration's approval of a new treatment for patients suffering from chronic obstructive pulmonary disease (COPD) including chronic bronchitis and emphysema.

Vehring was the lead inventor of Bevespi Aerosphere containing Pearl Therapeutics' patented co-suspension technology for metered dose inhalers. The technology uses engineered porous micro-particles, which drug crystals adhere to. The two components are then suspended together, or co-suspended, in the propellant of a metered dose inhaler.

This new technology has numerous advantages over previous suspension technologies for aerosol drug delivery. First, it allows for the simultaneous delivery of multiple drugs via a single delivery system. Because drug crystals adhere to the outside of porous particles, different drugs can adhere to different sites and avoid interacting.

It also allows for more homogenous, consistent delivery of drugs to the lungs.

Metered dose inhalers use a propellant to disperse the drugs in the airways. The drugs therefore need to be evenly suspended throughout the propellant.

"Previous suspension technologies allowed the drugs to settle out of the propellant," Vehring says. "This is why people are instructed to shake their inhalers. But that's obviously not a perfect solution."

The porous particles in the co-suspension technology, on the other hand, "like the propellant," Vehring says, and stay suspended and evenly distributed in the inhaler.

The porous micro-particles are made of phospholipids already present in our lungs and are non-toxic.

"Once the micro-particles reach the lungs, they simply collapse and the drug crystals are deposited in the airway," Vehring explains.

The U.S. FDA has approved use of Bevespi Aerosphere inhalation aerosol for the long-term maintenance treatment of airflow obstruction in patients with chronic obstructive pulmonary disease including chronic bronchitis and emphysema. The product delivers glycopyrrolate and formoterol fumarate, two bronchial dilators, which provide relief for COPD patients.

"In the future," says Vehring, "a steroid could be added to the current drug combination for patients who require an anti-inflammatory as well as the bronchial dilators."

People suffering from COPD will breathe easier with the co-suspension technology and Vehring is happy to have helped. "I was just a small part," he says. "It was a terrific team effort."

Joe Vericker/PhotoBureau

Raising a glass to success

By Judy Monchuk

Living a prairie boy's dream, Marc Ballantyne is based in New York City, where he works for Anheuser-Busch InBev, the leading global brewer. With operations in 25 countries around the world and a portfolio of over 200 beer brands globally, the company offers tremendous opportunities for growth and development. At 31, the Edmonton-born Ballantyne (Chemical '07) is Global Planning and Performance Director at AB InBev, working closely with colleagues spread across six zones around the world. His job involves co-operatively building budgets and monitoring the performance of a multi-billion dollar global capital expenditure program, while ensuring that every beer is brewed with the highest quality standards.

Some days he has to pinch himself as a reminder that it's all real.

"I've got this amazing career opportunity with potential to keep growing within our company. And I'm living in New York," he says. "I met my wife Joelle here. I love my job, Central Park, and all the museums. New York has an incredible vibe and I love the pace of life here. Everything is walkable, and available."

Ballantyne didn't grow up dreaming of life in the beer business, but he was raised with engineers and data and is a third-generation engineer. His grandfather Andrew George Ballantyne was a University of Alberta grad (Civil '43), while his father, George Robert (Rob) Ballantyne went to the University of British Columbia (Chemical and Environmental '69). No other academic field appealed to young Marc when he was looking for a career, although he briefly looked at science.

Ballantyne says he appreciates that his engineering education went far beyond applied science. Engineers, he says, learn how to approach problems.

"Engineers are about group success. You can't do anything on your own: you have to work collaboratively with people."

Ballantyne spent three years as Resident Engineer at Western Canada's largest Labatt Brewery in southeast Edmonton. In this role, he dealt with capital expenditures and budgets at the individual brewery level, as well as overseeing utilities management.

All of this came in handy when discussing operations at other breweries and with visiting managers who stopped in Edmonton from time to time.

Ballantyne jumped at the opportunity to have dinner with visitors and pick their brains. If another brewery was operating more efficiently, how did they do it? Was it specific improvements in practices or technology that could be replicated?

Armed with such insights and this umbrella knowledge, Ballantyne could make stronger suggestions and plans to improve efficiency to in the brewery. In March 2013, he made the move to the Big Apple.

Ballantyne says the University of Alberta Faculty of Engineering laid the foundation for his career by combining technical aspects of applied science and an accounting class for engineers "that provided an introduction to how the money works in any company." Lessons in chemical engineering, fluid dynamics and heat transfer were directly applicable to his Labatt job. And he found he could extrapolate his Edmonton brewery experiences to challenge and manage projects around the world.

As resident engineer at Labatt, Ballantyne chose to turn to his alma matter for co-op students, beginning in 2011. Key to that were the high standards set by the Faculty of Engineering.

"They set the bar very high for what they consider a U of A engineer should be," he says. "That ensures that the people you're working with, or the people the U of A delivers, have a work ethic that's second to none."

He was consistently impressed with the caliber of engineering students who were hired for the paid engineering job placements. "We had a really good record with co-op students from U of A," he recalls. "After a semester or two, we had a lot of interest."

Students were involved with utility improvement initiatives under Ballantyne's eye. The first month was spent learning the process, and for the duration of the term the student would plan and implement his or her own initiatives. The students had access to everyone in the plant: from the front-line brewery worker all the way to the plant manager.

"It encourages the students and gives that sense of accomplishment," Ballantyne says. "They got to own their results."

These days, Ballantyne owns his results. And that's going pretty well. His first year in New York flew by, partly because of the pace of work and expectations. "In addition to the day-to-day, I report to six global VPs and our Chief Supply Officer twice a month."

He also has a healthy attitude towards pressure: "When issues arise, it's important to work collaboratively with my colleagues across the globe to find solutions."

Ballantyne still has time for the odd beer. His favourite is Goose Island Sofie, a craft beer brewed in the company's Chicago brewery. Another brew that still lingers is the one-run batch of Maple Jubilee Lager produced by Labatt in 2013 to honour the 50th anniversary of the Edmonton brewery.

"It was maple syrup and beer," says Ballantyne, his tone warming with the memory. "It was wonderful."

And like life, a bit sweet.

The Civil (Department) chair

By Richard Cairney

Roger Cheng has won the APEGA Centennial Leadership Award. Cheng has served as chair of the Department of Civil and Environmental Engineering and School of Petroleum and Mining Engineering since 2002.

Roger Cheng, chair of the Department of Civil and Environmental Engineering since 2002, has won the APEGA Centennial Leadership Award in recognition of the impact he has had on education, research and industry.

The award, the highest honour APEGA bestows upon its members, recognizes Cheng's exemplary work in advancing research and teaching.

The department has seen incredible advances under Cheng's leadership. During his tenure, the department has doubled its graduate student population to about 500, the largest such group in the university. Undergraduate numbers have risen to about 1,000, the number of NSERC Industrial Research Chairs has grown to eight from one, and tri-council funding increased to $6.2 million from $2 million. The number of faculty has grown by 56 per cent.

As department chair, Cheng has played a key role in establishing large research projects, including eight IRCs, five endowed research chairs, multiple professorships and fellowships, eight centres for research and two engineering schools: the Hole School of Construction Engineering and the Nasseri School of Building Science and Engineering.

When Cheng was appointed chair, he worked with his colleagues to draft a strategic plan looking not at individual units but the department as a whole. It wasn't the most popular approach, but the results suggest it was the right tactic.

Cheng says the best way to succeed as chair is simple: you put the interests of the department as a whole first. The job is about service to the department.

"The reason you are in this position," he said, "is not to get something out of it personally—it's for the good of the department. The success of the department is my success, and expecting personal recognition just complicates things. It makes my job easier if I just focus on the things we're supposed to do—it helps me feel comfortable with my decisions."

Cheng says one of the reasons the department has been successful is that as chair, he has had the support of the dean. Most of Cheng's tenure as chair was under Dean Emeritus David Lynch.

"He was my biggest supporter," said Cheng. "He never said a single 'no' to me."

And however humble Cheng is about winning this award, he equally appreciates the colleagues who nominated him. He knows recognition is fleeting.

Cheng observes that two-thirds of the department's faculty members have been hired in the past decade. "That's the future of this department," he said. "If in 20 years the department is still doing really well, no one will say it was because of Roger, but if it's doing poorly, it'll be my fault."

"The reason you are in this position is not to get something out of it personally—it's for the good of the department."
—Roger Cheng

The accidental engineer

An APEGA award for excellence in education is motivating Aminah Robinson Fayek to do more great work

By Olga Ivanova

For Aminah Robinson Fayek, a professor in construction engineering and management who holds the NSERC Industrial Research Chair in Strategic Construction Modeling and Delivery, teaching is synonymous with engaging and empowering. Her achievements as an educator have been recognized through this year's prestigious APEGA Excellence in Education Award.

With 20 years of experience in education, mentoring and student supervision, Robinson Fayek firmly believes in the value of face-to-face interaction with students in the classroom, and serving as a role model for young women in engineering.

Robinson Fayek didn't envision a career in engineering.

"I never set out to become an engineer," she says. "In fact, I was quite interested in the arts, in fine arts, but I always loved math." Her math skills eventually led to an engineering degree from McGill University, a master's degree in construction engineering and management from the University of British Columbia, and a PhD in construction engineering and management from the University of Melbourne in Australia. Teaching is a lifelong passion for Robinson Fayek and it became an integral part of the job as her career progressed.

Today, she's an educator in a broad sense of the term: classroom instruction, graduate student supervision, creative teamwork and student mentorship are just some of the aspects of teaching she excels at.

She also volunteers as an educator with groups like the Edmonton Science and Technology Hotline and visits elementary school classes to encourage an interest in engineering among young students. She's active with WISEST (Women in Scholarship, Engineering, Science and Technology) and participates in group and panel discussions with female high school students.

Robinson Fayek believes in increasing female student representation in the profession by showing that being an engineer goes far beyond traditional engineering work. "There is a stereotype, a very narrow definition of engineering that does not always appear to recognize the interests of women or the diversity of skills that they can offer," she says. "As a result, many female students do not end up pursuing an education in engineering."

To break down the stereotypes, she strives to get the right message across, to educate young students about engineering and to get them excited about what the profession is really about.

"Career opportunities in engineering go far beyond how we traditionally think of the field."

This is the second year in a row a U of A engineering professor has won the award. For Robinson Fayek, it is an honour and recognition not only of the work she has done, but also of work yet to be done.

"I feel like I'm on a journey, and this award only serves as further motivation to continue to expand my knowledge and methods as an educator. I feel very honoured and fortunate to receive this award and to be recognized for something I love to do."

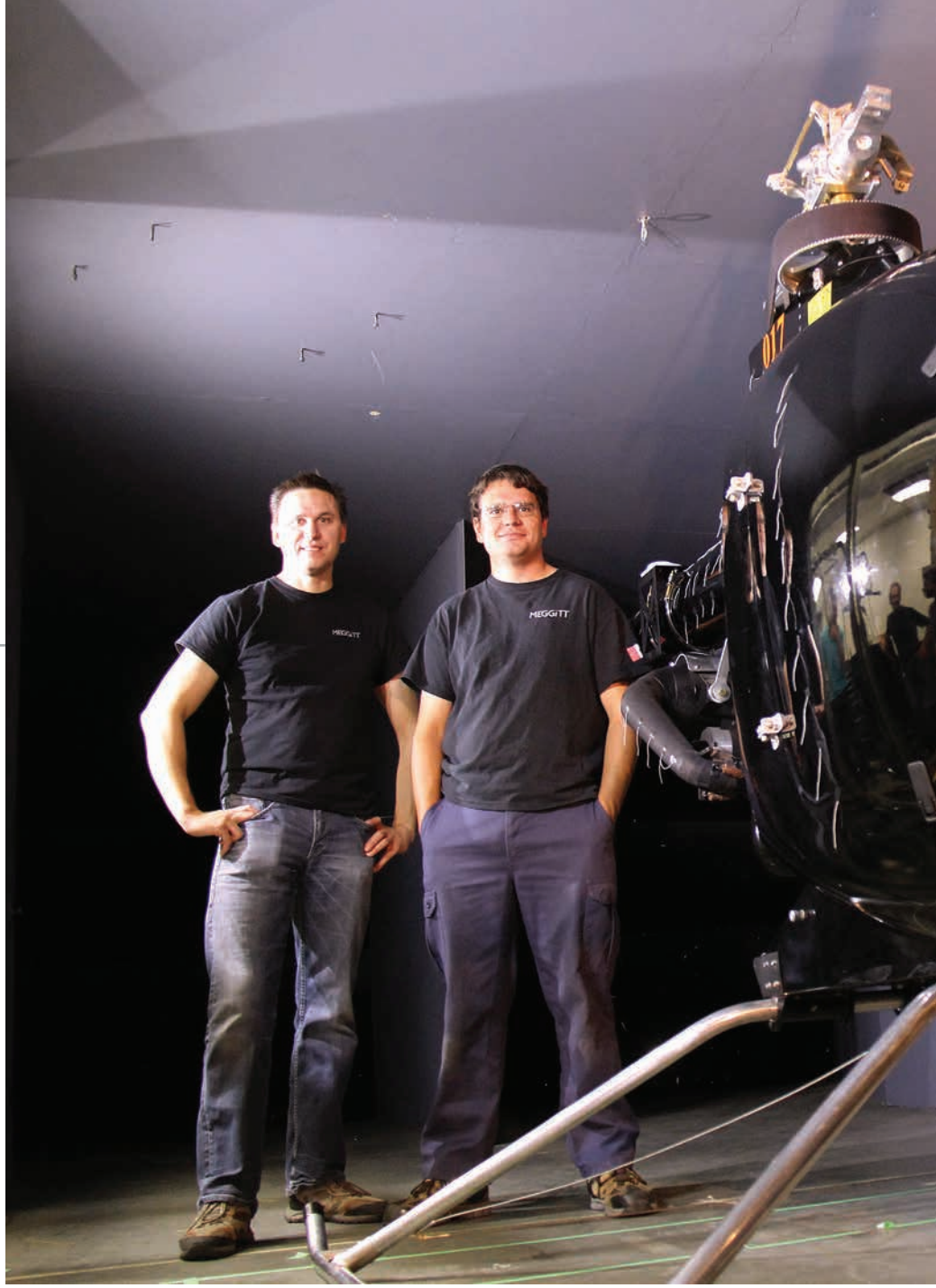
Grecia Pacheco

Aminah Robinson Fayek, winner of the APEGA Excellence in Education Award, seen here with her graduate students, teaches in the classroom and beyond campus borders.

High-tech trap shooting

Brian Godbolt—and his PhD—are making their presence known in the aerospace industry

By Malcolm Azania



Looks can be deceiving. If you glanced at Bryan Godbolt, you might take him in his no-nonsense glasses and dress shirt for an accountant, or a dentist. You'd be wrong. Godbolt is a 32-year-old PhD whose work is more closely related to security. The short story? He makes stuff that gets blowed up real good.

While many regard a doctorate as a career-blocking move at private engineering firms, that isn't the case. Godbolt works for the U.K. aerospace firm Meggitt PLC, which contracts for Defence Research and Development Canada. Defying myth again, he built his aerospace career in Alberta.

"We make live-fire targets for the military," he says, while sitting in the food court of the University of Alberta's Student Union Building. He spent plenty of time there while earning his PhD before criss-crossing the globe with his expensive expendables. His specialty is designing autopilot/remote-access flight controls for helicopters. But the wider field—mobile pilotless military targets—goes back to the 1930s. "You'd take old military hardware," he explains, "and remote-control it somehow for target practice."

Some of Godbolt's predecessors at Meggitt have been working at Canadian

Richard Cairney

Godbolt's employer in Medicine Hat (Meggitt later bought it), and CDL Systems in Calgary (Lockheed-Martin later bought that). CDL Systems creates the ground-control desktop software with radio links to Meggitt's targets. CDL, Meggitt and others, says Godbolt, represent "30 years of developing and improving new products as technology changes"—prime examples of the vista of aerospace engineering careers in Alberta.

So how did Godbolt get hired? Partly through luck. In 2013, he emailed Meggitt, not even hoping for a job, but just advice. "I had an email the next morning that said,

Forces Base Suffield since the 1980s on contracts for DRDC, which has centres of various specialties across the country. "The one near Medicine Hat in Suffield specializes in a bunch of stuff," he says. "That's where the unmanned vehicles group is."

Godbolt says that while the Department of National Defence was seeking ground-based anti-aircraft weapons systems in the 1980s and 1990s, it asked Suffield to supply targets. The pilotless-systems group constructed watercraft and fixed-wing aircraft, and some of the professionals in this group who tested their mettle on the metal split away to create two companies:

Brian Godbolt (right) and a colleague test one of Meggitt PLC's autonomous aircraft at the Faculty of Engineering's wind-tunnel—one of the biggest in the country. Above, an antennae array is used in the field to communicate with the aircraft.

'Come to Medicine Hat.' " Two months later, he was working there. But Godbolt says Meggitt's Alberta branch was nervous about hiring its first PhD. Because he'd be a starry-eyed, egghead college boy ordering them around? "Exactly," he says, smiling. "That kind of stuff."

But Meggitt needed Godbolt because around 2010, the company began a helicopter target program that demanded expertise beyond fixed-wing aircraft. "Mechanical complexity, the maintenance required and the auto-pilot (for helicopters) are quite different," explains Godbolt. His supervisor had searched widely for someone to create a helicopter autopilot, but "it was never successful. People over-promised and couldn't deliver. I knew the steps to get there, having literally done it here," he says, recalling work with his supervisor Alan Lynch, a professor in the Department of Electrical and Computer Engineering. "We just got it to work. My PhD is actually in control theory and systems—that's actually the expertise you need to design a flight control."

That the Faculty of Engineering played a key role is no fluke. Lynch (who brought his post-doctoral research experience from Germany's Institut fur Regelungs und Steuerungstheorie), also specializes in control systems and helicopter autopilots, with current research into navigation and control algorithm design, multi-view geometry and real-time visual tracking. In 2011, Lynch had been searching for a post-doctoral fellow with wide-ranging theoretical and practical experience to research remote helicopter navigation and control.

But it wasn't just an outstanding supervisor who helped Godbolt make breakthroughs—it was also the Faculty of Engineering's wind tunnel, one of the biggest in the country. It occupies parts of two floors of the Mechanical Engineering Building with "a humongous fan." "When you crank it up, it gets pretty loud, and it gets hot because the motor's so powerful." Godbolt and his Meggitt colleagues have used the wind tunnel to test their own devices, disassembling and reassembling a small helicopter inside the wind tunnel for testing.

Godbolt's work isn't limited to helicopters. One of Meggitt's corporate demonstration videos shows another use for target autopilots: weaponized boats of the sort that attacked the USS Cole in 2000 at the Yemeni port of Aden. In Meggitt's videos, orca-like boats blast over waves

Controlling helicopter targets requires specialized knowledge. Through the work he took on during his PhD with computer engineering professor Alan Lynch, Brian Godbolt was able to deliver for his employer.

Image supplied

Field testing for the autonomous air and sea-craft vehicles can be an intense experience.

while ship-borne gunners fire hundreds of rounds at the targets with apparent 100 per cent inaccuracy. Hitting moving targets looks simple in video games, but in the real world, where adrenalin is surging and comrades are screaming, the stakes are far higher than hitting Play Again. It's almost impossible to hit the target in real life. There are other factors. "The automated system relies on radar," he says, "and every time [the target] goes behind a wave, it disappears." Critically, such tests show the Navy its vulnerabilities and, ironically, according to Godbolt, they boost the confidence of aggressors.

Godbolt doesn't just watch these videos—he's lived them. He and his colleagues spent a couple of weeks last spring "floating around in the ocean testing a boat" for the Cole attack simulation. "We had one small fishing boat we were using for command and control. Every time we turned in the waves I had to grab all the laptops to keep them from falling off this folding table!" He laughs. "I personally love the fieldwork."

While many PhDs "tend to want to do the analysis … and leave the fieldwork to technicians," Godbolt's PhD studies put him on helicopter flights. "I had the experience of shovelling the pad off during an Edmonton winter and getting the heaters going and setting up tents so we could operate the vehicle."

Other adventures during his PhD studies, such as crashing a helicopter, might be minimized on some people's CVs. In Godbolt's case, they "convince people you've actually done the work and are worth taking the risk on." Such credibility has won him a place on an "exceptional team" that takes him to places he'd never otherwise see. "DRDC Suffield is one of the biggest ranges in Canada, or even in the world." He recently spent a month on range work at Suffield. "We're able to fly there. It's military-controlled airspace."

There are plenty of careers for aerospace careers in Alberta for the eclectically educated (Godbolt's training includes welding, applied mathematics and computer engineering) with the will to follow their own path. The field of unmanned vehicles is exploding. "Ours are, literally," he says. Options include software engineering for ground stations, coding vehicle software and designing reliable radio links for vehicles tens of kilometres away. Godbolt cites Calgary's Microhard Systems Inc. as an example of offering "world-class specialization in radio-modems," and NovAtel as another top-line company offering global navigation satellite systems with "an incredible team of Canadian engineers" and plenty of radio frequency specialization. And Godbolt's field never exhausts its need for mechanical engineers.

Goldbolt still finds himself on campus, consulting with researchers. Does going back to the hallways and seeing hushed professionals hunched over laptops make him feel like, well, like a badass? He laughs, waits a few seconds, and finally says, "Yeah."

"My PhD is actually in control theory and systems—that's actually the expertise you need to design a flight control."
– Brian Godbolt

RISING FROM THE ASHES

Brian Vance (Mechanical '81) drove slowly through the barren streets of Slave Lake, Alta., in the twilight before dawn May 17, 2011. Surveying the smouldering ruins after a wildfire swept through the town of 7,000, Vance, the town's chief administrative officer, couldn't believe his eyes. "There was just a sense of disbelief that it was all gone—a feeling that it can't be real," he said.

Reconstruction of the town is nearly complete. More than $31 million was spent on infrastructure, not including an $18-million Legacy Centre that houses a new daycare, community hall and performing arts centre. The town has taken measures to prevent fire from entering the town again.

We caught up with Vance to get a sense of how things are progressing in Slave Lake—and to get his insights on the tragedy that has struck Fort McMurray.

Richard Siemens

How has the Town of Slave Lake been involved in the Fort McMurray wildfire?

We've been providing some information and suggestions and templates on how things were done here, and we've sent one of our staff—we called her our recovery manager—to help out with the provincial Municipal Affairs Department.

We're seeing some subtle things they are doing better than we did, which is good. I think they're doing a really good job with communications—especially using social media. I think they're using some of what we learned to start their planning. They're working on getting fencing and getting a start on the environmental testing. They're using our experience.

I've talked to various towns and groups and engineering associations. What I recently did, which is quite unusual for an engineer, was speak at an emergency management conference about human resources factors in an emergency. Just think about the people who stay behind to deal with a disaster, and following the disaster you've got all these people who stayed and dealt with it, and they now have to help people who are returning while they're dealing with their own stresses and in many cases their own losses. The other part is that this lasts a long time. We saw a huge turnover in people between one and two years where they just put their heart and soul into their job for a full year but they were just burnt out—they needed something different.

What advice would you offer city employees?

I'd tell them to cultivate fellowship and celebrate things, even little things, and support each other. It's really important to give people time to deal with their issues. When somebody loses their house, it's amazing how much time it takes, talking to the insurance people, lawyers, builders—they have to go and pick out their carpet colour—and all these things take time out of their workday. Be sure you realize this and give people the time they need.

People will literally work themselves into a frazzle without even knowing it. A lot of people who were hit hard, they were tough, they could take it. They kept going but after a year they were still in that mode where you just have to focus and get the job done, and they couldn't relax again.

What advice would you offer residents?

What I would say to residents is be patient and make sure you do things right. Don't rush and make mistakes. What we saw in many cases is that people were very rushed to get their house built. You can always find a contractor who can promise the world, and when they don't deliver, that's when the disappointment settles in. They also have to realize that it's going to take a long time before they can even start rebuilding, and when they do rebuild they have to take the time and do their research and check references.

What measures has Slave Lake taken to prevent a repeat of the 2011 fire?

One of the things we've done is established a FireSmart crew, which is trained in urban and rural interface firefighting. They're trained to stop a fire at the perimeter of town. In most cases you have wildfire crews and town crews and they don't necessarily even talk to each other. One group stands on one side of the road and one stands on the other side. During the summer, the forest service contracts them from the town and they're used for first-attack crews, and the town earns some income from that.

We're lobbying the provincial government for a wildfire training centre, because we think we have some unique knowledge on how to deal with it on the emergency management side and in interface firefighting. I don't think there is anyplace like that in Canada, and we would be well suited for that kind of centre.

We've also eliminated all the pathways where fire could come into town and we do a lot of underbrush clearing and selective clearing; we do a lot of grass burning in spring and cutting in the fall to provide breaks.

Another thing we've done is put in a town siren. There was a lot of discussion around higher-tech types of things, but in the end everyone remembers the town siren. I have a big red button here and if I press it everyone in town will want to know what's going on. If you hear it you're supposed to check the website and social media, but generally it means you need to evacuate.

One of the issues raised in Fort McMurray is the fact that there are just two ways to exit the city, and it was difficult to even get out of neighbourhoods. Has Slave Lake addressed similar issues?

That was one of our issues too—all of the exits from the city were all blocked off at the time of the fire.

We have built emergency roads between various neighbourhood homes and the highway—typically there are two or three streets taking you in or out of a neighbourhood, so we put additional exits in—just gravel roads with crash gates, in case people need to evacuate. Sometimes it's just the small, practical things that make the biggest difference.

Jimmy Jeong

Nobody goes to work expecting to die

The Lynch School is creating a new culture of safety—one graduate at a time

By Mifi Purvis

Demetri Giannitsios

Gordon Winkel makes a powerful case to support safety and risk management during a presentation to alumni. Winkel has been appointed as director of the new David and Joan Lynch School of Engineering Safety and Risk Management.

Train derailments. Oil spills. Building collapses.

Ensuring engineering students graduate with a grounding in safety and risk management is key to preventing such disasters, and it is an unbridled passion for safety and education that drives Gordon Winkel (Mechanical '77, MEng '79), the first director of the new David and Joan Lynch School of Engineering Safety and Risk Management.

The school—the first and only one of its kind in Canada—builds on 25 years of ESRM teaching, research and outreach at the University of Alberta's Faculty of Engineering. The aim is to ensure every graduate will become an engineer whose decision-making considers high public expectations around risk management, from the design of an intersection to plans for a sprawling refinery. Their work will protect communities, infrastructure, livelihoods and people.

With the help of more than $5 million from 59 individual and 19 corporate donors, more engineering students are getting an ESRM education. And they're getting it largely from industry stakeholders such as Ledcor, a global construction company with extensive experience in large infrastructure projects. Ledcor's executive president Tom Lassu (Civil '92), is a strong Lynch School proponent.

"When I graduated, it was accepted that there'd be a certain number of fatalities in oil and gas," Lassu says. "Now, if there's an incident, we ask, 'What was our role? How, as leaders, did we contribute? How could this have been avoided?' " The Lynch School, he says, is a means to entrench ESRM so it becomes "part of the fabric of being an engineer."

Chris Coles (PetE '88, MEng '93), vice-president of manufacturing with Cenovus Energy and a lecturer at the school, concurs. "If you leave the program with curiosity, with the ability to ask the right questions, you'll understand risk so you don't have to learn it on the job," he says. "The Lynch School builds it into an engineer's DNA." And there are financial benefits. "There is a strong correlation between a company's safety and profitability. They are so married."

Winkel is keen to see "the ripple effects of the Lynch School," the overall improvements to engineering design and practices that will spread across industries and jurisdictions—even around the world—with future cohorts of U of A engineers. He brings 30-plus years' experience in industry, most recently as vice-president of Syncrude Canada. He joined the U of A in 2010 in as chair and industrial professor for safety and risk management.

Winkel points to two U of A mining engineering students who finished first in the ESRM portion of the 2016 Canadian Mining Games with a score of 95 per cent, far ahead of the second-place finishers.

"All the judges were very impressed with the content of our presentation. Specifically, we were able to provide quantitative reasoning in order to formulate reasonable solutions, where other schools were unable to," students Blake Simmons and Duncan Sproule wrote to their ESRM professor, John Cocchio. "We truly believe that the Engg 404 course was the root cause of our success in this competition." As they launch their careers, they bring ESRM proficiency into their first engineering positions.

To start the ripple effect and create a culture of safety built into every graduate, the U of A aims to establish a $15-million endowment to sustain and increase the impact of the Lynch School, named in honour the faculty's former dean David Lynch and his wife, Joan. David Lynch, during his 21 years as engineering dean, made the U of A a leader in engineering safety and risk management.

Earnings from the endowment will make it possible to recruit more people to teach, research and develop ESRM courses and programs. It will also support the engagement of speakers and fund student projects.

"Safety and risk management will increasingly become part of the fabric of how engineers do their work," Winkel says, "and the U of A will be a leader in providing this core competency to students."

> **"When I graduated, it was accepted that there'd be a certain number of fatalities in oil and gas."**
> **— Tom Lassau**

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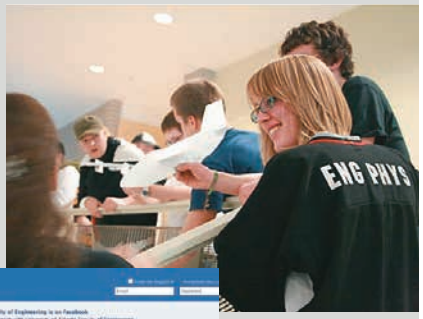

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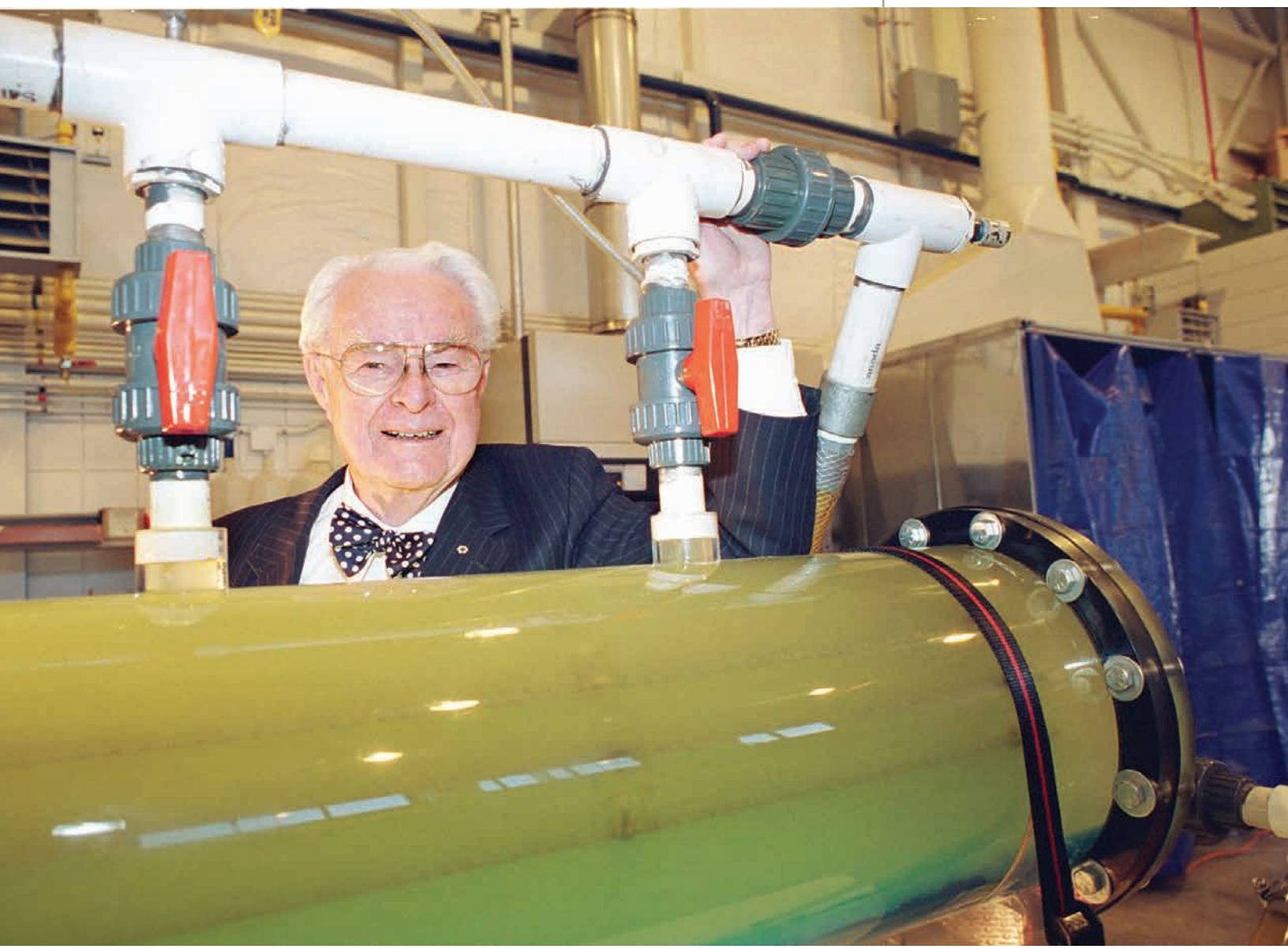
The Dean's Dean

Robert Ritter recalls the spirit of his mentor and friend, George Govier

By Richard Cairney



Former Dean George Govier built the Faculty of Engineering's petroleum engineering program and played a vital role in the responsible development of Alberta's natural resources. Facing page: Govier's official portrait as dean.

The relationship between student and professor can be life-changing for both. One influences the other, back and forth. Strong bonds form when the chemistry is mixed just so. The exchange of ideas, the debates, the hours of work and camaraderie can lead to a lifetime of collaboration and friendships.

Such was the case with George Wheeler Govier and Robert Ritter. Govier served as dean of engineering from 1959 to 1963, and his many achievements included supervising Ritter to become the faculty's first PhD graduate, in 1962. Like his mentor, Ritter became a dean of engineering himself, at the University of Calgary.

Govier died February 22 at the age of 98.

Ritter remembers Govier as an academic who was dedicated to excellence and who was at his best when managing enormous responsibilities. Ritter's first impression of Govier came from the contents of a sealed envelope delivered to his door in 1955. Ritter had been accepted to study for his PhD at both the University of Toronto and the University of Alberta. Govier's acceptance letter to Ritter made the difference.

"He mentioned that the school hadn't graduated an engineering PhD yet and it was time they did," says Ritter. "He wrote a great letter. It was a personal letter, and he just gave me the right kind of feeling about doing a project with him as supervisor."

Shortly after entering the PhD program, Ritter applied for and won an assistant professor's position. Ritter and Govier were now student and teacher as well as professional colleagues.

"We became really good friends," says Ritter.

As happens in such friendships, Ritter once found himself helping Govier with some home repairs. While adjusting a support column in the basement, the two heard "a loud crack" from the main floor. "George thought, 'That didn't sound right,' and ran upstairs to see what was going on. We cracked a wall."

As recalled in Govier family legend, Ritter was left in the basement alone, holding up the entire house.

Govier was a proud scholar and teacher, and a founder of the Department of Petroleum Engineering. He was a leading researcher and academic during a period of great change in Alberta, as the oil industry emerged and expanded. He served as department chair from 1948 to 1959 and as dean of engineering from 1959 to 1963.

He also led the Government of Alberta's Oil and Gas Conservation Board, which set standards for and controlled the province's growing oil and gas industry. The board used engineering and science and the development of new technology to set standards that would ensure responsible development of natural resources over a long period. Processes developed by the Alberta board were copied in jurisdictions around the world. In this role, Govier sometimes worked closely with then-premier Ernest Manning.

"George called the premier 'Mr. Manning' and the premier called George 'Dr. Govier.' They had a lot of respect for each other."

Govier became chief deputy minister of energy and natural resources in 1971 in the Peter Loughheed government of Alberta. From 1978, he served on boards of directors of a number of companies and enjoyed a full career for nearly 30 more years as a consultant to corporations and Canadian and foreign governments before fully retiring in 2006. He was a president of APEGA and of the Canadian Institute of Mining and Metallurgy. He was active in the World Petroleum Congresses, serving as chairman of the Scientific Program Committee for eight years.

Socially, Govier was outgoing and rather dashing. He and Doris, his wife of 74 years, were exceptional dancers.

Ed Kaiser/PostMedia

"It wasn't just his good looks. He had a lot of style—a lot of style."
— Robert Ritter

"It wasn't just his good looks," says Ritter. "He had a lot of style—a lot of style. He was very energetic and he was still skiing in his 80s. He must have been skiing into his 90s!"

Ritter left the U of A in 1966 to become chair of the Department of Chemical Engineering at the newly opened University of Calgary. He eventually became the U of C's dean of engineering. In 1974, he left that post to work on his own technology commercialization project, manufacturing a biomedical device he'd invented to help patients suffering from emphysema and cystic fibrosis.

Through the years, Ritter and the Goviers stayed in touch—until recently. Time caught up and the Goviers' health began to fail. Their friendship and mutual respect, Ritter says, is testament to their original chemistry.

"It was very collegial, almost a Socratic kind of relationship," he says. "It was a different time—a time when one became very much involved with one's teachers. Not all of the teachers, but there were one or two you had that kind of relationship with."

Govier was born on June 15, 1917. He grew up in Nanton, Alta., Penticton, B.C., and Vancouver. He earned a degree in chemical engineering from the University of British Columbia in 1939. The following year, he moved to Edmonton to become a lecturer at the University of Alberta. He completed his MSc in physical chemistry at the U of A in 1945, and in 1949 was awarded a PhD from the University of Michigan.

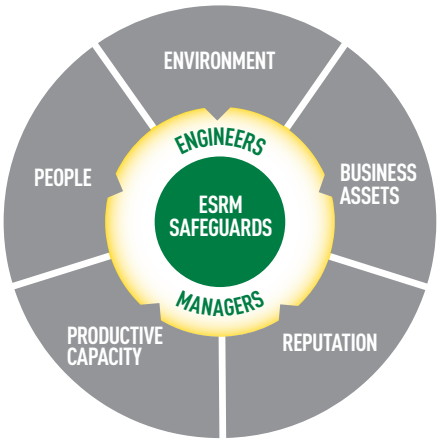
He was predeceased by Doris in 2014 and by his brother Oren in 2012. Donations in Govier's name may be made to Telus Spark at www.sparkscience.ca.

Engineering safety into every engineering graduate

The David and Joan Lynch School of Engineering Safety and Risk Management ensures grads will operate more safely, protecting people, the environment and profitability By Mifi Purvis

Chris Coles (Petroleum '88, MSc '93) recalls a scene so vividly it's like you were there.

It's a golden Saskatchewan afternoon and you're driving along a gravel road, dust swirling in the warm air. You approach an intersection to cross a secondary highway, but first you have to cross the raised rail bed that runs parallel to it—a typical prairie civil engineering design. No train in sight, you crest and cross the rail bed, the sun



in your eyes. That's when you see the stop sign, which had been obscured by the crest. You slam on your brakes, but the gravel in the narrow allowance between rail and road gives you little traction. Suddenly you see a little sedan—likewise obscured—directly in your path. You T-bone the car.

Coles, now VP of manufacturing performance with Cenovus Energy, investigated this real-life incident, which resulted in a fatality, in a previous job. "There was a confluence of factors," he says. "In engineering safety and risk management, we call it a hierarchy of controls." In this case, a paved intersection with better visibility and more space between rail and road would have mitigated much of the risk. The application of industrial safety and risk management gives engineers strategies to reduce risk to people, the environment and business. Coles shares case studies like this as a lecturer with the David and Joan Lynch School of Engineering Safety and Risk Management.

The school's director Gord Winkel (Mechanical '77, MSc '79), is keen to see "the ripple effects of the Lynch School," the overall improvements to engineering design and practices that will spread across industries and jurisdictions—even around the world—with future U of A engineers. Winkel brings 30-plus years' experience in industry, most recently as a vice president for Syncrude Canada. He joined the U of A in 2010 as Chair and Industrial Professor for the Safety and Risk Management Program, becoming inaugural director for the newly established David and Joan Lynch School of Engineering Safety and Risk Management in 2016.

A first in Canada, the school builds on more than 30 years of ESRM teaching, research and outreach at the Faculty of Engineering. Graduates will become engineers ready to assess risk and make decisions that take into consideration high public expectations around risk management in engineering, from the design of an intersection to plans for a sprawling refinery. Winkel says their work "will protect our communities and our business enterprises, our livelihoods and ourselves."

> The ripple effect of graduating 1,200 engineering students a year with a good grounding in safety and risk management means we save lives, prevent injury, spare businesses great losses, protect our environment, sustain industrial development and make society safer.
>
> GORD WINKEL, DIRECTOR, DAVID AND JOAN LYNCH SCHOOL OF ENGINEERING SAFETY AND RISK MANAGEMENT

Tom Lassu (Civil '92), executive president at Ledcor, agrees the school's time has come. "When I graduated, it was accepted that there'd be a certain number of fatalities in oil and gas," he says. "Now if there's an incident, we ask, 'how did we contribute?'" The Lynch School, Lassu says, is a means to entrench ESRM so it becomes "part of the fabric of being an engineer."

Coles concurs. "If you leave the program with curiosity, with the ability to ask the right questions, you'll understand risk so you don't have to learn it on the job," he says. "The Lynch School builds it into an engineer's DNA." And there are financial benefits. "There is a strong correlation between a company's safety and profitability."

Winkel agrees. "If you think investing in ESRM is expensive, wait until you have an incident," he says. "We have the responsibility to seek techniques that allow us to manage any enterprise safely, and benefit and safeguard society."

20

The number of industry leaders at the Lynch School who contribute to ESRM delivery.

DAVID LYNCH'S LEGACY

In 2015, David Lynch stepped down after more than two decades as dean of engineering. Lynch entrenched ESRM in the formal engineering curriculum. During his leadership, five new buildings added 110,000 square metres to campus for engineering education and research and 26,360 square metres of office space. Enrollment increased from 2,900 to 6,000. The U of A graduated 51 per cent of its 25,000-plus BSc engineers to date and awarded more than 5,000 master's and doctoral degrees.

How You Helped

More than twenty-five years of ESRM expertise at UAlberta's Faculty of Engineering went into the creation of the **David and Joan Lynch School of Engineering Safety and Risk Management.** Donor support made it happen.

Take a look at our recent progress.

THE LYNCH SCHOOL WAS ESTABLISHED IN 2015, EXPANDING THE REACH OF THE SUCCESSFUL ESRM PROGRAM

BE A LEADER

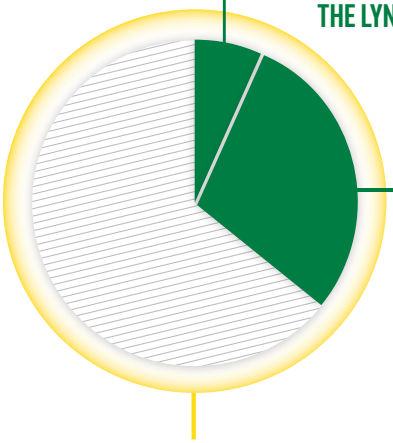
The Lynch School will offer its first graduate-level Leadership in Risk Management course in 2017.

GET CERTIFIED

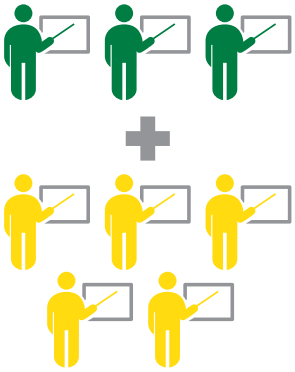
Industry professionals can take courses toward an ESRM certificate, starting 2017-2018.

PLAY MINE GAMES

UAlberta engineering students ranked first in the ESRM portion of the Canadian Mining Games in 2015-2016.



THERE ARE 3 faculty dedicated to teaching ESRM, a number that will grow to 8 over the next few years.



25%

The amount of lecture time delivered by industry leaders in 2015-2016.

BY 2018, all UAlberta engineering grads will have taken at least one ESRM course.

1,200
STUDENTS

FIND OUT HOW YOU CAN MAKE THE WORLD SAFER, CONTACT:

Bryce Meldrum, Director of Development
FACULTY OF ENGINEERING
780-318-4196 | bryce.meldrum@ualberta.ca

To donate, visit: uab.ca/givetoESRM

IN MEMORIAM

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

Cameron, Robert Douglas,
Civil '55, MSc '67, in January 2016

Carlson, Carl,
Petroleum '60, BEd '64, in February 2016

Cooper, Richard Hamilton,
Civil '63, MSc '66, PhD '70, in March 2016

D'Appolonia, Elio,
Civil '42, MSc '46, in December 2015

Deemter, Jan,
Civil '75, in February 2016

Duff, Norman Alexander,
Civil '80, in August 2015

Duncan, Ian Windley,
Civil '51, in November 2015

Fregren, Trevor E.,
Mining '53, in August 2015

Gillis, Robert,
Civil '73, in April 2016

Goh, Raphael Kee Hong,
Electrical '67, in March 2016

Govier, George Wheeler,
Dean Emeritus, MSc '45, in February 2016

Hlavay, Joseph Francis,
Civil '50, in November 2015

Hudson, Anna Elizabeth,
Mining '11, in November 2015

Hunt, John Frederick,
Civil '47, in February 2016

Karpinski, Edward,
Electrical '62, MSc '66, PhD '71, in September 2015

Kelly, William Francis,
Civil '51, in October 2015

Kubash, Christopher Joseph,
Electrical '85, in September 2015

Maier, Leonard Frederick,
Petroleum '56, in September 2015

Masuda, Aki,
Chemical '52, MSc '55, in February 2016

Mather, George Reckly,
Electrical '46, in August 2015

McMillan, William Robert,
Chemical '49, in October 2015

Mooney, Robert Alexander,
Chemical '60, in January 2016

Morimoto, Thomas Eiichi,
Chemical '49, MSc '52, in December 2015

Nelson, Dennis Walter,
Mechanical '66, in November 2015

Overn, Einar Melvin,
Electrical '49, in September 2015

Riva, Donald Alexander,
Mining '68, in October 2015

Robinson, Richard Gilbert,
Chemical '58, B.Ed. '60, in January 2016

Samantaraya, Lalmohan,
MSc '75, MSc '80, in March 2016

Scott, Gordon Robert,
Mineral Process '61, MSc '65, in November 2015

Snell, Emma Margaretha,
Civil '49, Dipl (Nursing) '36, in August 2015

Watamaniuk, William,
Electrical '63, in September 2015

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

Crang, Frank H.,
Electrical '37, in March 2010

Cronk, Arthur Edward,
Electrical '66, in May 2015

Keyes, Robert Elliott,
Electrical '49, date unknown

Kushnir, B. William,
Metallurgical '61, in February 2015

Olsen, Elden Clark,
Electrical '43, in August 2008

Pitcher, Peter Naismith,
Mining '33, date unknown

Smith, Robert Leroy,
Mining '35, date unknown

Thomas, David Peter,
Electrical '72, in May 2015

Wilkins, E. Bertram,
Civil '43, in April 2015

BANGA, MOHINDER
(Eng Physics '91)

Has been elected Councillor for Ward 12 (covering the far southeast part of the city) in the City of Edmonton. Banga spent 24 years working as a detective with the Edmonton Police Service, serving much of that time in southeast Edmonton. He won with 18 per cent of the vote in a by-election contested by 32 candidates.

BURRELL, ROBERT

Has received the inaugural Governor General's Innovation Award. The award recognizes Burrell, who is the chair of the Department of Biomedical Engineering and holds the Canada Research Chair in Nanostructured Biomaterials, for his revolutionary contribution to wound treatment. Burrell invented Acticoat, a wound dressing that uses nanocrystalline silver to fight bacteria and inflammation, while working for Westaim Biomedical, later Nucryst Pharmaceuticals. He joined the Faculty of Engineering in 2002. He is one of six recipients of the new national award.

CAMARTA, NEIL PEng
(Chemical '75)

Has been named one of Canada's Top Energy Innovators (2016) by Alberta Oil magazine. The CEO of Calgary's Field Upgrading is spearheading the development of new, skid-mounted technology to refine marine diesel, which burns cleaner than marine fuel and meets new sulphur regulations. Plans are to have the Fort Saskatchewan-based process operational by 2019, with a target to ship 10,000 bpd to market.

CHENG, ROGER PEng

Has received the APEGA Centennial Leadership Award for his exemplary work in advancing research and teaching in his capacity as Chair of the Department of Civil and Environmental Engineering at the University of Alberta. Since becoming Chair in 2002, Cheng has helped shape the department into one of the largest civil engineering departments in North America.

CUKU, DENNIS
(Mechanical '99)

Has been named an Avenue magazine Top 40 under 40 (Edmonton). Cuku's Mosaic Family of Companies has a foot in the oil and gas industry and in the renewable energy sector. The company's new headquarters, on Edmonton's south side, is the first net-zero office building in Alberta and the northernmost building of its kind.

FRANCHUK, CAMERON PEng
(Civil '00, MSc Structural '02)

Has been named an Avenue magazine Top 40 under 40 (Edmonton). Franchuk is a structural engineer with DIALOG and an instructor with the Department of Civil and Environmental Engineering. Franchuk volunteers with the Canadian Institute for Steel Construction and the Consulting Engineers of Alberta's Young Professionals' Group (YPG). He won the Rising Young Professional Award through the CEA in 2012.

GUPTA, ROHIT
(Computer '02, MBA '06)

Has been named an Avenue magazine Top 40 under 40 (Edmonton). Gupta joined Rohit Group of Companies, which his father established, in 2002 and is now its president. He's responsible not only for new housing developments, but also for a solid corporate citizenship record that supports groups like Habitat for Humanity and WIN House.

HARDY, DARREN PEng
(Chemical '89)

Has been elected to a one-year term as a councillor of APEGA. Hardy has more than 25 years of experience working in the oil sands sector. In 2008, Hardy joined the executive team at Canadian Oil Sands Ltd. where he was responsible for providing oversight of the Syncrude operation. In this role, he has been the chair of the Syncrude Growth and Development Subcommittee, the co-chair of the Operations and Strategy Subcommittee, and a member of the Syncrude board of directors.

HRUDEY, STEVE PEng, FEC
(Mechanical '70, DSc (Hon.) '12)

Has been sworn in as president of APEGA. Hrudey is a University of Alberta Professor Emeritus and currently principal of his own environmental risk consulting firm. He is known nationally and internationally for his expertise in engineering focusing on water safety and has received substantial recognition for his work.

JOSEPH, TIM PEng
(Mining '96, PhD Mining '00)

Has been elected to a three-year term as a Councillor of APEGA. Joseph is an associate dean at the Faculty of Engineering at the U of A, responsible for student services, including directing cooperative education and employment programs, student admissions, promotions, and discipline decisions for more than 6,000 engineering students.

LYNCH, DAVID PEng, FEC
(PhD Chemical '82)

Has received the Syncrude Award for Excellence in Sustainable Development in recognition of "a lifetime's contribution to generating sustainable opportunities for research and education and supporting Canada's resource industry." The award promotes the Canadian minerals industry as an active seeker of sustainability solutions that engage and affect the Canadian public. Sustainability is defined as meeting the needs of the present generation without compromising the ability of future generations to meet their needs. Lynch served as dean of engineering at the U of A for 21 years.

NAKAI, SUNIL PEng
(Electrical '05, MBA '14)

Has been named an Avenue magazine Top 40 under 40 (Edmonton). A senior project engineer with SMP Engineering, Nakai is responsible for beautification projects that have literally lit up the High Level Bridge and the Muttart Conservatory pyramids.

POELZER, FENNA PEng
(Mining '96)

Has been awarded the CIM Presidents' Role Model Medal for setting an outstanding example and recognizing early career accomplishments as a role model within CIM. Poelzer has been promoting CIM membership to U of A engineering students for more than 20 years.

ROBINSON FAYEK, AMINAH PEng

Received the APEGA Excellence in Education Award for her exemplary contributions to teaching and learning at the University of Alberta Faculty of Engineering. Since joining the Department of Civil and Environmental Engineering in 1997, she has excelled as an educator, demonstrating composure, professionalism, thoughtful instruction, and a commitment to outreach and lifelong learning.

Do you have news to share? Send your news of awards, appointments and other successes to **engineer.alum@ualberta.ca**

The Group of Seven

In April 2016, the following U of A Engineers were appointed to a two-year term on the City of Edmonton's 15-member Energy Transition Advisory Committee. The mandate of the committee is to provide a wide and strategic perspective on issues relating to energy transition in Edmonton. They will advise Edmonton's City Council regarding the implementation of the strategy and assist city council in developing performance measures.

GREGORY CALDWELL (Petroleum '06)

DON HICKEY (Electrical '71)

MARC HUOT (Mechanical '06, MSc '09)

REZA NASSERI (Electrical '70)

LORI NICKIFOR (Electrical '90)

CHRIS VILCSAK (Mechanical '85, MBA '97)

GEOFFREY WAGNER (Electrical '93, MEng '07)

SPACHYNSKI, ARDEN PEng
(Electrical '84)

Recieved the APEGA Outstanding Mentor Award for his passionate commitment to mentoring. Spachynski brings his decades of experience in electrical engineering and his dedication to educating others to selflessly mentor new generations of students and professional engineers.

SPARROW, BEN PEng
(Mechanical '99)

Sparrow's company, Saltwork Technologies, has been named on of Canada's Top Energy Innovators (2016) by Alberta Oil magazine. Saltworks is advancing new technology that decontaminates SAGD wastewater to safe levels, potentially eliminating the cost of trucking wastewater to a disposal site.

TAYLOR, DON OC PEng
(Civil '58, MSc '60)

Was promoted within the Order of Canada from a Member to an Officer. Taylor was recognized for his "influential and innovative donations as a benefactor of civic, educational, and health care initiatives in Canada and abroad." He is the past president of Engineered Air.

DAVID VONESCH PEng

Has been named an Avenue magazine Top 40 under 40 (Calgary). Vonesch is a partner and COO of SkyFire Energy, a solar energy company responsible for nearly half of the province's grid-connected solar projects. He is also chair of the electrical retail collective Spark, which sells renewable and regular grid energy and directs 70 per cent of its profits to renewable energy projects.

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EDMONTON, ALBERTA

Alumni Weekend 2016

Thursday, September 22 through Sunday, September 25

The Faculty of Engineering looks forward to welcoming back our alumni to the University of Alberta campus. Please note that all Engineering events are FREE to alumni and their guests, but pre-registration is requested to help ensure appropriate space and refreshments.

To register for an event, visit http://alumni.ualberta.ca/events/alumni-weekend. For further information, contact Jackie Lewyk at 780-492-7167 or Lewyk@ualberta.

Faculty of Engineering Events

Class of 1956 Engineering Alumni Luncheon

Friday, September 23, 2016
11:00 a.m. – 2:00 p.m.
Faculty Club, University of Alberta
Who's Invited: Engineering graduates of the Class of 1956 and earlier, and their spouses/guests.

Dean's Engineering Alumni Reception

Friday, September 23, 2016
4:30 p.m. – 7:00 p.m. (Doors open at 4:30 p.m.)
Fred Pheasey Engineering Commons, 8th Floor, Donadeo Innovation Centre for Engineering
Who's Invited: All engineering graduates and their spouses/guests.

Dean's Engineering Alumni Breakfast

Saturday, September 24, 2016
9:00 a.m. – 11:00 a.m.
Solarium, 2nd floor, Engineering Teaching and Learning Complex (ETLC)
Who's Invited: Engineering graduates from 1971 or earlier along with their guests.
Reunion class photos will be taken after the breakfast for graduating classes from 1971 and earlier.

Engineering Expo 2016

Saturday, September 24, 2016
10:00 a.m. – 3:00 p.m.
Maier Learning Centre (ground and 2nd floors), Engineering Teaching and Learning Complex (ETLC)
Who's Invited: Open to everyone including the general public

Visit www.engineering.ualberta.ca/expo for more information and a schedule of tours, activities and events.

All-Campus Events

Thursday, September 22

Alumni Awards

Friday, September 23

Class of '66 Cap 'n Gown
Green & Gold Day
What Will Your Legacy Be?

Saturday, September 24

Festival
Family Fun
Golden Grads Dinner
Tethered Hot Air Balloon Rides
Tao of Homer
Drive In Movie

Sunday, September 25

Turkey Trot Fun Run

See the August 2016 issue of *New Trail* for more details on activities taking place during Alumni Weekend 2016, or visit www.alumni.ualberta.ca/events/alumni-weekend.