

U of A • Engineer

Keeping in Touch with
Alumni

THANKS FOR THE MEMORY

How **Lubomyr Romankiw**
revolutionized data storage

Saline
Solution

Creating Spaces
for Engineering Art

Kicking the
Ride Fantastic

A Helping
Hand

Letter from the ESS President

Greetings Alumni

My name is Alex Nilson and I am the Engineering Students' Society President for the 2012-2013 school year. I am currently in my last of my electrical engineering degree and very excited to join your ranks upon graduation. Looking back on my education thus far, I think of all the homework assignments, lab reports, exams, and lectures—but most of all the feeling of being part of a team. This feeling is shared by all students who are involved in student clubs, project groups, and even in the classroom.



The aspect of engineering at the University of Alberta which I am most proud of though, is the sense of community. This is seen in students working late into the night trying to make sense of all of the material that was covered in a 50-minute lecture, in the professors who take extra time to go over concepts that just aren't clicking, and in the efforts of our student body to participate in our charitable events. It is a great time to be an Engineering student. The world is going through many environmental, economic, and political changes and there is a great need for engineers to lead the way. With this climate waiting for us upon graduation, it is very encouraging to know that there are alumni out in the "real world" who have set the tone for what engineers from the U of A are capable of and what we represent.

On behalf of the Engineering Students' Society and the over 4,000 undergraduate engineering students who we represent, I want to extend my sincere thanks to all of our alumni and donors who have supported the faculty through gifts of time, through your mentorship and volunteer work, and financial resources to provide support for student groups, facilities, and lab equipment.

Many thanks,
Alex Nilson
President
Engineering Students' Society
University of Alberta

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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.



5 Back to the future

When he was studying engineering physics during the late 1990s, Collin Twanow had a front-row seat at Alberta's emergence into the world of micro and nanotechnology. Now, he is back in the Faculty of Engineering, helping educate fourth-year engineering students at a new, one-of-a-kind undergraduate teaching facility.

COVER STORY

6 Thanks for the memory

Lubomyr Romankiw was part of a team that changed the world by creatively devising a revolutionary memory storage system and then inventing the tools to manufacture it, laying the foundation of an era built on data.

12 Kicking the Ride Fantastic

Alumni Horizon Award winner Graham Buksa designs and builds longboards that are considered to be among the best in the world. He'll risk his own skin on the quality of his designs, hurtling downhill at more than 100 km/h.

16 Saline Solutions

Talk about a eureka moment. Ben Sparrow's bright idea to desalinate water has turned into one of the fastest-growing companies in the West. Saltworks is making a difference in industry and has its sights set on helping people in water-scarce regions.

20 Rising Stars

Young alumni talk about their first year in the engineering profession, as a new group of engineering graduates leaves campus to embark on professional careers.

26 A helping hand

A new chair in process design will focus on teaching the next generation of engineers—and on research into the best teaching practices.

28 Alvin Nelson: Mustang Master, Inventor, Engineer

Alvin Nelson, an engineer and inventor to the core, played a key role in developing the iconic P-51 Mustang during the Second World War. Nelson passed away on Good Friday, at the age of 101.

30 Creating Spaces for engineering art

Engineering alumni contributed their talent to an art exhibit curated by two engineering students. The inaugural "Spaces" engineering art exhibit shattered myths and appears to have a bright future.

35 A stellar career

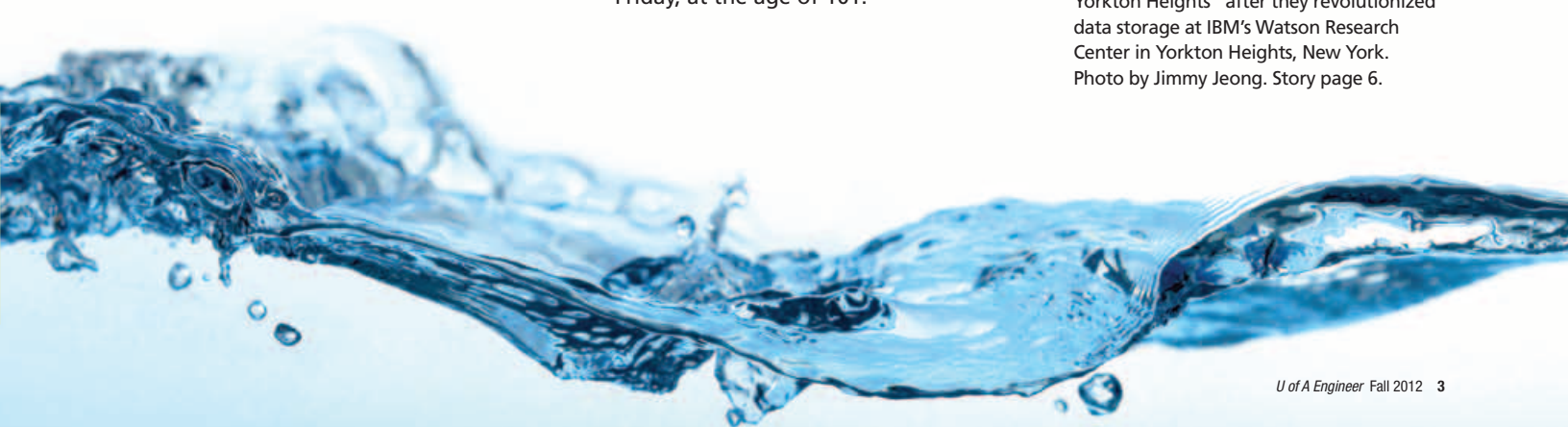
Garry Lindberg's engineering education helped push the boundaries of space exploration. The recipient of an honorary degree, Lindberg drew on the events of his career to offer graduating engineers advice as they prepared to begin their own professional lives.

DEPARTMENTS

33 In Memoriam

34 Kudos

On the Cover: Lubomyr Romankiw's colleagues referred to him as "the Wizard of Yorkton Heights" after they revolutionized data storage at IBM's Watson Research Center in Yorkton Heights, New York. Photo by Jimmy Jeong. Story page 6.



Message from the Editor

A helping hand makes all the difference

My first visit to the University of Alberta was in Grade 3, when our hockey team came to watch the Golden Bears play. Memories of the game itself are gone, overshadowed by

my becoming lost in the shuffle of coaches and parents driving kids home. I found myself left behind on campus, alone, very late at night.

The streets were empty. I began to plan the long trek home, to the north side. I could walk to 109th Street, cross the High Level Bridge and make my way further north through

the Rat Hole (a long-gone tunnel that ran beneath 102nd Avenue) and continue towards the NAIT area. There, my mental map of the city began to blur. It was a ridiculously long walk—about halfway across Edmonton. Too risky. I decided, instead, to look for help on campus. Maintenance staff took me into their care, called my parents and sent me home in a cab. I missed the adventure of walking home alone, but the cab ride was fun. And, I thought, the people at the U of A were nice. They took care of me.

Taking care of people, according to Garry Lindberg, is what good universities do.

Lindberg was one of the youngest first-year students ever to attend the U of A. He graduated from Engineering Physics in 1960 and eventually became project leader for the development of the Canadarm. He began his studies here at the age of 15.

His mother, a teacher, taught Garry to read and he entered school at age six, in Grade 2. In his first year of school, he completed Grade 2 and 3; he was home schooled in Grade 4. When he reached Grade 7, he found himself in a Grade 7/8 class.

“My teacher promoted me to Grade 9 against the wishes of my parents and the school board, so I gained another year,” Garry says.

This is how he arrived at the U of A at such a young age. Looking back, Garry realizes there were actors behind the scenes at the U of A, looking out for his well-being.

“During Grade 12, I went to Edmonton and the U of A for three days for testing, to help me decide what I wanted to study. That’s what I thought at the time, but I suspect that they were evaluating me and deciding whether or not to admit me.

“I stayed in residence for four years, which was generally not done, and I believe that a

number of key people in the residences and in the Faculty of Engineering knew of my circumstances and secretly looked out for me; no doubt they were primarily concerned about social adjustment. I was happy at the U of A and did well academically, so early admittance worked out well for me.”

Garry’s right. Good universities help people. I have the great pleasure of working with many of the behind-the-scenes staff at the University of Alberta and can safely say that students are everyone’s first concern. Teaching, research and serving the community are our purpose. When I speak with people like Garry, or to students who have just graduated from their engineering programs, or to any of the folks written about between these pages, I see the cumulative impact of hundreds of helpful gestures and realize how far one simple act of goodwill can go.

Read more about Garry Lindberg on page 35.



Richard Cairney
Editor

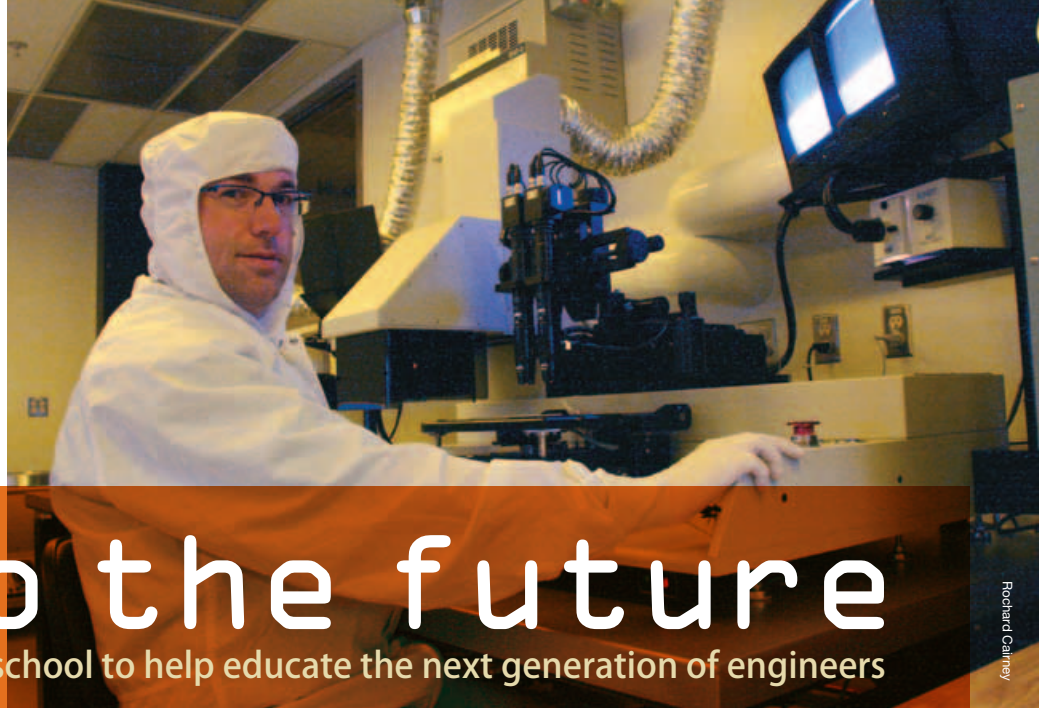
Save the Date!

Starting December 31, you can download the 2013 Faculty of Engineering calendar for your iPad or iPhone!

Visit the iTunes store and search for U of A Engineering Calendar.



Collin Twanow has returned to the Faculty of Engineering to help set up and operate the new Micro and Nanotechnology Teaching Facility, opening this fall.



Back to the future

Collin Twanow comes back to school to help educate the next generation of engineers

Richard Cairney

When he was studying engineering physics at the University of Alberta, Collin Twanow (Eng Physics '97, MEng '02) had a front-row seat at Alberta's emergence into the world of micro and nanotechnology. Now, he is helping educate the next generation of engineers at a new, one-of-a-kind undergraduate teaching facility.

Twanow has joined the Faculty of Engineering as co-ordinator of the Micro and Nanotechnology Teaching Facility. When the first phase of the facility opened in 2010 (on the sixth floor of the Electrical and Computer Engineering Research Facility), it became North America's only dedicated undergraduate nanotechnology teaching facility. This fall, the faculty opened a new \$1.8-million clean room, in which students will practice lithography and etching to manufacture their own electronics.

"I'd say this is the tip of the iceberg but it is an amazing introduction to this technology," says Twanow, who will supervise teaching in electrical engineering professor Michael Brett's Microfabrication and Devices course. "Students get to pull the curtain back on this technology and

decide to move on to something else or make a career out of it. It's amazing technology and getting hands-on experience really connects all the dots in understanding how devices are made."

The impact on undergraduate student learning will be significant, raising the number of student spots in the class from 32 to about 60. Until now, the hands-on portions of the course were taught at the faculty's NanoFab micro and nanofabrication facility, reducing potential lab time for industrial partners and researchers conducting work at NanoFab, which is an open-access facility.

The new clean room itself is a high-tech marvel. When manufacturing electronics at the micro-scale, you must keep your workspace completely free from foreign particles. Air in the room is exchanged seven times a minute and run through HEPA filters. Students and instructors suit up in head-to-toe "bunny suits" before entering the room, which has double doors and a slightly pressurized atmosphere to keep particles out. Even the light is filtered—windows and lights are tinted to prevent UV rays from damaging light-sensitive polymer layers used for pattern transfer.

Twanow's student experience with micro and nanotechnology wasn't quite that sophisticated—but it was leading edge at the time. After graduation, he worked with Westaim's Thermic Edge Group for two years before joining Micralyne, a

company spun off from the U of A's Alberta Microelectronic Centre.

In 12 years with Micralyne, Twanow worked as a project engineer and a project manager in research and development. He spent time as a product line manager, essentially managing Micralyne's telecom industry sales portfolio, and then served as research and development director, supervising a group of 10 engineers and scientists.

"It's amazing technology and getting hands-on experience really connects all the dots in understanding how devices are made."

— Collin Twanow

Last fall, he returned to the Faculty of Engineering to get the new teaching facility up and running.

"Putting a room together and having it work—providing students with a lab—is a big milestone," he says.

"It's a great experience to see students amazed by the technology. To teach is rewarding in itself, and to teach something you've spent your whole career working on is even more rewarding."

IBM

THANKS

FOR

THE

How
Lubomyr Romankiw
revolutionized
data storage

By Scott Rollans

MEMOIR

Photos by Jimmy Leong



At 81, Lubomyr Romankiw (Chemical '55) is having quite a year. He was inducted into the National Inventors Hall of Fame and has earned the University of Alberta's Distinguished Alumni Award. Working at IBM's T.J. Watson Research Center in Yorkton Heights, New York, Romankiw played an instrumental role in revolutionizing computer memory, co-inventing the magnetic thin-film storage head.

Thomas Edison. Alexander Graham Bell. Guglielmo Marconi. Henry Ford. And...Lubomyr Romankiw. You might not be familiar with that final name. But Romankiw, a soft-spoken U of A engineering graduate (Chemical '55) has officially earned his place among the rest, as an inductee to the National Inventors Hall of Fame in Alexandria, Virginia. Along with Romankiw, the seven inductees for 2012 included the late Steve Jobs.

In other words, Romankiw has just been admitted to the world's most prestigious and exclusive inventors' club. Thousands are nominated for this honour, but its members number just 469. And, although he might not be as famous as Edison, Ford or Jobs, Romankiw has arguably had as big an impact as any of them on our technological society. Along with his IBM colleague David Thompson, Romankiw co-invented the magnetic thin-film storage head, which was used for the first time in 1979 in the IBM 3380 disk storage system.

OK. I can imagine the blank look on your face.

Virtually every aspect of the personal computing age—from laptop computers, to ATMs, to the Internet itself—would have been impossible without Romankiw's invention. The thin-film head, with incremental improvements over the decades, is the tiny component that reads and writes data on the disk in every disk-based storage device made since 1979. Romankiw and Thompson helped lay the very foundation of an era built on data.

The thin-film head industry currently tops \$8 billion per year (and the disk storage system industry as a whole exceeds \$35 billion), but the invention's impact extends almost infinitely beyond that, touching virtually every business and every individual on the planet.

So, yes—this Ukrainian boy from a small Prairie university went on to change the world.

In 1948, Romankiw was a 16-year-old who spoke virtually no English who found himself lost in the halls of St. Joseph High School in Edmonton. Just two days earlier, his family had arrived in Edmonton, straight from a post-war displaced persons camp in Europe. "I must give credit to my parents, who thought education was absolutely the most important thing in the life of a young person," he says. "They didn't have a job; they didn't even have an apartment, but they put me in school."

Not surprisingly, the youngster soon gained a reputation among his classmates as a math and science whiz and, as a result, a valuable person to know. "I got a lot of help from my fellow students," recalls Romankiw. "We kind of traded—I helped

them with physics and chemistry and math, and they helped me with English."

It took him a couple of years to catch up—at the start, his English teacher had Romankiw insert Ukrainian words into essays whenever he couldn't come up with the English equivalent—and he eventually graduated, with his sights set on the U of A.

University wasn't an easy goal. Like many immigrants today, his father (a former lawyer) and mother (a high school teacher) were stuck in menial, low-paying jobs. Romankiw found work in the mailroom at the Alberta legislature, and saved his money for two years.

For a time, he even held the world's most stereotypical bad job. "One summer, I couldn't find any job other than finishing the ditches at a refinery that was being built. A machine dug the ditches, and then I had to go down and finish them off. My head was about two feet below the level of the ditch. After throwing the dirt for a day, I went home very determined to go to university and study!"

Eventually, he saved enough money to go to school. He dreamed of becoming an architect ("I loved drawing and painting"), so he was drawn to the closest U of A equivalent—engineering. Of course, there was still the matter of choosing a specialty. After working one summer as a concrete inspector during construction of the Calgary airport, he decided civil engineering wasn't a good fit—"too much outdoor work," he chuckles. At the suggestion of his sister, a pharmacist, he headed into chemical engineering. The rest is history.

Romankiw has fond memories of his U of A studies, and singles out then-dean George Govier and thermodynamics professor Don Robinson as particular influences. "Those two were my guiding lights," he says.

Romankiw worked at Sherritt Gordon in Fort Saskatchewan during his final two summers at the U of A, and then signed on full time after graduating. Before long, though, his inventive tendencies caused a bit of friction with his more highly educated colleagues. "I suggested a method to recover zinc using leeching," he says, "but I couldn't convince all the PhDs around me that it was going to work."

Frustrated, Romankiw decided his theory might make a good post-graduate thesis. When he approached Dean Govier, however, he got a surprising response. "He said, 'We can't take you. You've already learned everything you can from us.'" Govier personally sent letters of recommendation to the leading schools in the U.S., and Romankiw ended up doing his master's degree and doctorate at MIT.

After completing his studies, Romankiw nearly ended up with a career back in Edmonton. The U of A offered to let him set up a course in metallurgy and material sciences, but he was disappointed to discover that he'd have to wait a full year before the funding would be in place. He applied to several companies in the emerging U.S. electronics industry and joined IBM in 1962. "I'm still with IBM, and this November it will be 50 years," he says proudly.

At the time Romankiw started at IBM, the company's state-of-the-art storage technology was the RAMAC 350. The device, which filled a small room, contained 50 disks, each 24 inches in diameter. The read-write heads were made by hand-winding thin copper wire around ferrite cores to create horseshoe magnets—in other words, they were unimaginably clunky by modern standards. The disks were able to store just 2,000 bits per square inch, or five megabytes for the entire massive device. In contrast, a single high-density, 2.5-inch hard drive today can hold up to half a terabyte—that's a half-million megabytes, enough to fill 10 Blu-ray discs or 100,000 of the room-sized RAMACs from the 1970s.

Researchers throughout the industry were looking for ways to manufacture much smaller and more precise read-write heads, a necessary step for boosting the density on data disks. Romankiw spent his early years at IBM exploring different ways in which electrochemistry could be used to replace the much slower, more expensive vacuum processing that then dominated the field. He had begun tinkering with the concept of a thin-film head to replace the RAMAC-style hand-wound heads when he joined forces with David Thompson, a former professor who had left Carnegie Mellon to work at IBM.



“Many things that I did were contrary to what was accepted as the ‘right way’ of doing things. It was all risk-taking, but I was convinced that things would work, and that I’d eventually be able to build something. It was a challenge to me.”

— Lubomyr Romankiw

It was a partnership made in heaven. The two worked in adjoining offices, firing ideas back and forth. Thompson would dream up theoretical designs for various thin-film heads, and Romankiw would then try to invent electrochemical methods, magnetic alloys, suitable dielectrics, plating solutions, fabrication techniques and processes that would make the designs feasible.

“Dave would tell me, ‘We need a magnetic diamond.’ That was his way of saying ‘very hard magnetic material that will not wear off,’” Romankiw recalls. Romankiw would create some sort of quick fix to solve the problem temporarily. Often, these “temporary” ideas evolved into long-term solutions. “They’re still ‘temporary’ 33 years later,” he smiles.

Romankiw thrived on finding creative answers for Thompson’s seemingly

impossible demands. “Many things that I did were contrary to what was accepted as the ‘right way’ of doing things. It was all risk-taking, but I was convinced that things would work and that I’d eventually be able to build something. It was a challenge to me.”

Thompson’s respect for Romankiw’s ingenuity often had its humorous side. “Dave, as an electrical engineer, a magnetics person, was always calling my electrochemistry a black art, or even, occasionally, witchcraft.” Romankiw’s electrochemical “magic” enabled them to take the functionality of the old hand-wound heads and shrink it down to a miniscule permalloy horseshoe magnet wound with 30 turns of copper—the entire structure was thinner than a human hair.

After they sent their first head to IBM’s testing facility in San Jose, California, for

testing, Thompson received word that the results were positive. “Dave came into my office with a sorcerer’s hat and put it on my head,” laughs Romankiw. “He said, ‘Here it is! You’re the chief sorcerer of the impossible!’”

In addition to creating the thin-film heads, Romankiw invented an effective way to batch-produce them. He spent the next few years commuting coast to coast, experimenting in New York and then implementing his findings in the pilot line in San Jose, which he helped design.

Work on the project was carried out in secret—a novel condition for a career scientist like Romankiw. A head start on this type of game-changing technology would be worth untold millions. “We knew we were way ahead of everybody, and IBM preferred not to publish,” he says. “So, I was just applying for patents. It wasn’t until 1979, when IBM announced the first heads, that I was allowed to start talking about my work.”

Romankiw’s work on thin-film heads and his subsequent refinements to their manufacture changed the entire field of electroplating. He introduced steady-state operations, which allow an electrochemical process to continue indefinitely without having to replace the plating solution. He also invented the paddle cell—a very small paddle that moves rapidly back and forth in the plating solution, providing precise agitation right at the surface.

Meanwhile, Romankiw used his influence to shape electrochemistry programs at universities around the world—travelling to make presentations on what kinds of skills were needed in the electronics industry. These road trips even allowed him to bring his educational life full circle. “The University of Alberta is using many of my techniques, perhaps not even knowing when, by whom and for what reason they were introduced. They are now accepted techniques in high-precision device fabrication, in which alloy composition and thickness uniformity are important,” he says proudly.

This past May, he and Thompson made their momentous trip to Virginia for their induction into the Inventors Hall of Fame. “The night before the ceremony, I had the opportunity to meet several people who were



inducted before me,” he says. As an inductee himself, Romankiw will attend similar ceremonies each May for years to come.

Romankiw continues to work at the T.J. Watson Research Center in Yorkton Heights, New York, as an IBM Fellow. He spends much of his time sitting in on meetings with younger electrochemical researchers, giving them the benefit of his 50 years of knowledge.

With his somewhat slower pace at IBM, Romankiw has more time to indulge in what he calls “my other job”—the Ukrainian scouts, also known as Plast.

Romankiw joined Plast when he was about 11, although the organization was underground at the time because of the German occupation. “We didn’t wear uniforms, but we practised scouting and saying the scout pledge, and so on.” Later, in Edmonton, he helped organize a Plast group, which still exists today.

In 1991, when Ukraine won its independence, Romankiw became actively involved in reviving the movement in his home country. He has remained involved ever since, fundraising to support growth of the organization in Ukraine, travelling there each year to help train scouts and frequently taking groups to jamborees worldwide. In 1997, he was elected Nachalniy Plastun (chief scout) for Plast, which is now active in nine countries. He credits scouting for building the initiative and organizational skills that have marked his career as an engineer.

Of course, he still finds time to do some of his own tinkering. “I’m exploring today the use of carbon nanotubes inside copper, to improve the copper conductivity. That’s sort of pioneering work.”

He doesn’t foresee ever losing that spark, the compulsive need to find answers that most people wouldn’t even dare to seek. “When somebody says in a talk that something cannot be done, or that something is needed, I love taking on the challenge—even now, although I shouldn’t be starting anything new anymore! But, I love seeing if I can solve problems that are seemingly impossible.”

If Edison, Bell, Marconi and Ford were able to meet Romankiw, they would certainly recognize a kindred spirit.

WHERE TO NOW?

Engineering researcher hopes to shatter memory limits

By co-inventing the magnetic thin-film storage head, Lubomyr Romankiw (Chemical '55) helped usher us from a world in which the storage of five megabytes of data required a device the size of a small room, to one in which we can store one million megabytes (one terabyte) on an affordable 2½ inch hard drive. He revolutionized data storage and, in the process, changed our world.

Sandipan Pramanik, a professor in the U of A’s Department of Electrical and Computer Engineering, hopes to take us to the next era in data storage. He and his team are looking for ways to not only radically increase the density of data storage—for example, making it possible to store the equivalent of four Blu-ray discs in a single square centimetre—but to also change the very nature of computer memory.

“Today, just for data storage, we have multiple technologies in a device like a computer,” Pramanik explains. “And each technology—hard drive, SRAM, DRAM, flash drive—has its own advantages and disadvantages.”

An ideal storage technology would combine all of the advantages of these various devices without any of the disadvantages. It would be fast, inexpensive, durable, energy-efficient, stable, and very, very small. It would boot up your computer in a few seconds, store a mind-boggling amount of data while being able to access it almost instantly, retain that data even when disconnected from power and require very little power when it does operate.

In short, a single device would do everything that current forms of data storage do, and do it better, faster, more efficiently and at a tiny fraction of the size.

That theoretical type of device—known in the field as “universal memory”—is considered the Holy Grail of data storage. Scientists and corporations around the world are eagerly pursuing it, but so far with limited success. “There are certain fourth-generation devices available in the market,” says Pramanik. “But where they are lacking significantly is in terms of storage density.” Whereas DRAM can currently store around a gigabit per square inch, he says, the new devices can manage no more than a few kilobits or megabits.

Pramanik’s team is exploring the use of spintronics—controlling the spin of individual electrons—to store data. Each cell in an array, depending on its resistance, would store a binary value, either a zero or one. And, because those cells are built using carbon nanotubes or nanowires, an incredible amount of data could be stored in a very tiny area.

Despite the advanced science underlying the concept, Pramanik believes that this type of memory could eventually be much cheaper to manufacture than current technologies. “We’re trying a method called self-assembly of nanostructures, which is a very cost-effective way to make these kinds of devices.”

If he and his colleagues succeed, the RAM, hard drives and flash drives of today could end up looking like yesterday’s room-sized data-storage behemoths. And the world as we know it will change once again.



KICKING the RID FANTASTIC

Using his engineering know-how, Graham Buksa has become king of the hill in longboarding

By Wanda Vivequin

Alumni Horizon Award winner Graham Buksa (Electrical '04) is the founder of Rayne Longboards, and a speed demon on the hills.

F



There are grand descriptions of the longboards Graham Buksa designs and manufactures—they are among the best in the world and we will get into design details momentarily. For now, let's consider the basic facts: Buksa balances himself on pieces of wood no more than a quarter of an inch thick, bolted to four tiny wheels, and propels himself downhill so fast that his parents probably don't want to hear about it. The speed record for longboard racers is 116 km/h and Buksa holds the sixth-fastest spot, at 112.1 km/h. It should go without saying that the sport is dangerous. But with such an intimate knowledge of his craft and his sport, Buksa's eloquent description reveals a zen-like state is essential to mastering the longboard.

"The road could be pitted and pockmarked," he says. "There are cracks everywhere, and when the road reaches its fastest point, it feels like a roller coaster. It drops, then levels out, before dropping again. Your stomach is in your throat and your bowels at the same time. If you don't have the mental stamina to control the small movements your body makes, you can come off your board. The wind can and will throw punches at you. When you pass or get passed, the draft winds fight you. It's not a time for second-guessing yourself.

"To be fast, one must be calm. Your mind and body need to work together. You must be an unmovable statue, perfectly balanced and optimized to the shape of the wind rushing over your body while the outside world rushes by."

The brains and brawn behind Rayne Longboards, Buksa (Electrical '04) designs and builds some of the world's top rides for a sport that has an uber-cool, laid-back image, along the same lines as surfing and snowboarding culture. He and the Rayne racing team travel thousands of kilometres in search of the perfect hill.

"Like surfing, when you find one [a hill], you might tell someone the pseudonym for the road, but never its location. You only go if you really trust your own abilities and your equipment."

And Buksa certainly trusts his. If you ever needed any reassurance that the person designing your longboard knows what he's

doing, remember that Buksa regularly puts his life on the line racing at meets around the world, riding boards of his own design. The fact that he is so involved in the sport makes him the perfect person to design longboards. The fact he is an engineering graduate and knows how to access research and development funding is a double score for longboarders.

Rayne Longboards produces boards with signature design elements that stand out in a highly competitive marketplace. Made of strong and supple bamboo sandwiched between two layers of fibreglass, Buksa's designs allow for subtle, rider-specific modifications. He has developed new ways to mount the trucks (the metal turning mechanisms that attach the longboard wheels to the deck) in order to lower the board's clearance, and he has put his own unique twist on concepts used in snowboard design. Other critical design aspects are part of the DNA of the Rayne product line. For example, the decks (top of the boards) of several models have subtle indentations and arch support bent into the wood, allowing riders to feel and check with their feet where they are on the board. These "undulations" affect the rider's position, reduce leg and foot cramping and increase the amount of control a rider has when gliding, turning and doing tricks.

"I've worked hard to focus on the ergonomics of the deck design—things that make sense, feel right and make a difference to how longboards can be ridden," says Buksa. A background in engineering has definitely played a big part in how he tackles problem-solving and design, although many of his innovations have come to him while longboarding.

"There's no point in trying to work out what kids want while you're sitting behind a desk. You need to be out there riding to work that out," he says.

He also takes advantage of the Rayne racing team, getting feedback from world-class racers. "Our team riders are the best in the world and they give the best feedback in the world because they spend more time on their boards than anyone else. Their feedback is just as important as my understanding of how to change designs to meet their needs," adds Buksa.

The team is a competitive but tightly knit group that has fun on hills around the world and at Rayne's home turf, Vancouver's North Shore, a locale that inspired and supported Buksa's business. It was to this mecca of extreme sports that Buksa moved after graduation. The North Shore is synonymous with edgy adventure sports for 20-somethings, so it made sense for Buksa to base himself there. How he arrived is a tale that seems as impulsive as jumping on a board at the top of a hill. After working as an engineer-in-training for a year, Buksa took out a loan for \$5,000 to start his company.

"To be fast, one must be calm. Your mind and body need to work together. You must be an unmovable statue, perfectly balanced and optimized to the shape of the wind rushing over your body while the outside world rushes by."

— Graham Buksa

"I loved designing and building boards so, on a whim, I purchased enough maple veneer to make 100 boards," he explains. "I decided to quit my job and spent that summer constructing longboards."

He packed up his boards and hit the road, selling his first boards to shops in B.C. The trip convinced him to stick with the business and base himself on the North Shore. In its early years, the company struggled and the young entrepreneur earned what he reckons was the equivalent of 50 cents an hour for his efforts. He slept in his workshop and lived a tough life but never gave up. The \$5,000 loan is



long gone, and since then, Buksa has used his engineering background to convince the National Research Council to invest in some of his ideas. He has a research grant to look into production of a natural fibreglass using natural composites like hemp and jute. This innovation will complement his commitment to recycling as much of his boards as possible at the end of their lives.

“For sure, having a degree makes people take me more seriously when I look for money to help with R & D,” he says.

Keeping up with the times has provided a few interesting challenges. Somewhere in between when he started and now, Buksa’s typical customer changed. In the last few years, more and more 10- and 11-year-olds have begun taking up the sport, prompting a rethink in designs for lighter, shorter riders. Once again, Buksa’s engineering degree came in handy as he worked out the modifications needed to cater to this new crowd of enthusiasts. The result of all this interest, however, is that Buksa is running out of room in his factory. His business is doubling every year and he needs to find somewhere bigger to store his products. “This is my challenge right now,” he says.

Rayne employs 28 staff and sponsors a racing team of upwards of 35 international riders. Sold in 20 countries, the 14 models of longboard in the Rayne lineup cater to all types of riders, from free riders and racers, to cruisers and carvers. Buksa believes one of the main reasons his company is so responsive and innovative is because all production is done in-house: someone comes up with a good idea, and a prototype is made in-house, then tested, modified and, when ready, put into production. Buksa remains steadfast about keeping the business in Vancouver, and he insists on being involved in everything to do with making the boards and test-riding them.

“I do the design and mould-making and I complete the feedback cycle when we make a board. Whether it sounds cheesy or not—I have a connection to each board we’ve made. I draw it, model it, program the computers to make the mould and watch it being made. I run my hands on the moulds to feel imperfections. I know the cut-out shapes by memory and can see small sanding errors. It’s very personal. Although the company is

called Rayne, it’s my company. My name is on each board and I need to guarantee that they are the best.”

Rayne is meeting that goal, being named the top deck company in the four categories of longboard style by readers of *Concrete Wave* magazine.

These days, Rayne is enjoying a “relaxed pace of innovation,” Buksa says. The focus now is more on efficiency, sustainability and automation of some of his processes.

“My ‘aha moments’ in the last little while have come from little things, like new equipment that makes us more efficient or efforts to create less waste,” he says.

Rayne’s revolutionary move to using bamboo has created stronger, lighter and more responsive decks for boards. Unfortunately, the flip side of importing 1.2-metre lengths of bamboo from Asia initially meant wasted offcuts. This, and the poor quality pallets on which the bamboo was transported, troubled Buksa.

The solution? The company now makes eight different items from the offcuts and has convinced shippers to improve the quality of their pallets so that others can re-use them in Canada.

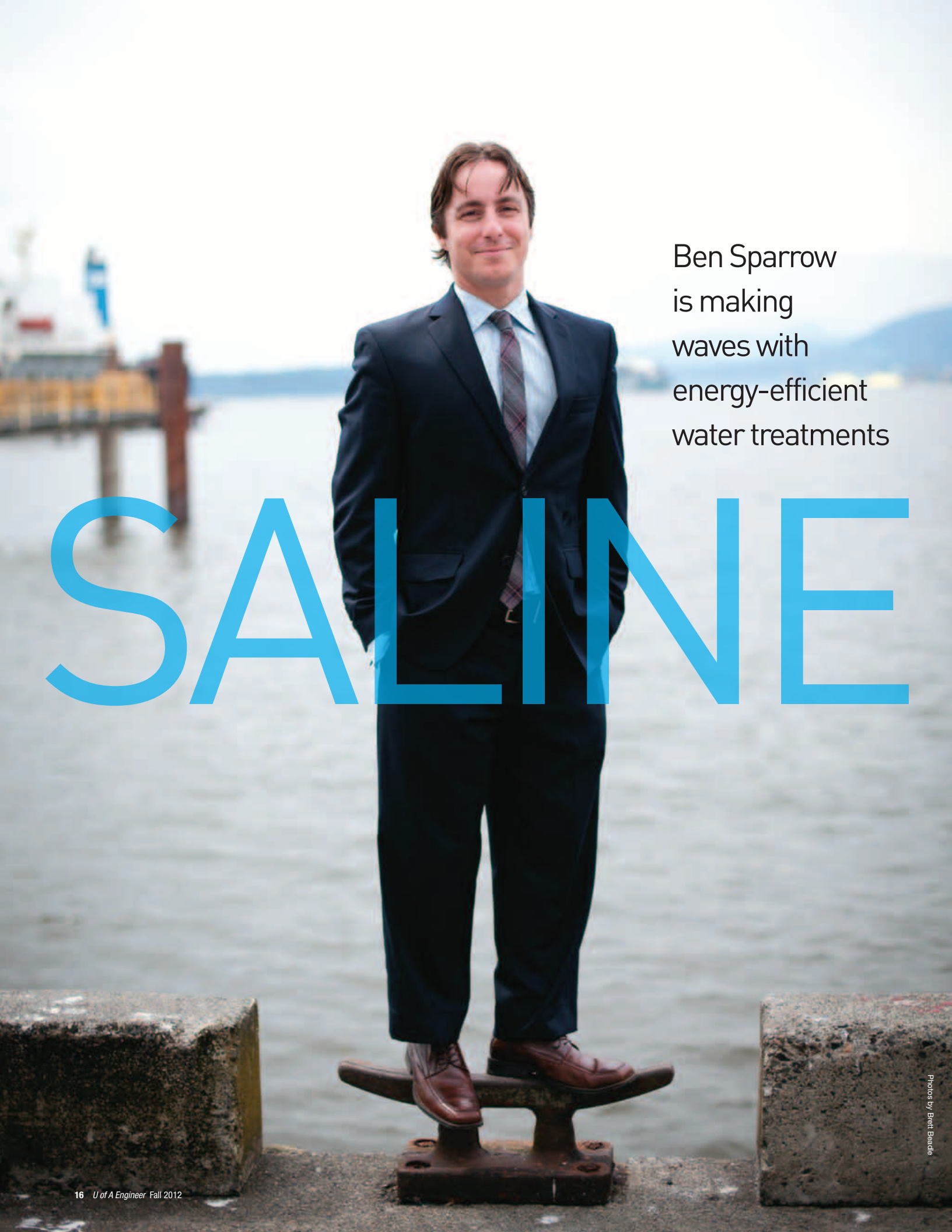
“It’s the little things like this that are important to me today,” says Buksa.

As for being awarded a 2012 U of A Alumni Horizon Award—which recognizes the outstanding achievements of U of A alumni early in their careers—Buksa is humble.

“I’m truly honoured to be picked from amongst all of the engineering graduates, and all of the U of A’s graduates,” he says.

“It is a great time to reflect on how I got here—how important it was that there were opportunities in life that got me here. I laugh to myself. When I was at the U of A, I always felt like I was abusing my privilege. I had after-hours access to machine shops, tool rooms, and access to inter-faculty instructors. To be given an award for taking opportunity and squeezing out every last drop—I find it humorous,” says Buksa.

“Universities are often seen as stodgy places where only highly acclaimed researchers get to tinker and discover. This award is a great recognition that the U of A has such a great attitude that it encourages opportunities for everyone.”



Ben Sparrow
is making
waves with
energy-efficient
water treatments

SALINE



By Judy Monchuk

solution

Ben Sparrow's fresh take on getting salt out of seawater came to him during a nighttime train ride between Beijing and Shanghai in April 2005. The lightning bolt of inspiration spilled out in a rush, crystallizing the countless hours he had spent in libraries poring over thermodynamic data and chemistry research looking for an economical way to harness the energy potential of seawater, which generates electricity when mixed with fresh water.

“I began drawing a picture of this machine I'd been dreaming about. Within three or four minutes, the right picture was drawn,” says Sparrow (Mechanical '99), the 35-year-old CEO of Vancouver-based clean-tech firm Saltworks Technologies and recipient of a 2012 U of A Alumni Award for Excellence.

Sparrow was fixated on creating a green and lean model to counter the high-cost, high-energy requirements of commercial desalination technologies.

One common method uses high pressure to push seawater through membranes; another involves evaporation and condensation. Both require large amounts of electricity, which, in turn, increase greenhouse gas emissions and the carbon footprint. For years Sparrow worked on computer modelling scenarios, trying to find the technological twist that would make desalination economical and energy efficient. He found it in a thermo-ionic exchange process.

“It was a tweak,” he says modestly.

At the time of this eureka moment, Sparrow was taking a break from his MBA studies at Simon Fraser University and a vacation from his job at utility company BC Hydro, where he worked rebuilding large hydroelectric turbines and overseeing a \$500-million portfolio of power plant rehabilitation projects. He returned to Vancouver, filed a provisional patent on his idea and spent any free hours over the next few months in his living room building

Saltworks developed its thermo-ionic technology in secret for a year before taking it to Dubai for an International Desalination World Congress in late 2009. When Sparrow and Zoshi arrived, they found an eager audience intrigued by an article in *The Economist* describing the Canadian process as “ingenious.”

a prototype for the seawater battery. The morning after producing “first water,” he quit his job. Sparrow reconnected with Joshua Zoshi, “the most talented person I knew from MBA school.” Together, they started Saltworks in July 2008.

Access to clean drinking water is a huge concern in the 21st century. The World Health Organization determined in 2007 that 1.1 billion people did not have access to this basic human need, while an estimated 97 per cent of the Earth’s water is salty seawater, and a big chunk of that is frozen at both poles. Water is also big business, with \$80 billion projected to be spent on desalination around the globe between 2005 and 2015. Any way to improve the process has governments, industry and investors interested.

Saltworks developed its thermo-ionic technology in secret for a year before taking it to Dubai for an International Desalination World Congress in late 2009. When Sparrow and Zoshi arrived, they found an eager audience intrigued by an article in *The Economist* describing the Canadian process as “ingenious.”

“Our competitors wanted to talk to us and we were running away from them,” Sparrow says. After sitting down with some of the other industry players and innovators, he began to see that the thermo-ionic process could be hybridized to work with reverse osmosis technology. That meant potential new markets, including cleaning waste water produced by mining operations. The Saltworks game plan was turned upside down.

“Our competitors became our collaborators,” says Sparrow. “Rather than competing against established technologies, we were able to focus on a new market.”

In Canada, one such opportunity is cleaning the water used in oilsands production in northern Alberta. Saltworks uses a spectrum of treatment methods to desalt water that is naturally brackish, or saline, because of the area’s geology. Saltworks is also getting started on treating tailings from conventional surface mining or water produced during in-situ mining using the Steam Assisted Gravity Drainage (SAGD) process.

Oil giant Cenovus Energy uses SAGD technology in its Athabasca operations.

Alexander Munro, who manages the Cenovus Environmental Opportunity Fund, says Saltworks technologies have the potential to cut capital and operating costs while making substantial reductions in carbon emissions by thousands of kilotonnes each year.

Munro was impressed with Sparrow’s original breakthrough concept during a 2010 meeting: “Ben’s idea was a very simple chemical principle, but one that would have varied and widespread application potential.” But it was the young entrepreneur’s vision, his ability to see other business considerations and his management skills that convinced Cenovus to invest \$2.5 million in Saltworks. Munro believes Sparrow will be a leader in establishing Canada as a provider of low-cost environmentally sustainable technology.

“The delta of development I’ve seen over the last 12 months has been impressive,” says Munro, adding that Cenovus is exploring ways to apply Saltworks technology across various oil and gas operations. “We’re looking for a very long-haul return.”

Today, Saltworks is concentrating on immediate commercial prospects, including a waste saltwater treatment method that Zoshi says showcased all Sparrow’s skills. He was able to create the process, form a team to build a working prototype and pull together a full system for a major industrial customer—all within six months.

Zoshi describes Sparrow as that rare combination of inventor and leader: someone who can take an idea from concept to reality while motivating others to excel. He is “passionate and driven, yet practical and thorough.” Sparrow’s multiple roles have not stymied his innovative side. Since creating the thermo-ionic process, Sparrow has been the primary inventor of more than 20 patents relating to energy-efficient water treatment, while the company has 30 patents held or pending.

Sparrow downplays his role in the creative hubbub, praising his team and stressing it has improved and invented far better machines than his initial desalination prototype. “We certainly haven’t got everything right. But we’ve had a few that

worked very well and those are the ones that we're commercializing."

Sparrow recently returned from the Australian outback, where he was setting up a low-energy water treatment plant for a major oil and gas producer. Saltworks is also building compartmentalized plants that will be deployed in Alberta's Fort McMurray oilpatch. These plants are end-to-end operations that can accept almost



Ben Sparrow's dream design for a new desalination method has led to big things. His company, Saltworks, has clients all over the world and possibly beyond—NASA is testing a Saltworks water recycling system for possible use on the International Space Station.

any water source. Sparrow describes it as a flexible plant with a full suite of pre-treatment technologies, including reverse osmosis for "low-fouling waters" and Saltworks' proprietary system for "higher-fouling waters and brine volume reduction." There is also a final SaltMaker stage that treats the brine to produce solids, while turning out fresh water.

Sparrow credits a business plan competition by New Ventures BC, now partnered with the British Columbia Innovation Council, with helping the enterprise to succeed. In 2008, Saltworks won the top prize and the sustainability award, accessing \$160,000 in working capital that allowed the company to push forward and commercialize its business ideas. As its initial focus, Saltworks addressed the prohibitively high cost of the ion exchange membrane the water needed to cycle through.

"We said 'Why not invent our own?' It was an audacious goal but we accomplished it," says Sparrow. The creation of a novel, low-cost polymer membrane was the kick-start to a corporate culture championing new ideas and a willingness to fail. For the next three years, Saltworks put all its energy into building a team with creative vision and the ability to turn ideas into reality. It hired staff willing to "work hard, break things, pick up the pieces and try again."

Sparrow believes the engineering education he received at the University of Alberta, especially in design, was invaluable in giving him the confidence to devise and build his own projects. He notes the U of A's early instruction in 3-D, computer-aided design gave its mechanical engineering grads the ability to translate ideas into reality. The willingness of professors to discuss ideas outside the curriculum was also invaluable. "I never met a closed door. As I interview and hire engineers from many different schools, I believe that no school provides practical backing to students better than U of A MeChE."

That base has helped Saltworks gain a diversified reputation in energy-efficient water treatments. NASA is testing a Saltworks system that could improve water recycling on the International Space Station. The company also added its twist on conventional desalination technology with advanced automation, creating "smart" water plants that reduce the need for water system operators, including a highly automated remote base "water maker" for the Canadian navy that can be used in crisis operations. "They need their staff, the troops, focusing on what they do best, not operating a desalination plant," says Sparrow.

To meet the burgeoning demand for its expertise, Saltworks is in rapid expansion mode, building a 35,000-square-foot manufacturing plant in Vancouver, B.C., for commercial production of its components. The plant is expected to be operational by spring 2013. There are also plans to ramp up staff from 28 to 150 over the next three years, creating a hybrid business model that moves into construction while still retaining its research and development lifeblood.

Currently, Saltworks has four pilot projects operating around the clock at its Vancouver facility, testing the durability of different design ideas.

"We're bursting at the seams," says Sparrow. "We're fortunate that we're working with very good clients. They understand the scale that we're at right now: we're transitioning from a small company to one that can deliver" on bigger projects.

The willingness to push creative limits while hitting production milestones is a tricky balance to maintain. Not everyone wants to work under those conditions. But Sparrow believes the right people will thrive in such an environment. Saltworks has attracted a high-energy staff, a group of individuals wanting to work in a field where they feel they are doing something positive for the environment.

"I think it's a very healthy tension to have," says Sparrow. "We have both the creativity and delivery, with room for failure. We try to get things 70 per cent right on R & D. With construction, it has to be 100 per cent."

Sparrow is adamant Saltworks will not lose its research and development focus, although that will be scaled back to about 10 per cent of its overall business model. Nor will the company back away from the desalination process that started the ball rolling and the original goal of providing technologies to help get fresh water to needy populations—an increasing concern for large regions of the world.

"Two to five years out, we want to do more projects that have a humanitarian aspect to them," he says. "But at this time, our oil and gas and mining clients are excellent clients. They have the capital to fund the projects and have highly skilled engineers to help us develop the technology."

RISIN



G STARS 2012

A new group of engineering graduates enters the profession with confidence and enthusiasm, while the Class of 2012 tells stories of unforeseen challenges, risks and rewards

By Richard Cairney



CHRISTOPHER ROGERS

Top of the class

Christopher Rogers (Engg Physics '12) wasn't sure what he wanted to study at the University of Alberta, but engineering turned out to be a good choice—he graduated with a perfect 4.0 grade point average, earning 45 A+s and two As. He is now at Stanford University, working on a PhD in electrical engineering.

“It was the chance to really apply science and physics to real-world problems that attracted me to engineering,” says Rogers, winner of the Governor General's Silver Medal and the C.D. Howe Memorial Fellowship award for academic excellence, the highest honour the U of A bestows upon a convocating undergraduate student.

Rogers chose engineering physics as a specialty because of the opportunities to use physics to solve problems. For

his capstone project, he investigated the physics of emerging nano-electronics, using simulations and numerical methods to test a new material for use in transistors.

Looking forward, Rogers is now in a similar position to the one he was in entering university as an undergraduate. This fall he will feel his way around Stanford, looking for a project he can focus on for his PhD. Beyond that, he's looking forward to working as a professional engineer and, maybe one day, returning to academia as a professor.

“I could definitely see myself becoming a professor down the road,” he says. “The professor who mentored me in my capstone project, Mani Vaidyanathan, has been a big influence on me here—I've had a lot of good professors here and good teachers all the way from elementary, as well.”



GINETTE DUBE

Testing her entrepreneurial mettle



Ginette Dube felt she owed her professors an explanation for seeming inattentive during the fall term.

“I was stepping out of class to answer phone calls and my laptop was always on and I was coming to class late—and I went to China,” says Dube (Materials '12). “So I emailed all of my professors and apologized and told them what I was doing and sent them a link to my website.”

What Dube was doing was remarkable: running her own company while completing her final year of studies. That company, Direct Alloys, distributes carbon and alloy steels to Alberta's oil and gas sector and provides metals to machine shops and manufacturers.

“My professors were really excited,” Dube says of reaction to her email. “They

all said it was great—I got very positive feedback from everyone.”

Dube always wanted to form her own company, and she took delight in applying her education while auditing production facilities in China. But she says there's something she learned at school, something less tangible than formulas and engineering principles, that prepared her to strike out on her own.

“Everything at school was moulding me as a person to get ready for this,” she says. “In the group projects, you're responsible for timelines that need to be met, and the long nights studying and writing reports definitely helped because customers buy from us and they get quality documents and I elaborate on things for people. The whole experience, the atmosphere, the professors—it all formed me.”

ANDREA BADGER

Northern Exposure

Andrea Badger (Civil [Co-op] '12) had definite goals for her education and professional career: she was good at math and physics and decided she would go into engineering. She wanted to work in the North, and she wanted to have a positive impact on the environment.

She can check each one off her list. She's now an engineer-in-training with environmental consultants Golder Associates in Whitehorse, Yukon.

"I can't remember the instant that I decided this was what I wanted to do, but I'm an environmentalist, I wanted to go into engineering and I wanted to do something that would have a net positive environmental impact," she says.

Her experiences in the co-op program certainly prepared her to meet those goals. Her first work placement was as an

inspector on a highway project for the Yukon government. Later, she worked on major clean-up projects at two long-abandoned gold mines north of Yellowknife, Northwest Territories, with AECOM.

At the Tundra mine, she helped deal with tailings, arsenic contamination and waste rock. The Colomac mine required some shoreline rehabilitation and building demolition, and contaminated soil and cyanide mine waste had to be treated. When winter blew in and the ice roads across the lake opened, Badger returned to the mine site as environmental officer, ensuring that buildings and equipment were transported back to Yellowknife safely.

"That is totally the kind of work I wanted to do," she says. "I'm really happy with my degree. I feel confident and well-educated, and prepared for anything."



DUSTIN STEWART

The secret to success: helping others



Moving from a small-town school to a large university has its challenges. Dustin Stewart (Mechanical [Co-op] '12) developed a successful strategy to thrive at a campus with more than 40,000 people: he just made the big place feel small.

"In Grade 12, our graduating class was 37 or 38 people. You could put a face to every name," he says. "It was a bit of a shift coming to the U of A."

Leaving his hometown of New Sarepta, Alberta, Stewart arrived at the U of A and immersed himself in his studies and First Year Engineering Club activities. He was elected Engineering Students' Society (ESS) vice-president of finance and operations during his second and third years, AVP of marketing and advertising, then ESS president for his

final year of studies.

For Stewart, balancing academics and student governance meant starting his days at about 6:30 a.m. in the ESS office, taking advantage of the quiet time to study or complete ESS duties. Stewart participated in student life fully not only because of the positive impact it has on others, but also because he enjoyed it.

"At the end of the day, I wouldn't have been doing this if I didn't like it," says Stewart, who is now working in Edmonton as an engineer-in-training with Suncor Energy Ltd. "For me, it was something I became passionate about. It was directed energy. I feel like it personalized my degree—that it gave me more ownership over my education."

ELAINE RIPPON

Keeping it clean

Elaine Rippon (Civil '11) always said that there's plenty of room for creativity in environmental engineering. Now working as an engineer-in-training with Alberta Environment's approval team, she sees it every day.

In short, Rippon reviews applications for industrial activity, making sure companies meet or exceed standards outlined in the Environmental Protection and Enhancement Act. In the process, she sees a lot of great ideas.

"We know these companies have fantastic people working for them and we want to take advantage of that," she says.

Provincial laws tell industry the targets they must meet in order to operate. The "how" is left to engineers.

"You see really creative initiatives from the companies. It's interesting to me to see

what they're doing and how they're going to meet standards. The company is responsible for how it meets standards, so we get to see real innovation and creativity."

Rippon says that in the past year, working first with the department's cumulative effects program and now in approvals, she's being exposed to ideas and experiences that keep her learning at a steady rate.

And she's impressed that environmental stewardship is taken seriously by industry, whether it is a small waste disposal company or the big oilsands players working together to solve the problem of tailings ponds.

"Nobody wants to be that company that sticks out and has a bad reputation," she says. "And as an environmental engineer, I find that really promising."



ROBERT TEED

Leaving the nest

It sounds counter-intuitive: you graduate with an electrical engineering degree and land a job designing peptides in a high-profile medical imaging laboratory at Stanford University. You co-author a research paper detailing a breakthrough discovery and jointly patent new peptide imaging technology. Then you quit the Best Job Ever.

"It was a difficult decision. A very, very difficult decision," says Robert Teed (Electrical '11). It's not only that the job was terrific—he also left his boss and mentor, Dr. Sanjiv Sam Gambhir. The two met a year before Teed began studying engineering, and he worked summers in Gambhir's lab until signing on full-time after graduating last year.

The work in Gambhir's lab involved engineering peptides that detect even the

smallest cancerous growths. "They are injected into your body and work like little molecular spies to find a specific target," explains Teed. "In our case, the target is often associated with cancer so we are engineering imaging probes or tracers for cancer imaging."

The idea of game-changing medical technology is what has lured Teed away from his Stanford job and join a new biotech start-up company as a molecular engineer.

"The company's vision is to develop what I would call a massively disruptive therapeutic strategy. It is unlike anything that is out there right now and, if the vision is accomplished, it has the capability to cure any disease.

It sounds like a bit of a fantasy and it's an ambitious goal, but I'm really looking forward to fulfilling that goal."

AMANDA SCHNECK

Discovering professional passions

As a student, Amanda Schneck (Materials [Co-op] '11) was accustomed to a full schedule. Besides maintaining near-perfect grades, she was involved in student governance and led the Panda's track and field team. Upon graduation, U of A Engineer joked with Schneck about what she would do with all her free time.

"It turns out there isn't that much free time when you start working," she says with a laugh. A year after graduating, Schneck first served as an engineer-in-training with RAE Engineering. A year later, she has signed on with Enbridge, returning to a group she worked with during her final Co-op placement in 2010.

With RAE, Schneck had an opportunity to work on pipeline and tank integrity projects for SAGD oil extraction sites, and

worked on a failure analysis project, helping to investigate a pipeline rupture.

"It was like a mini CIS investigation without the fingerprints and blood," she says. "You go to the site and with your knowledge of materials science you collect data and put all the pieces together. It was a direct application of what I was taught."

All in all, Schneck is confident in her ability to take on any assignment.

"I felt pretty competent because of the co-op work terms I did and because I did integrity work at Enbridge prior to graduating. When I started at RAE my supervisor was surprised at how much base knowledge I already had. I was ready to tackle things and was not afraid to ask questions, either."



KATE MAGUIRE

Expect the unexpected

Kate Maguire (Mechanical '11) sought out the unexpected while studying engineering. She completed a course on sustainable energy at the University of Freiberg in Germany and took part in an international space exchange at the Andoya Rocket Range in Norway.

Now an engineer-in-training with Calgary-based Enerflex, the unexpected has come to her.

Things changed at Enerflex last year when it aligned with General Electric's gas engine business, establishing a partnership called Gas Drive. Maguire works with Gas Drive, which sells and services gas engines used in compression and for power and heat in settings such as hospitals and government buildings.

"I do a lot of things," Maguire says when asked about her role.

Some of her responsibilities involve work traditionally associated with engineering, like advising customers on technical issues and maintenance. But other duties are new to her.

"I'm doing bidding and business-development work, like finding ways to improve our business and ways we can price contracts or implement technology," she says. "Because it is in its infancy stages, we get to be involved in a lot of areas most people would not be involved in."

She's confident in taking on these tasks.

"Every time we have a new project to work on, we start from scratch because there isn't a template, but there are a lot of good people to get advice from," she says.

"It's interesting because to a certain extent, you get to mould your own job description."

Dean of Engineering
David Lynch with
William and Betty
Magee and Bill Pick,
inaugural William
G. Magee Chair in
Process Design.

A Helping



New chair helps redefine process design education

Richard Cairney

A new chair at the Faculty of Engineering has been established in process design—a subject at the very heart of engineering. Named for U of A Engineering alumnus and philanthropist Bill Magee (Chemical '60), the William G. Magee Chair in Process Design will focus on teaching tomorrow's engineers, and on research into best teaching practices.

“This is primarily a teaching chair that will also research pedagogy,” Dean of Engineering David Lynch said during a formal announcement of the new chair. “This establishes, very firmly, that teaching and research go hand in hand.”

Process engineers are responsible for designing entire production plants, such as oil refineries. They are responsible for

Hand for tomorrow's engineering leaders

BY RICHARD CAIRNEY

every detail: from high-level safety and productivity cost estimates down to the smallest component, such as the types of pressure gauges and valves to be used in different parts of a plant.

Given those types of responsibilities, the level of education in design provided to students is unique to engineering, says Lynch.

“When we think of what distinguishes engineering from other areas across campus, this is something that really does go to the heart of design, writ large, across all of our programs,” he said. “And process design is really at the heart of engineering. It is at the heart of creative activities of engineers across all disciplines.”

In order to educate the next generation of process design engineers, the faculty needs to bring in seasoned professionals, and it has done so in selecting Bill Pick (Chemical '79, MEng '84) as the inaugural chair. Pick has 33 years of experience in process design with Dow Chemical. Among his many achievements, he helped design Dow's ethylene plant and led the expansion of its vinyl chloride plant and its ethylene plant—a project that received a prestigious Summit Award for Project Excellence from the Association of Professional Engineers and Geoscientists of Alberta. In 2000, he was promoted to Global Process Engineering Technology leader for Dow's light hydrocarbons business, essentially becoming the leader of an international group of process design engineers.

Pick, who has retired from his position with Dow and now teaches in the Department of Chemical and Materials Engineering, has a passion for teaching. In 1991, he became the inaugural Stollery

Executive-in-Residence at the Faculty of Engineering, working with students on real-world design challenges. He says that experience is one of the highlights of his professional career.

As a student, Pick was originally interested in environmental engineering, before finding his true calling.

“I took the introduction to chemical engineering course and realized, ‘This is where I want to be,’” Pick recalls. “I loved chemistry and loved the mass and energy balance problems that were presented in the class, and it was just what I wanted to do with my life. I went from the lost puppy to the ‘a-ha’ moment.”

He has fond memories, too, of a materials engineering course he took on corrosion, which featured weekly assignments in the form of a fictional memo to the students “from a crusty old foreman with a corrosion problem.” Every one of the problems, Pick recalls, was one the professor had dealt with as an engineer.

Pick plans to draw similar teaching opportunities from his own decades of experience, planning different design problems to present to students. “I’ve been writing down neat examples that might be good learning experiences,” he says. “I have a folder full of problems.”

“One of the things I’m looking forward to is the joy I get from what I call the ‘light-bulb moment,’ when you see someone learning something or understanding a new concept for the first time.”

The chair is funded by Bill Magee and his wife, Betty. With the increasing demand for chemical engineers and with many current professionals approaching retirement, Magee says it's vital to help



Bill Pick (Chemical '79, MEng '84)

educate young engineers. After all, the projects they design add value to raw materials, generate jobs, create facilities that pay taxes, and provide a return to investors.

“All processing plants have one thing in common,” he observes. “They create wealth.”

Process design engineers have a huge impact on safety, the environment, the economy and society, Magee says. It's therefore essential to educate the next generation well, so they can keep pace with such a rapidly evolving field.

“As a young engineer, I soon came to realize our U of A professors provided us with an excellent set of tools to get on with our jobs,” he says. “I know I would have benefited greatly from courses that are offered now that we didn't have, like the fourth-year design projects. And I know this new chair will help provide students with the best possible tools to take on future challenges.”

The dean is excited about the impact the new chair will have on teaching.

“We know that an initiative of this magnitude will transform all of our programs,” Lynch says. “We will see that transformative effect move across all of our programs—and beyond the university as well.”



Alvin Nelson

Mustang Master, Inventor, Engineer



By Ellen Schoeck

Capt. M.A. Buzhurin, U.S.S.R. plant representative, Alvin C. Nelson, British Air Commission representative, and U.S. representative Lt. Col. Frank C. Merrill drink a toast to victory on May 8, 1945, VE-Day. Nelson (Electrical '39) played an important role in the manufacturing of the Mustang aircraft (above) during the Second World War.

An extraordinary human being, sharp of mind and gentle with all people, has passed from our midst at age 101. Alvin Nelson (Electrical '39), an engineer and inventor to the core, died on Good Friday of leukemia.

Just before his death, Alvin was a revered and respected guest at Reunion Weekend where, at the Dean's Reception, he was surrounded by undergraduate engineering students intent on hearing his stories about the manufacture of Mustang aircraft during the Second World War.

Alvin was the son of Scandinavian pioneers who, in 1905, broke sod on a quarter section of land in Camrose, Alberta, creating a mixed farm that produced more than the family could eat. "For the support of a large family," Alvin remembered, "such a small land base was considered impossible. My parents were good farm managers."

Alvin was one of nine children, seven of whom survived to adulthood; two siblings died of whooping cough. Whooping cough, smallpox, diphtheria, polio and tuberculosis were common in Alvin's day, and one of his joys in becoming a centenarian was to witness the eradication of diseases so dreaded in his day.

Just before he turned 100, Alvin wrote about his life on the farm.

He was born in a building that later became the farm's granary. By the age of six, he was walking four kilometres to school every day—after doing his chores. Alvin loved that life. "Our school, Avonroy, was a one-room building housing Grades 1 to 8, and taught by a single teacher, usually a young lady recently graduated from normal school. The one-to-one method heard so much about today was completely foreign. The teacher attended to one grade at a time, while all the other students were more or less self-propelled on assignments. Some students attended to business while others doodled. I did a bit of both!"

On those walks to school, Alvin observed exactly how the road allowances were cleared of brush and graded. He has described precisely what machines were used, what engines powered the machines and how many "wagons wide" the ditches were. Here was an engineer in the making. But Alvin also observed nature and the land, which he has described in loving detail. "My memory of the countryside goes back to 1915, when it was still in its God-created condition. Since then, the whole landscape has been altered beyond belief in ways that one could never imagine. My early memories are most pleasant, and probably much like that of the native people. An indelible memory that lingers with me was the sight and sound of meadowlarks perched on fence posts along a roadway and singing their hearts out."

The farm gave Alvin his first lessons in inventing. There were no store-bought toys back then. But as a young boy, Alvin could set his jackknife to work on a willow and turn a piece of bark into a whistle or

water pistol for his younger siblings. “I now realize that our play may well have had a more lasting character development lacking in today’s push-button, gimmick-filled classrooms. In winter, we used the snow and ice for many games, and we loved tunnelling. Except for a baseball bat and glove, all other equipment came from the land, including for the game ‘Dilt,’ which required only a stick and a hole in the ground.”

Every piece of farm equipment that broke was fixed with whatever was available on the acreage or from the neighbours. In his later years, Alvin liked to call that sustainability and recycling.

The farm also set Alvin on a path that fuelled his curiosity about how things were built or how they worked. As his interest in engineering developed, his focus on inventing came to the fore. For his entire adult life, Alvin had a fully equipped workshop in his basement where he “made things,” and he turned his mind to efficiencies. “My father was very fussy and tidy and spared no effort in keeping the farm neat and orderly,” he has written. “This led to a great deal of work, which was not always carried out in the most efficient manner. Now that I am an engineer with many years’ exposure in the manufacturing industry, I can think of so many ways life could have been made easier. Arrangement of farm buildings and work areas could be improved, as could the tools and human effort needed. However, I see all this against a background of advanced education and experience not available to my father or all the other settlers.”

Alvin’s post-secondary education was deferred because of the Great Depression. Instead, he worked—including part-time work fixing appliances at a shop in downtown Edmonton just off Jasper Avenue. He continued this work all through his university years. At the University of Alberta, Alvin was educated by the greats, including Jimmie Adam, the member of the first U of A graduating class who designed the original U of A crest. Alvin’s painstaking and masterful undergraduate drawings and graphs, created during his 1935–1939 undergraduate years, have been donated to the Faculty of Engineering.

After graduation, Alvin became the British representative to the U.S. aircraft industry, from which the British were purchasing aircraft for the Royal Air Force. The British were at war; the U.S. had not yet declared, and the situation was delicate. “I was just a boy off the farm! And there I was in the midst of the war industry.” Alvin took a three-month crash course in aircraft technology in Toronto, followed by three months at an aircraft factory in Ontario. Then off he went to Los Angeles for a posting to North American Aviation for a year, capped by four years at North

American in Dallas, Texas. Here Alvin was in charge of production of the P-51 Mustang fighter aircraft which was designed by North American Aviation for the British. Later, the U.S. took over production of these workhorse airplanes, which escorted bombers for flights over Berlin and served later in the Korean War and other conflicts.

Alvin took the Mustang from prototype design to flight test and then to production of the very first model, which was shipped from the Los Angeles factory to England.

You might say that he helped to win the war.

Remembering Alvin

I met Alvin Nelson quite by chance in 2008 while roaming around campus looking for another U of A engineering grad I wanted to meet and write about—Bill Kent (Civil ’31). It turned out that Bill had already left by Greyhound for his hometown of Langley, B.C. But I did not know that. Having not found Bill, I walked to the quad, dejected—and saw an elderly gentleman sitting alone on a bench, watching everyone with an intent gleam in his eye. I was drawn to his impish, focused look, and went over to say hello. Our friendship took immediate hold from that one chance event.

Alvin survived the Great Depression, two world wars and the terrible influenza epidemic of 1918, which took more lives than the First World War. By the early 1940s, his career as an engineer was on the rise after his phenomenal success with the Mustang airplane pilot project during the Second World War. Then, in 1945, after returning from the U.S., Alvin was diagnosed with tuberculosis. He spent the next five years in a sanatorium (the “San” as he called it). It could have

been a blow and laid him low. But not Alvin. He had no symptoms, just a positive test. So he learned accounting and started a magazine for the patients by the patients. After his release, he worked on contract for Ontario Hydro. Following his marriage to Dorothy, Alvin made the life-changing decision that TB meant he must live a slower-paced life. He became a registered patent agent at Canadian General Electric and changed both his lifestyle and work style in order to stay out of the San. Alvin said: “I had to work smarter, tend to business during business hours and be selective in the work undertaken. I did not take work home. My evenings were always free for rest or activities around the home.” Alvin credited his longevity to Dorothy, and son, Bob.

Alvin had a special relationship at the U of A with Rob Burrell, chair of the Department of Biomedical Engineering. They met at a reception hosted by the Dean of Engineering in 2009 and became fast friends, spending time together on Rob’s farm and corresponding. Rob travelled to Ontario for Alvin’s

funeral and spoke to Alvin’s humanity and inventiveness and to his love for students, witnessed by his many years of volunteering at a University of Toronto information desk. Alvin once told me this: “I am supposed to be at the information desk to give students directions to various buildings, but what they really seem to need is someone to talk to about their life choices. So I listen to them and talk with them about all the many choices they can shape.”

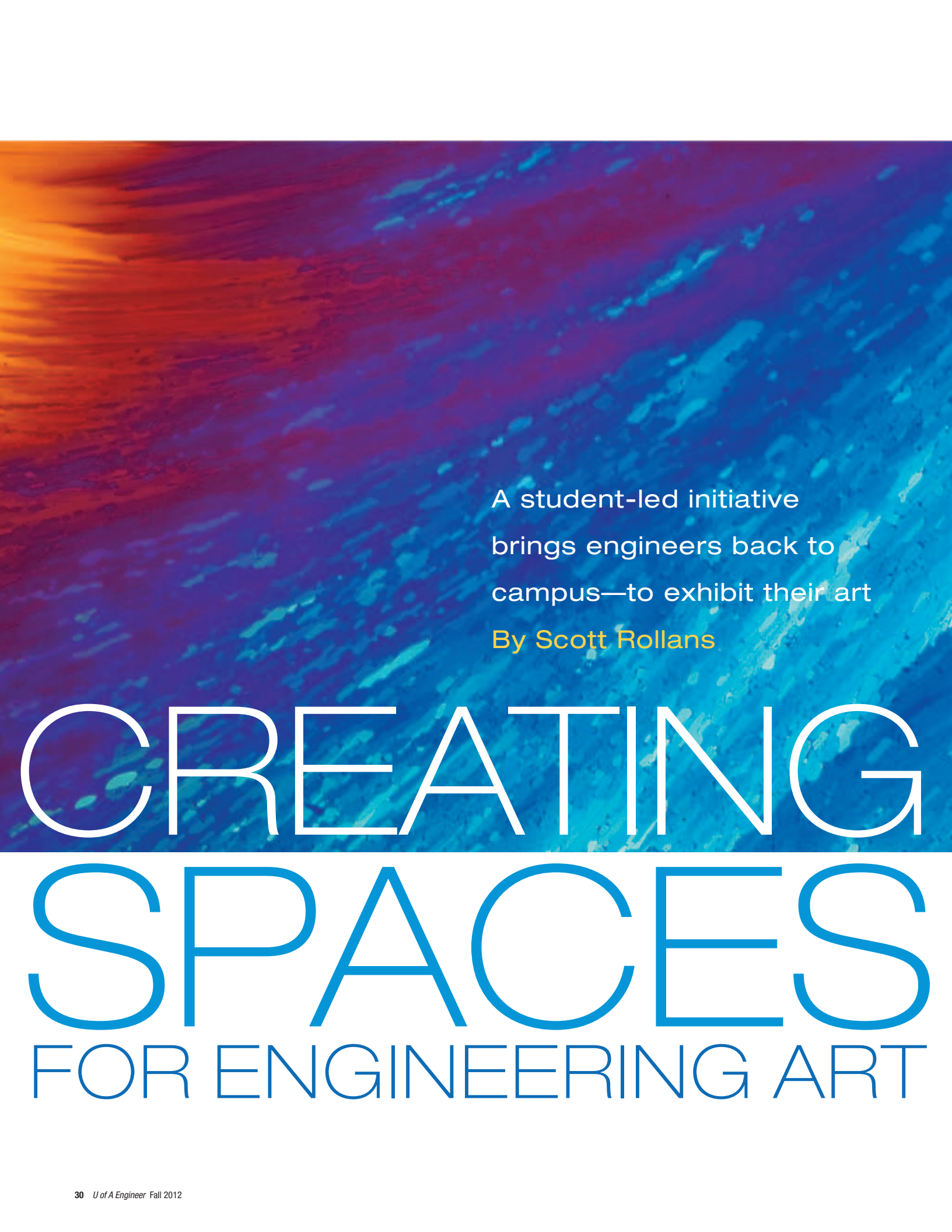
I imagine those students got precisely the advice they needed.

— Ellen Schoeck



Dean David Lynch with Alvin Nelson and Bill Kent during Alumni Weekend 2011.

Richard Cairney



A student-led initiative
brings engineers back to
campus—to exhibit their art

By Scott Rollans

CREATING SPACES FOR ENGINEERING ART



Art, loosely defined, involves using your imagination, plus the materials or people at hand, to create something new. At its heart, engineering often reflects a similar impulse. Despite this basic connection, we usually view the two as separate realms. We talk about “right brain” versus “left brain” thinking.

So, this past March, passersby could be forgiven for doing a double take when confronted with visual art exhibits in ETLC and NREF. For 12 days, the two buildings hosted ‘Spaces’ a groundbreaking exhibit of art by engineers.

The show began as the late-winter brainchild of civil engineering student Tyler Heal. “We realized that there was really no venue, or space, for engineers who also do art to display their work, and to celebrate it.” Along with co-director Fraser Mah (and their team of volunteers), Heal coaxed the project into fruition, just in time for National Engineering and Geoscience Month.

Like any good engineer venturing into unfamiliar territory, Heal sought out some expert advice. He set up a meeting with Blair Brennan, galleries and exhibitions manager for the Department of Art and Design.

Brennan was tickled by the idea of an engineering student sacrificing his precious spare time to organize an art exhibit. “Tyler’s a pretty amazing guy,” he marvels. “He said he thought about coming to talk to me because he walks past FAB gallery when he goes to his band practice. So he’s an engineer, who’s also in a band, and interested in visual art. There’s a story right there.”

Of course, Brennan knew Heal would need much more than enthusiasm to

get the job done. “Anybody who decides to put on a show, even when artists get together to put on a show, they soon start to realize what’s involved in it—what’s required technically, what’s required in their communication with the contributing artists, what’s required in promotion and parking and all that kind of stuff,” Brennan says. “You’re forced to deal with that, and deal with it on a timeline. If you say the show is open to the public on a certain date, it better be open for people to see. And they better know how to get there. And the information should be complete online.”

Heal and Mah started the planning process in January, setting March 19 as their opening. In February, they began looking for submissions, sending out the call through various engineering mail lists and doing some of their own digging online. “We just searched for things like ‘engineering art Edmonton,’ and came up with a good number of alumni that way,” explains Heal. “And a lot of it spread through word of mouth. A surprising number of people just emailed us out of the blue.”

Despite the tight deadline, the two soon realized that an actual show was beginning to take shape. “I was surprised by the calibre of the pieces that we received and by the number,” Heal says. “I think we got 52 works from 31 artists—which is a lot.

It left us scrambling a little bit towards the end, but it was definitely a lot of fun to put together.”

Terry Lawson (Civil ’72) was among the artists who answered the call. “It was a tremendous idea,” he enthuses. “Just from the perspective of all of us being ‘those left-brain guys’—to have the opportunity to show that there is another side of us that likes to come out every once in awhile. It was a great display—not only photography, but all sorts of different media.”

Like Heal, Lawson feels that art and engineering draw on a similar creative



Top: Spaces organizer Tyler Heal, a civil engineering student, plans to make the exhibit an annual event. **Facing page:** Detail from John Nychka’s award-winning polarized light micrograph ‘Fire and Ice’. **Right:** Roy Leadbeater’s sculpture (as well as his paintings) helped round out the high calibre of work on display at Spaces.



'All that Glitters is Not Gold', a quilt by Donna Clement (Civil '81) , captivated viewers at the Space exhibit.

spark. “That’s what’s fun about engineering. That’s why I like going to work every day. You’re creating things that haven’t been done before. You have to be innovative to come up with solutions.”

Lawson has a theory to explain why engineers seem particularly drawn towards photography. “Not only is there the creative aspect of taking a photograph, there’s also the technical aspect as far as the camera is concerned, and the technology to create art from your photographs with post-processing. I think that’s why photography and engineering go together.”

Since retiring, Lawson has found himself increasingly obsessed by his art—although certain traces of his old profession persist. “People who know me as an engineer see geometry in my photographs,” he laughs. “I’m still someone who likes things vertical and horizontal. I can’t get that out of my system. So those geometric shapes come out in my photographs—even when it’s nature.”

To view Terry Lawson’s work, visit terrylawsonphotography.ca.

Anima McKertcher (Computer Software '04) also sees her profession as something of an art form. “Software engineering can be quite a creative process,” she observes.

“You’re problem solving. You’re told to create something that does x-y-z, and you have to find ways to use the languages that you have, the platforms that you have, to actually do it.”

Even so, she laughs, some people have a hard time connecting her identity as a software expert with the fantasy-tinged paintings she produces when she’s away from the computer. “A lot of people are shocked when they see my art. They’re like, ‘Oh, you’re an engineer?’ I guess, to most people, those two things don’t go together. But I’ve always loved math and physics, and I’ve always loved art, as well.”

McKertcher enjoyed seeing her paintings alongside work by her fellow engineers. “It’s nice to have a show like this and to see that there are a lot of other people like me.”

Recently, McKertcher has taken a step back from full-time engineering, working from home as a consultant while raising her young son. Meanwhile, her painting has grown from a hobby to a serious side project. “A lot of people were saying, ‘I’d love to buy your art. Why don’t you have it for sale?’ So, I started spending more time on it. I developed a website and began marketing my work.”

Anima McKertcher displays and sells her art at artbyanima.com.

Travis Hnidan (Civil [Biomedical] '11) knew Tyler Heal from his student days, when the two volunteered together with Engineers Without Borders. At Heal’s invitation, Hnidan attended a few of the planning meetings for ‘Spaces’ and ended up helping with the exhibition.

Although he doesn’t consider himself a serious artist, Hnidan felt inspired to submit a work of his own to the show—a collection of eight one-panel comics by the late Jim Unger, with their captions creatively rearranged.

“My roommate had picked up a book of Herman comics from the Antique Mall, and he left it on the coffee table,” explains Hnidan. “We were flipping through it, and we realized that the comics don’t always make much sense, even with the captions. We thought it was funny to switch the captions with other ones, and we found them to be more appropriate.”

Next, with the help of a scanner and Photoshop, Hnidan made the reimagined comics a reality. The jumbled result, cleverly titled *Hiswoman*, proved popular at the exhibit, as visitors chuckled at the new versions and tried to mentally reconnect the pictures with their original captions.

During his years of study at the U of A, Hnidan learned that engineers are more well-rounded than their reputation suggests. “It was always surprising to find out what sorts of things other students were interested in,” he recalls. “There were people who were into drama or painting or music—and not just as hobbies.

“Just because you’re an engineer, it doesn’t mean you do engineering all the time.”

Titilope Sonuga (Civil ’08) helped provide the exhibition with an unanticipated wrinkle—spoken-word poetry. “I run a weekly poetry night downtown on Tuesdays, and somebody had seen me perform at the show,” says Sonuga. When Mah heard that there was a vibrant engineer/poet in town, he looked her up on Facebook.

Sonuga didn’t require much convincing. “As soon as I heard what it was about, I was on-board.”

Sonuga—reached by phone while supervising a road reconstruction project—jokes that there’s not a lot of room for poetry in her everyday work. Rather than stifle her artistic side, she decided to formally set aside time for it. “I need both parts of my brain working simultaneously to feel like I’m whole,” she says. “So I don’t see myself quitting one for the other. I like the balance of both worlds.”

Still, she found it a bit physically jarring when the two worlds collided at the exhibition. “It was kind of weird being in a room where I had probably been studying or whatever, and I’m doing poetry in that space,” she laughs.

Once the shock wore off, she found herself enjoying the sensation. “No matter what we do as engineers—or whether we’re scientists or brain surgeons—we all have our stories to tell,” she says. “Poetry’s always very relatable in that way. People like to hear stories, and that’s what I consider myself to be: a storyteller.

“It was a nice homecoming.”

See and hear Titilope Sonuga’s spoken-word poetry at titilope.ca.

On March 29, Blair Brennan strolled across campus to the official ‘Spaces’ reception. He welcomed the change of scenery. “How often do I go to SUB? Hardly ever,” says Brennan. “And I go to engineering even less. People get stuck in patterns—the students and the people who teach and work here. They get busy, and everybody’s got their heads down looking at their own work. This kind of event, whether it’s an art show or concert or poetry reading or some other public display—is an opportunity to pick your head up, look around, and see what else is around on campus.”

And what did Brennan think of the work of his budding young engineer/curators? “I’m really proud of them,” he declares. “I think they did a great job. It’s difficult enough organizing these shows when you have a gallery space. But when you’re doing it in the kind of temporary spaces they were organizing their show in, it’s a lot more challenging.”

Heal would certainly agree—he found the entire adventure a lot more exhausting than he anticipated. Still, he’s not quite done yet. “We’d like to keep this running as an annual event,” he says. “And one of our end goals is to have some permanent gallery or exhibit-style space within engineering. I’ve been logging a little bit of time with the Faculty about maybe integrating this into ICE—the new Innovation Centre for Engineering.”

When asked for his take on the idea, Brennan doesn’t hesitate for a second. “That would be great! I’d help them however I could.”

Left brain, meet right brain. And may you live happily ever after.

If you missed Spaces, you can still visit its website, which includes an online gallery, at engineeringspaces.ca.

In Memoriam

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

Mr. Frederick Astle, Civil ’59, February 2012
 Mr. Bruce Baker, Electrical ’69, February 2012
 Mr. E Gerald Brown, Civil ’55, June 2012
 Mr. James Buchholz, Chemical ’54, May 2012
 Ms. Michelle Chang, Chemical ’03, May 2012
 Mr. James Denis, Chemical ’49, April 2012
 Mr. Rene Diamond, Mining ’48, August 2012
 Mr. Geoffrey Dunn, Civil ’69, February 2012
 Mr. William Erichson, Electrical ’55, August 2012
 Mr. Tony Fettig, Civil ’52, April 2012
 Mr. Ronald Goliss, Mining ’49, July 2012
 Mr. Horace Gopeesingh, Mechanical ’73, June 2012
 Dr. Paulus A Goud, Professor Emeritus, Electrical ’59, February 2012
 Mr. M James Hannah, Chemical ’60, May 2012
 Mr. Ernest Harwood, Electrical ’50, June 2012
 Ms. Wita Holte, Civil ’97, February 2012
 Dr. Laurie Kennedy, Professor Emeritus, July 2012
 Mr. John Kraychy, Mineral Process ’58, July 2012
 Mr. Roland Lazerte, Chemical ’46, June 2012
 Mr. Frank Lewis, Mining ’39, January 2012
 Prof. Jack Longworth, Professor Emeritus, Civil ’45, March 2012

Mr. Henry Mah, Electrical ’71, May 2012
 Mr. Floyd Mathers, Electrical ’43, August 2012
 Mr. Paul McConnell, Electrical ’47, April 2012
 Mr. Bill McLaggan, Civil ’47, March 2012
 Dr. Ralph McManus, Civil ’42, MSc Civil ’46, March 2012
 Mr. Kenneth Molnar, Chemical ’88, February 2012
 Mr. Alvin C Nelson, Electrical ’39, April 2012
 Mr. Danny Nishimura, Chemical ’54, February 2012
 Mr. William Peacock, Civil ’56, July 2012
 Mr. Chester Peel, Civil ’49, March 2012
 Prof. Ron Phillips, Professor Emeritus, Electrical ’42, March 2012
 Mr. William Plank, Chemical ’51, April 2012
 Mr. Greg Price, Mechanical ’03, May 2012
 Mr. Kenneth Rainsberry, Civil ’58, March 2012
 Mr. Lloyd Schulte, Electrical ’50, March 2012
 Mr. Qayum A. Shaikh, Petroleum ’58, MSc Petroleum ’60, March 2012
 Mr. Steve Skrypiczajko, Civil ’58, February 2012
 Mr. Kenneth G Smith, Electrical ’43, February 2012
 Mr. John Sparrow, Mining ’36, February 2012
 Mr. William Taylor, Electrical ’74, April 2012
 Mr. Alan Thomas, Electrical ’76, July 2012
 Mr. William Tobey, Mining ’41, April 2012
 Mr. Norman Tozer, Civil ’62, May 2012

Mr. William Wakaryk, Mechanical ’67, March 2012
 Mr. George Walker, Civil ’50, February 2012
 Mr. Bruce H. Wilkerson, Civil ’61, June 2012
 Mr. Robert Wilson, Civil ’56, April 2012
 Mr. Bob Wright, Chemical ’70, 2012

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

Mr. Brian Bowers, MSc Chemical ’64, August 2008
 Mr. Dennis Burningham, MSc Chemical ’66, July 2010
 Mr. Doral De Maere, Civil ’55, December 2011
 Mr. Lou Earp, Civil ’51, March 2009
 Dr. Kurt Eigenbrod, PhD Civil ’72, July 2005
 Mr. James Goris, MSc Civil ’65, December 2010
 Mr. Arthur Holroyd, Civil ’50, February 2006
 Mr. Allan Lee, Electrical ’59, December 2011
 Mr. Donald Lee, Chemical ’56, August 2010
 Mr. A Bruce Murray, Chemical ’56, February 2011
 Mr. W. M. Parker, Civil ’54, December 2011
 Mr. Armin Petzold, Mechanical ’65, 2011
 Mr. James Allen Ross, Civil ’61, May 2011
 Mr. Ben Sather, Chemical ’69, April 2011
 Mr. Gerald Turnquist, Civil ’62, November 2009
 Mr. Robert Wilde, Civil ’50, November 2011

Kudos

Taking pride in achievement

HURDEY, STEVE E. PEng (Mechanical '70)

Has received an honorary doctorate from the University of Alberta in recognition of his research and teaching related to water and human health. He has also been awarded the 2012 A.P. Black award from the American Water Works Association, the world's largest professional organization dedicated to safe drinking water. Hrudey is only the second Canadian to receive this award in the association's 45-year history. He is a professor emeritus in the Faculty of Medicine and Dentistry's division of analytical and environmental toxicology.

HUDSON, CASEY (Mechanical '98)

Has been named one of Alberta's 50 most influential people by Alberta Venture magazine. Hudson is a programmer for Edmonton-based software developer and Electronic Arts subsidiary BioWare, and executive producer of its Mass Effect trilogy of games.

KIPNES, IRVING PEng (Chemical '59 LLD [Hon.] '09)

Has been invested to the Alberta Order of Excellence for his exemplary record of service. Kipnes was recognized for his leadership in business and tireless advocacy of community health, education and arts initiatives.

KRESTA, SUZANNE PEng

Has been awarded a prestigious Killam Annual Professorship. The designation is bestowed on leading U of A professors who excel in teaching, research and service. A professor in the Department of Chemical and Materials Engineering, Kresta has also been named the 2012 Academic Woman of the Year by the U of A Academic Women's Association, marking the second year in a row that the honour has been bestowed on an engineering professor.

MASLIYAH, JACOB, PEng



Has been awarded the Queen Elizabeth II Diamond Jubilee Medal, a national honour in recognition of his contributions to the greater community. A professor emeritus of chemical and materials engineering,

Masliyah is recognized as a pioneer of oilsands science whose research has had a profound impact on our understanding of this resource and the ways industry manages it. He is also an Officer of the Order of Canada.

MERTINY, PIERRE PEng

Will receive the prestigious Ralph R. Teeter Educational Award at the 2013 SAE AeroTech Congress and Exhibit, for his achievements in engineering education. A professor in the Department of Mechanical Engineering, Mertiny has previously received the Faculty of Engineering Teaching Award in Mechanical Engineering for 2008 and 2009 and 2009 and 2010 and the 2010 Annual Award for Excellence in Teaching by the Mechanical Engineering Club.

MULLANE, THOMAS PEng (Chemical '83)



Has been appointed as vice president and chief operating officer of Freehold Royalties Limited. Mullane will serve in the same capacity for Rife Resources Ltd. and Canpar Holdings Ltd. Mullane

has more than 25 years of industry experience and background including 12 years as senior vice president of Bonavista Energy Corporation.

NOONAN, SHAUNA (Petroleum [Co-op] '93)



Has been awarded the 2012 SPE Gulf Coast Section Production and Operations Award. The Gulf Coast Section is the largest region within Society of Petroleum Engineers, in terms of members.

Noonan will soon begin a three-year term as technical director, production and operations, for the Society of Petroleum Engineers International board of directors. She is currently the Wells Technology Supervisor for ConocoPhillips Drilling and Completion Technology, based in Houston.

NYCHKA, JOHN PEng (Metallurgical '97)

Has won the Engineers Canada Medal for distinction in engineering education. A materials engineering professor who leverages his students' curiosity in order to enhance learning, Nychka plays a key role in improving teaching effectiveness, in collaboration with his colleagues across campus. He was previously presented with the 2011 Provost's Award for Early Achievement of Excellence in Undergraduate Teaching the 2011 APEGA Summit Award for Excellence in Education.

RICKETTS, MICHAEL PEng (Civil '67)

Has been presented with the 2012 APEGA Summit Award for Community Service. Ricketts has contributed more than 70,000 hours of volunteer

time to support his profession and community over more than 30 years of service. The extensive breadth of Smith's service includes service with groups such as youth development, fitness training and the preservation of heritage landscapes.

SEN, ARIN PEng (Chemical [Co-op] '95)

Is the recipient of the 2012 APEGA Summit Award for Excellence in Education. An associate professor in the Department of Chemical and Petroleum Engineering at the University of Calgary makes learning fun and interactive, providing students with creative learning opportunities and incorporating relevant examples to explain course materials.

SMITH, JIM PEng (Chemical '72)

Was presented with an Honorary Life Membership Award during the 2012 APEGA Summit Awards. As well as a 32-year career with Proctor and Gamble, Smith has served his profession selflessly, involving himself with APEGA activities since 1992, including service as president from 2011 – 2012. His community serviced also includes serving as director of the Grand Prairie Chamber of Commerce, chair of the Grand Prairie College Foundation Board, chairing the Grand Prairie United Way and a host of other volunteer duties.

SWAN, KEVIN (Mechanical '05)

Has been named one of Alberta's 50 most influential people by Alberta Venture magazine. Swan is a principal with Montreal-based iNovia Capital and provides venture capital funding for startup enterprises in Alberta's tech community.

VERHAPPEN, IAN PEng (Chemical '82)



Has been appointed as head of Canadian business with Yokogawa Electrical Corporation. As managing director of Yokogawa Canada Inc., Verhappen is responsible for the firm's Canadian operations. He spent the first 25 years of his career with Petro-Canada (Suncor), joined MTL Instruments, and worked as an independent consultant.

WRIGHT, JOHN PEng (Petroleum '81)

Has been named one of Alberta's 50 most influential people by Alberta Venture magazine. He is the CEO of Petro-Bakken responsible for a restructuring plan that has turned the company's fortunes around dramatically.

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

a STELLAR career

Garry Lindberg's engineering education helped push the boundaries of space exploration



University of Alberta Creative Services

Garry Lindberg (Eng Physics '60) was recently presented with an honorary doctorate of science from the U of A. In his convocation address, he recounted his career highlights and offered advice to graduating engineering undergraduates. An excerpt of his address follows:

...By today's standards my career sounds rather conventional. After completing my PhD, I spent 35 years with the federal government, working at the National Research Council (NRC) and the Canadian Space Agency (CSA). After 10 years of carrying out research, I was appointed project manager of the Canadarm. This was a multi-faceted job that required many skills. I became an international negotiator, policy developer, financial planner, contract manager, technical overseer and communications specialist.

I was then appointed director of the National Aeronautical Establishment, with the opportunity to work with the aeronautical research communities of Canada, NATO and the Commonwealth and to establish the Canadian astronaut program. As a founding vice president I helped create the CSA, merging program elements and staff from four existing government departments with a cadre of new employees while relocating to St. Hubert, Quebec.

What would I like to pass on?

My first suggestion is to be open to receiving advice. I had the great fortune to be mentored by two people at key times in my professional life. The first was Dr. George Ford, professor of mechanical engineering and dean of engineering here at the University of Alberta. An inspiring teacher and a great thinker, Dr. Ford steered me into the Aeronautical Engineering Physics program, into graduate school and

then to the NRC. My second mentor was Frank Thurston, director of the National Aeronautical Establishment of the NRC, who encouraged me to develop my non-research skills and selected me to be project manager of the Canadarm. Sometimes mentors find you but you can also seek them out. Do not be afraid to ask for guidance from people who you respect and admire.

Secondly, be prepared to take risks and seek out challenging opportunities.

I started out as a research engineer in an exciting new field and had considerable success. I might have continued along that career path but jumped at the chance to be the project manager of the Canadarm, even though I had little project management experience and knew that this endeavour would move me well out of my comfort zone. It was a huge shift from the relative security of research, but very exciting and rewarding.

My third suggestion is to "pick your battles".

Develop your ability to understand the nuances underlying seemingly straightforward situations. Identify areas where you can influence the outcomes rather than engaging in fruitless dialogue. Seek to develop "win-win" situations and work to maintain your values and integrity regardless of the politics of the work place.

My fourth suggestion is to cultivate your innovation skills.

Strive to be creative and to think outside the box. The team of engineers, scientists and technicians who designed and built the Canadarm were faced with huge challenges. The ideal Canadarm would have had zero mass, infinite stiffness and consume no power, but of course that was impossible. Very challenging design goals were set and great ingenuity was required to develop solutions that would work.

Garry Lindberg (Engg Physics '60) received an honorary doctor of science degree from the University of Alberta during convocation ceremonies June 7.

Lastly, ensure you practice and improve your communications skills.

In today's world there are many challenges that require great technical skills. You have received a very strong foundation for these here at U of A. However, the workforce is frequently looking for someone who can synthesize and communicate with the larger public. You not only have to be technically literate and innovative but you also need to be able to explain what you do and why it is important. The challenge of being able to express views and translate highly technical concepts into words that laypersons can understand remains paramount. Thousands of amazingly well-qualified applicants competed to be a Canadian astronaut. The successful candidates also possessed superb communications skills.

In conclusion, I am very proud of my rural Alberta roots and of being a graduate of this university. I arrived here in 1956 as a rather green 15 year old. The university quietly established a safety net for me so I could survive and flourish during my four years here. Good universities do this and I feel certain that you have benefited from similar support. Be proud that you are a graduate of one of the great engineering schools in Canada and the world. You represent the high standards that the U of A has maintained for over 100 years. Stay involved and help ensure that these high standards continue.

Thank you, again, for this great honour. Good luck in your future endeavours.

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University of Alberta ENGINEERING



President's SOCIETY

Did you know...?

The President's Society was created to recognize individuals and organizations who play a leadership role in supporting the University of Alberta and donate \$1,000 or more annually to any area on campus, including the Faculty of Engineering. Once you have reached this level of giving, membership is automatically granted.

The President's Society provides donors with opportunities to become involved and engaged on campus and to connect with the recipients of their generosity: students, researchers, and faculty. Members are invited to participate in a number of gatherings; some educational, some social, and sometimes both. Members can expect to learn about issues and initiatives directly from our campus leaders: our dean, the provost, and the president.

Did you know you can enjoy all of the benefits of The President's Society and still support the next generation of UofA Engineers? **Your gifts to the Faculty of Engineering** count towards the \$1,000 threshold to become a member of this group of dedicated supporters.

If you wish to make a gift to the Faculty of Engineering for the 2012 tax year, we remind you that the University is closed from December 24 through January 1. To allow us sufficient processing time for your 2012 tax receipt, we suggest planning to make your gift by December 17.

I wish to make a gift of:

\$50 \$100 \$250 \$500 Other \$ _____

Cheque (payable to the University of Alberta) VISA MasterCard AMEX

_____/_____/_____/_____/ expiry date: _____

Name (please print): _____

Signature: _____

I have also enclosed:

a corporate matching gift form from my (or my spouse's) employer

I would like information on how to make a gift of publicly traded securities to support the Faculty of Engineering at the U of A.

I would like information on how to include the Faculty of Engineering at the U of A as part of a will, life insurance or other planned gift instrument.

I have provided for the Faculty of Engineering at the U of A in a will or trust agreement.

I would like my gift to support:

\$ _____ Areas of greatest need as determined by the Dean

\$ _____ Biomedical Engineering

\$ _____ Chemical and Materials Engineering Fund

\$ _____ Civil and Environmental Engineering Fund

\$ _____ Electrical and Computer Engineering Fund

\$ _____ Mechanical Engineering Learning Laboratory Endowment Fund *

\$ _____ Mining and Petroleum Engineering Fund

\$ _____ Other _____

* Donations made to endowment funds are invested in perpetuity and the investment earnings are used to advance the specified purposes of the funds within the University.

Please return to:

Office of the Dean, Faculty of Engineering
University of Alberta
E6-050 Engineering Teaching and Learning Complex
Edmonton, Alberta T6G 2V4

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