

WEAL

WATERLOO | **ENGINEERING** alumni letter

IN THIS ISSUE

Powering Up

New Green and Intelligent Automotive research facility driving greener and cleaner innovation

06

Biennale Innovation

Architects put their artistic mark on Venice

11

Revolutionizing Robotics

From delivering coffee to saving limbs and lives

15



WEAL

Faculty News 04

Feature Story

Powering Up 06

Our Stories

Biennale Innovation 11

Revolutionizing Robotics 15

Class Notes 19

Upcoming Events 31

Waterloo Engineering Alumni Letter

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As shown in this architectural rendering, RoboHub will be an advanced robotics research facility located in the new Engineering 7 building.



Another autumn brings another exciting addition to Waterloo Engineering as we officially open our new, state-of-the-art facility to push the boundaries of automotive research and help develop smarter, cleaner vehicles for a more sustainable future. Known as Green and Intelligent Automotive (that's GAIA for short), the \$10-million facility features the latest high-tech equipment in three labs dedicated to powertrain efficiency, longer-lasting batteries and testing on a rolling dynamometer. Part of the existing Waterloo Centre for Automotive Research (WatCAR), the new facility will enhance our position at the leading edge of Canadian innovation to revolutionize the auto industry with the electric and hybrid vehicles of the future.

That same ambitious, can-do approach to real-world problems is also highlighted in the fall's edition of WEAL through ongoing work in the burgeoning field of robotics, both close to home and abroad. Using personal experience as a source of inspiration and motivation, for instance, recent mechanical engineering graduate Richard Yim is planning to deploy a landmine-defusing robot in his native Cambodia after developing it with several teammates as a Capstone Design project. When the \$3-million RoboHub research facility opens its doors in the new Engineering 7 building in 2018, students, researchers and industry partners working on a wide range of other robotics projects will have a virtual theatre in which to test and showcase their creations.

Garnering attention for ground-breaking work, meanwhile, has become almost routine for faculty members at the Waterloo School of Architecture. A single invitation to curate an exhibit at the Venice Architecture Biennale, which draws more than 200,000 visitors every two years, is honour enough. Waterloo has been represented four of the last five times the prestigious exhibition of architectural excellence has been held, including haunting models this year of features from an Auschwitz gas chamber. Based on the research of professor Robert Jan van Pelt, the exhibit displays stark white recreations of a gas-tight hatch and other elements, plus plaster casts of documents, as architectural evidence of the genocidal Nazi plan during the Second World War.

While also putting the worst of the past in chilling perspective, Waterloo continues to show the way to a better future by educating more engineers than any other school in Canada. I am personally encouraged and gratified to note that the number of women entering our programs has climbed again to an all-time high. Thanks in large part to our outreach programs, almost 30 per cent of students starting classes this fall are women — up from just 15 per cent in 2005. It remains our priority to both recognize their vast potential to contribute in all fields of engineering and help them to realize that potential to the benefit of everyone.

To accommodate our steady growth in terms of both undergraduate enrolment and research endeavours with industry partners, work continues apace on Engineering 7, the 240,000-square-foot building that is to be home to numerous programs. Running in parallel to the construction project is our Educating the Engineer of the Future campaign to raise \$70 million towards its cost. We encourage you to read the campaign update in this edition, visit our campaign website at engineerthefuture.ca and consider becoming part of the story by contributing.

Finally, as always, I look forward to meeting many, many of you at class reunions for Waterloo Engineering in October, a chance to celebrate your shared educations, your subsequent successes and your hopes for the future.

Sincerely,

A handwritten signature in black ink that reads "Pearl Sullivan".

PEARL SULLIVAN
Dean, Faculty of Engineering

Waterloo Engineering antenna orbiting Earth

A one-of-a-kind communications device developed by Waterloo Engineering researchers is circling the Earth as a central component of a microsatellite launched June 22 in Sriharikota, India to test new technologies in space.

The product of several years of work and refinement, the compact, sophisticated antenna for identifying and managing marine traffic is built into a Canadian Space Agency (CSA) satellite that is about the size of a household dishwasher.

A team led by electrical engineering professor Safieddin Safavi-Naeini at Waterloo's Centre for Intelligent Antenna and Radio Systems (CIARS) collaborated on the project with the CSA and COM DEV International (now Honeywell Canada) of Cambridge, which built the small but powerful microsatellite.

"The antenna was designed to perform with 100-per-cent reliability because there is no way to actually fix it once it is in space," said Safavi-Naeini.

In addition to improving Canada's ability to track ships from space using technology known as the Automatic Identification System, the mission is testing devices to ensure data continuity and measure static electricity, and a new generic satellite platform design.

Rechargeable battery expert awarded prestigious Steacie honour

A Waterloo Engineering researcher is the recipient of a prestigious E.W.R Steacie Memorial Fellowship from the Natural Sciences and Engineering Research Council of Canada (NSERC) for his work in developing new materials that make batteries and fuel cells smaller, lighter and longer-lasting.

Zhongwei Chen, a chemical engineering professor and the Canada Research Chair in Advanced Materials for Clean Energy, leads a team of engineering graduate students that is producing low-cost nanomaterials for fuel cells, batteries and supercapacitors. Their technology has the potential to lower the costs of fuel cells by reducing or even eliminating the need for precious metals such as platinum and palladium.

Chen plans to use his fellowship grant of \$250,000 to expand his team and advance his research.

Lecturer honoured for teaching excellence

Carol Hulls, a continuing Waterloo mechanical and mechatronics lecturer, is the recipient of a national award for innovative teachers.

Hulls received the 2016 Society for Teaching and Learning in Higher Education/Brightspace Innovation Award in Teaching and Learning. Known for using experiential learning methods in her classes, she is a founding member of the Engineering Ideas Clinic, which incorporates hands-on activities into all Waterloo Engineering programs.

"I want my students to be innovative engineers, willing to try new approaches and learn from failure to make a better design," said Hulls, who graduated with her three engineering degrees from Waterloo and began teaching in the Faculty of Engineering in 1999.



Management engineering student receives a top co-op award

Jordan Grant, a second-year management engineering student, was honoured as engineering's top co-op student of the year by the University.

Grant was recognized for his co-op term spent as an innovation analyst at Deloitte. Challenged to create something during his co-op term, he developed the Deloitte Tech Exchange (DTEX). DTEX is an event that gives Waterloo students the chance to work with high-end technology that would otherwise be unattainable due to cost.

\$2-million entrepreneurship program launched

Waterloo Engineering has partnered with a Silicon Valley-based venture capital firm to provide a new entrepreneurship program for students that includes access to a \$2-million venture capital fund and expertise from the world's leading startup ecosystem.

The Waterloo Engineering | Spectrum 28 Student Venture Program is providing senior students with early-stage venture support through pop-up classes and expert mentorship in addition to the opportunity to compete for funding.

The idea for collaboration came from alumnus Lyon Wong, who graduated from systems design engineering in 2003 and went on to found Spectrum 28. Wong believes entrepreneurial student teams will benefit from the twin advantages of having a closer connection with engineering faculty members as well as having graduate students or faculty members as co-founders.

The year-long program includes a series of pop-up classes with Waterloo faculty and Silicon Valley experts, a Fast Feedback Day where the successful teams go on to refine their ideas or products, and a Demo Day.

Educating the Engineer of the Future update

At Waterloo Engineering, no one happily settles for an 88% final mark. Those who aspire to solve the difficult problems of the world buckle down, ask for help and then give it all they've got.

That's where we are at now with our Educating the Engineer of the Future campaign. With a private-sector fundraising goal of \$70 million to support four priorities: construct Engineering 7; enhance student experience; provide more graduate scholarships; and establish Chairs in emerging technologies, we are now at 88% of our goal. This means we have successfully raised \$62 million as of August 2016. But, like all dedicated engineers who have a difficult problem to solve, we need to achieve 100% in order to make the vision we have for our students and research a reality.

Waterloo Engineering has had some phenomenal support over the two years of this campaign from individuals and industries who believe in Waterloo Engineering's vision. From multi-million-dollar philanthropic gifts that provided crucial impetus to our campaign to the \$100 donations from supportive friends of Engineering, we are enthusiastically chipping away at the \$70-million goal.

Strong industry support

What is abundantly clear in this campaign is how closely industry wants to partner with the world-class researchers here at Waterloo. Through industry support, Waterloo Engineering is now able to fund new Industrial Research Chairs in emerging technologies, such as the General Motors Industrial Research Chair in Integrated Computational Mechanics for Mass Efficient Automotive Structures. It's these types of partnerships that are allowing Waterloo Engineering to continue to be a key driver in our nation's quest for innovation excellence.

With just one year remaining in our Educating the Engineer of the Future campaign and \$8 million left to raise, we are working hard to share our vision with as many people as possible. At Waterloo Engineering, the future is in our hands and we want you to be with us. To read more about our campaign, visit: engineerthefuture.ca

A | **Carol Hulls** of mechanical and mechatronics engineering received a national award for teaching.

B | **Safieddin Safavi-Naeini**, **Aidin Taeb** and **Reza Rafi** of Waterloo's Centre for Intelligent Antenna and Radio Systems developed a unique communications device that's now orbiting Earth.

Powering Up

New automotive research facility
driving greener and cleaner innovation

Ross McKenzie, managing director of WatCAR, **Stefanie Bruinsma**, powertrain engineer for GAIA, and **John McPhee**, who heads up GAIA, test the performance of an electric vehicle in Waterloo Engineering's Green and Intelligent Automotive (GAIA) research facility that officially opens its doors this month.





On a frosty couple of days last March, about 100 people camped outside a Vancouver Tesla dealership for over 28 hours. The individuals were willing to brave the elements for a chance to pre-order the Model 3, an electric car with a starting price of \$35,000 U.S. that they hadn't yet seen.

Although the car won't go into production until 2017, Canadians in Vancouver, Toronto, Montreal and elsewhere were willing to put down \$1,000 to add their names to a waiting list for a chance to own the vehicle with an expected range of at least 345 kilometres, more than double what most other popular electric vehicles get now.

Waterloo Engineering researchers are coming up with equally innovative solutions. Whether they're developing technology to increase battery longevity, using intelligent transportation systems technologies to make cars more efficient, or finding ways for electric vehicles to thrive even in Canada's cold climate, professors, staff members and students are helping create a new breed of smarter, cleaner vehicles that could revolutionize the automotive industry.

This month, a brand new state-of-the-art Waterloo Engineering facility officially opens its doors to automotive researchers. Part of the Waterloo Centre for Automotive Research (WatCAR) that leads automotive-academic collaboration in North America, the \$10-million Green and Intelligent Automotive (GAIA) research facility provides the high-tech equipment needed to push the boundaries of research.

GAIA consists of three labs: one focusing on powertrain efficiency, another on longer-lasting batteries for hybrid and electric cars, and a third for testing research-modified hybrid electric vehicles on rolling dynamometers in

real-world conditions. Although Toyota is a significant sponsor of the facility, lab space will be made available to interested parties.

"We can do innovative development and testing on hybrid and electric vehicles that nobody else is able to in Canada," says John McPhee, the Canada Research Chair in System Dynamics who heads up the lab. "That's exciting."

Increased visibility

Stefanie Bruinsma can't wait to see the lab in full action.

As someone who admits her childhood dream was to become an automotive engineer, stepping into the facility is a little like walking into a candy store. Bruinsma, who graduated in 2015 with a degree in mechanical engineering and has her Red Seal Trade designation as a mechanic, is the powertrain engineer for the GAIA lab.

She's impressed by the lab's scope and scale, which means that a research project can progress through stages all within the confines of the facility. A project could start at the component level — say, optimizing energy usage in a battery or engine — before implementing the technology into the powertrain system and then testing it in a full vehicle on a rolling dynamometer. Eventually, the vehicle can move to the test track.

Bruinsma says the lab is indicative of how automotive engineering is gaining more visibility at Waterloo.

"I chose Waterloo because it's one of the best engineering schools, but I hadn't realized how much automotive research is on campus and how many resources there were," she says. "Everything that I want is here. And now this lab brings it all together."

Range in motion

Creating a game-changing green car is not without its challenges. “Range anxiety” is a huge problem when it comes to convincing drivers to pay for and drive electric vehicles. That is, people worry that their cars will run out of energy before they get to their destination.

Addressing the anxiety is one of the most important hurdles to jump if electric cars are to truly take off. Some believe that the best way to do that is by developing technology that makes the anxiety moot. In other words, build cars that go further.

To address this issue, Waterloo researchers are finding ways to create more powerful batteries that hold a charge longer. Zhongwei Chen, a chemical engineering professor and Canada Research Chair in Advanced Materials for Clean Energy, recently secured a \$3-million funding agreement that will help further his work on developing silicon-based lithium-ion batteries. The new batteries will be more reliable, inexpensive, lightweight and longer-lasting than today’s versions, which depend on graphite anodes.

The new technology promises a 40 to 60 per cent boost to energy density and could eventually reduce a vehicle’s weight, making it even more efficient and able to travel 500 kilometres on a single charge.

“The end target is to commercialize this technology,” says Chen, who predicts that could happen within the next few years.

Meanwhile, Parisa Golchoubian, a systems design engineering graduate student, is working on simulating ultracapacitors so they perform in conjunction with electric vehicle batteries.

Zhongwei Chen is developing silicon-based lithium-ion batteries that will be more reliable, inexpensive, lightweight and longer-lasting than today’s version.

Ultracapacitors are a promising technology due to their astounding ability to deliver a quick surge of power. They store energy in an electric field, rather than in a chemical reaction, so they can be charged and discharged hundreds of thousands of times.

While batteries wear out much faster than ultracapacitors, they do have something important going for them: they have more energy storage capacity. Ultracapacitors are able to store roughly five per cent of what a lithium ion battery can. In a car, that would mean lightning-speed charging — but the vehicle would run out of pep quickly.

Golchoubian is writing algorithms that partner batteries with ultracapacitors to take advantage of their best qualities. She’s working on code that sends a message to the ultracapacitor to kick in so the battery can continue to do what it does best: maintain a consistent charge when acceleration isn’t needed.

“We’re trying to put bursts of power on the shoulders of the ultracapacitor to increase the battery’s life,” she says.

Golchoubian explains that the next stage will be using GAIA’s battery cyclers to test the ultracapacitor and eventually couple it with the lab’s test vehicle.

Increasing battery efficiency by decreasing heat (ultracapacitors use less) would also increase driving range.



Intelligent technologies

Improving batteries isn't the only option for increasing range, says Nasser Azad, a systems design engineering professor and director of Waterloo's Smart Hybrid and Electric Vehicle Systems Lab. Azad and McPhee, also a systems design engineering professor, are collaborating on a project with Toyota and a team of a dozen grad students to improve fuel economy and driving range by developing more intelligent control systems for electric and hybrid vehicles.

Azad and McPhee are using intelligent technologies that already appear in high-end cars today: GPS, vehicle-to-vehicle communication systems, vehicle-to-infrastructure communication systems and geographic information systems that capture, store and check data of everything around the vehicle as well as the route information. With that data, they're able to help the vehicle drive at maximum efficiency.

"If you're driving your vehicle with this technology, you know if there will be a hill in one or two kilometres and what the traffic conditions will be like in five kilometres," says Azad.

Information about grade, slope variations, traffic and even traffic lights are fed to the energy management controller, which decides how best to use the vehicle's energy sources. In a hybrid car, this can mean tapping into the battery if the vehicle knows there's a charging station only 10 kilometres down the road.

Azad says the GAIA facility will enable industry-grade testing and help researchers validate their newly devised controller.

"It wouldn't be possible without having access to such a great lab," he explains.

McPhee agrees the innovations fostered through the lab will not only have a significant impact on Waterloo Engineering research, but also on Canada as a whole. To be sure, creating a robust plug-in vehicle still needs work — Canada's cold winters and sheer distance between communities are challenges particular to the country and need to be addressed — but technology is improving all the time.

There's also support from the government in the form of rebates and a commitment to building a network of public fast-charging stations across the country. Green car owners can already charge up at stations in Tofino, B.C., to Mount Pearl, Nfld., and everywhere in between.

McPhee is certain this perfect storm of government interest, industry focus, public demand and emerging technology means it's no longer a matter of if we'll all be driving greener, smarter and even autonomously supported vehicles, but when.

"I think it's inevitable and it's going to happen even sooner than people realize," says McPhee. "You and I are going to be riding in zero-emission autonomous cars within our lifetime."



A | The \$10-million GAIA facility provides the high-tech equipment needed to push the boundaries of research.

B | **Parisa Golchoubian**, right, and her graduate studies supervisor **Nasser Azad** research ways to help vehicles drive at maximum efficiency.



Electric Vehicle Challenge: Design, Build, Race

While work at GAIA helps drive automotive innovation, the annual Electric Vehicle Challenge at Waterloo is doing its part to inspire the next generation of researchers and other professionals by putting teenagers to a test of skill, teamwork and perseverance.

Fourteen high school teams were part of this year's spring event, which saw revved-up go-carts running on 12- and 24-volt batteries racing around the .8-kilometre track set-up in an east campus parking lot. The number of teams is a sharp increase over last year when half that number competed.

"The goal of the competition is efficiency and endurance," says Peter Teertstra, director of the Sedra Student Design Centre and organizer of the event. "That really translates well into green energy and vehicles."

To win, each team must design, build and race a small vehicle that will run for one hour and finish the course using a battery with just enough power to get the job done. A well-designed, well-built and efficient car is more likely to make it to the finish line. Design flaws

and wasted energy due to friction or a heavy frame can spell disaster.

Keeping an eye on the speedometer is important too. For this race, speed does not necessarily equal a win.

Winning the race — as local Bluevale Collegiate Institute did in both categories this year — is only part of the event's *raison d'être*, says Teertstra. Successful teams can be as small as 10 students or as large as 60 or 70, but the one thing they have in common is their ability to engage students of all backgrounds. That means university-bound future engineers rub shoulders with those who aspire to marketing, sponsorship and fundraising careers, as well as youth who know their way around a milling machine.

"A lot of schools are breaking down barriers between students. They're trying to bring all of those groups together so they can collaborate," says Teertstra, a Waterloo mechanical and mechatronics engineering lecturer. "Having something like the EV Challenge gives schools the opportunity to put a real focus on that."

Increasing numbers of teams are powering up for the annual high school Electric Vehicle Challenge held on Waterloo's campus.



Biennale Innovation

Architects putting their artistic mark on Venice

For elite athletes, participating in the Olympics is the ultimate goal. For leading architects, it's the Venice Architecture Biennale: the largest and most important world-wide architectural exhibition, bar none. Every two years, more than 200,000 visitors descend on the city of canals to see the world's brightest talent unveil their ideas.

Waterloo School of Architecture faculty members have been invited to curate exhibits at four of the past five biennales — an unparalleled feat. “There’s no other school of architecture in Canada that’s had this kind of presence,” says Rick Haldenby, a professor and former director of the School of Architecture. “What’s particularly striking is just how different each Waterloo contribution has been.”

The Evidence Room, this year’s powerful Waterloo exhibit at the Venice Biennale, is definitely no exception.

Architecture of Auschwitz

The 2016 Biennale, open until November 27, is overwhelming in scope, a sprawling collection of 39 national pavilions plus a central, 2,800-square-metre exhibition space all vying for attention. So perhaps it’s not surprising that it takes many visitors a minute to realize that the sparsely signed, white-on-white room they entered isn’t simply a passageway to the next exhibit — and another minute for the meaning of the three stark structures on display to sink in.

The Evidence Room presents models of the architecture of Auschwitz: a ladder leading to a gas-tight hatch, a column used to deliver the deadly cyanide pellets, and a gas chamber door. On the walls, plaster casts turn blueprints, letters, photographs and contractors’ bills into three-dimensional proof that Auschwitz was deliberately designed to murder.

“It’s evidence about the worst crimes ever committed by architects,” explains Robert Jan van Pelt, a cultural historian in Waterloo’s School of Architecture. “The genocide of the Jews was done with all the tools of modern civilization, including architecture.”

To present that evidence at this year’s Biennale, he worked with Waterloo School of Architecture colleagues Donald McKay and Anne Bordeleau, current director of the school. McKay developed the design of the room and models, while Bordeleau, aided by a team of co-op students, took charge of making the models and creating the plaster casts that brought dozens of documents to life.

Like casts of footprints, her plaster creations make the absent tangible. “You give these pieces of evidence a natural presence that could be touched and touch you at the same time,” she says.

And that’s exactly the point. According to van Pelt, looking at things objectifies them, while physical contact sparks a different kind of connection. “What we tried to do is work through the gut,” he says. Van Pelt has immersed himself in the architectural details of Auschwitz for years, but some things still pack an emotional punch, like the replica of a gas column that killed 90,000 people. Touching it for the first time brought him to tears.

Venice papers declare The Evidence Room one of the “must see” exhibits of the Biennale, while weblog ArchDaily put it on its top 12 list. Although the exhibit focuses on the Holocaust, McKay hopes viewers take away a bigger message. “For me, it’s a larger cautionary tale about civilization,” he says.

Arctic Adaptations

Two years ago, Waterloo architecture professor Lola Sheppard put the spotlight on Nunavut, then celebrating its 15th anniversary. While there was much to celebrate about Canada’s youngest territory, the list didn’t include architecture. North of 60, building designs are imported from the south and chosen for how quickly and inexpensively they can be assembled.

“No one has figured out what contemporary northern vernacular might be, one that is contemporary but draws upon traditional Inuit relationships to seasonality, the land and culture,” Sheppard explains. And that, she says, creates tremendous potential.

Sheppard and her colleague, University of Toronto architect Mason White, worked with five northern architects, five northern organizations and five schools of architecture to imagine alternatives grounded in the geography, climate and culture of the Arctic.

They quickly realized that such a complex narrative had to be tackled in multiple ways, so soapstone carvings and photos from community competitions joined architectural models, topographical maps and timelines.

The exhibit — which garnered Canada’s first honourable mention at the Biennale — aimed to provoke questions, awareness and, above all, a sense of possibility. “What we really wanted was to make a case for architecture as a tool of cultural empowerment,” says Sheppard.

A | Interior perspective of The Evidence Room with plaster casts and models of gastight door and Auschwitz gas column.

B | Waterloo Architecture students **Alexandru Vilcu, Siobhan Allman, Anna Longrigg, and Piper Bernbaum** review the Auschwitz Crematorium Evidence Plans with **Robert Jan van Pelt**, second from right.



C | Hylozoic Ground presented a fantastical vision that reimagined architecture in radical ways.

Hylozoic Ground

With Philip Beesley's 2010 exhibit, visitors to Venice discovered a fantastical vision that reimagined architecture in radical ways. Instead of closed walls and firm boundaries, Hylozoic Ground presented delicate meshwork canopies, glowing lights, liquid-filled flasks and frond-like structures that furl and unfurl when touched.

"Our ambitions are pretty large," Beesley says. "We're asking questions like can architecture be alive? Can it respond to us?"

To develop answers, he collaborated with robotics experts, industrial designers, chemists and electrical engineers, injecting intelligence and movement into his creation using sensors, microprocessors and shape-memory alloy actuators.

The result was literally the talk of the town. Haldenby recalls sitting in a restaurant on the other side of Venice and overhearing conversations about Hylozoic Ground at every table. One critic called it "a symphony of pure sensation."

For Beesley, it was a projection of what the architecture of the future could be — and a success that has taken him around the world. Since Venice, he has toured with the South Korean president through his installation in Seoul, collaborated in a series of Paris runway couture shows and exhibited his "sentient" architecture at Washington's National Academy of Sciences.



41° to 66°: Architecture in Canada

Kicking off Waterloo's remarkable run in Venice was John McMinn. In 2008, he and a colleague at Ryerson University, Marco Polo, were invited to represent Canada with an exhibition linking regionalism and sustainability.

As architects began shifting from 20th-century ideas of internationalized architecture to a more regionally grounded approach, McMinn saw them incorporating elements of sustainability — often unconsciously.

That's because regional traditions date back to the days when people relied on local materials and created buildings designed with local climates in mind. Canada, with its diverse geographies and cultures, offered no shortage of examples.

In 41° to 66°, McMinn and Polo presented examples of contemporary regional architecture from 27 firms across the country, ranging from the rammed earth walls of the Nk'Mip Desert Cultural Centre in Osoyoos, BC, to the curved arch trusses made from small-diameter spruce and pine in a Nova Scotia meeting hall.

"What we were trying to do was talk about and reflect on the fact that sustainability is more than a technological exercise," McMinn explains. "It is a cultural exercise."



D | 41° to 66° showcased examples of architecture ranging from the earth walls of the Nk'Mip Desert Cultural Centre in Osoyoos, BC, to the arch trusses in a Nova Scotia meeting hall.

It's who we are

Bordeleau, who became director of the School of Architecture this past spring, says she's honoured not only by the continued involvement of the school's faculty members at the Venice Biennale, but more particularly by how professors have made it part of their mandate to also involve undergraduate and graduate students in every project.

Haldenby isn't surprised that Waterloo has joined the small handful of schools worldwide to be represented at the Biennale. "At one level, it's just who we are," he says. "It's the way we conceive ourselves as being part of that level of discourse, culture and education."

A four-decade connection to Italy through the school's Rome Program doesn't hurt. Since its launch in 1979, more than 2,000 Waterloo Architecture students have honed their skills in the Italian capital, gaining global perspectives and adding their voices to international conversations.

Haldenby's colleagues list other factors: ambitious faculty members, a supportive and collaborative environment, and a climate that embraces experimentation. According to Beesley, the School of Architecture encourages its faculty and students to be entrepreneurs, create possibilities and take risks.

And while it's a distinct privilege to be invited to Venice, pulling off a successful exhibit takes a tremendous amount of effort, resources, ingenuity and stamina. There again, faculty members have proven they're up for the challenge.

For van Pelt, it's simple. "No other architecture school in the world could have done this," he says. "I really am convinced of that."

In 2014, Waterloo Architecture's entry in the Venice Biennale put the spotlight on Nunavut, then celebrating its 15th anniversary.



Revolutionizing Robotics

From delivering coffee to saving limbs and lives

When the RoboHub opens its doors in 2018, the glass-walled structure on the ground floor of the new E7 building will put Waterloo Engineering's robotics research on awe-inspiring display.

William Melek holds up a sheaf of requisitions for equipment the new facility will house. A fleet of top-end Aeryon drones — “one of the best quad rotor platforms out there,” says Melek, the director of mechatronics engineering. Two robotic torsos and two full humanoid figures with a remarkable 240+ degrees of freedom each. Plus an assortment of mag-lev robots that can hover in mid-air, thanks to an array of magnets installed under the RoboHub floor in a custom-built pit.

The 10x10x10-metre space will offer a collaborative environment where students, researchers and industry partners can put robots through their paces and analyze performance with a 24-camera motion tracking system.

“We do not know of any other institution or research facility in North America that will have this kind of equipment all under one roof,” says Melek, who heads up the \$3-million initiative.

Robotic caregivers

We're moving to a future where robots aren't confined to the controlled environment of high-tech manufacturing plants. In the coming decades, they will fight fires, drive cars and perform surgery.

They might even be looking after us in our old age. And for that, humanoid robots are the best bet, says Dana Kulić, head of Waterloo's Adaptive Systems Lab and a RoboHub collaborator. If you want a robotic caregiver that can grab a can of soup from your kitchen cupboard, for example, something designed like Star Wars' C-3PO will have a much easier time of it than R2-D2.

You also need a robot that can learn, because programming it to deal with all the variations and

complexities it could encounter in a household just isn't feasible. “Think about a simple example of a robot helping people open a door,” says Kulić, an electrical and computer engineering professor. “Different homes have different doors. The handle is different, it's located in a different place, it opens in a different direction.”

“We really have to move to a situation where the robot is learning as it's embedded into its environment,” she says. That's why Kulić is developing algorithms that will allow robots to watch humans perform a task and learn from them.

Coffeebots and self-driving cars

Meanwhile, in the Waterloo Autonomous Vehicle Laboratory, director Steve Waslander envisions a future that includes self-driving cars, infrastructure-inspection drones and an email-summoned coffeobot that brings freshly brewed joe right to your desk.

The coffeobot is coming along nicely. Waslander predicts it will be keeping the third floor of Engineering 5 supplied with caffeine in a matter of months. Self-driving cars might take a little longer.

To navigate roads safely, autonomous vehicles have to recognize all the signals and objects around them: lane markings, signs, other vehicles and, of course, pedestrians. “And none of the cars look the same, none of the road markings are consistent, every sign is at a slightly different height and slightly different angle,” says Waslander, a mechanical and mechatronics engineering professor. “That's where the real research challenge lies.”

To tackle those problems, he's working with researchers from across Waterloo's campus, including electrical and computer engineering, mechanical engineering, systems design engineering, computer science and applied math. Their work got a big boost with the arrival of an experimental self-driving car over the summer.

The drone rangers

Waslander is also developing drones that can shift seamlessly from open skies to dark, cramped environments where GPS signals don't penetrate, enabling them to inspect the undersides of bridges.

According to his collaborator, Sriram Narasimhan, infrastructure inspections are often limited to what an official can see standing on the shoreline or by the side of a highway with a pair of binoculars. Drones equipped with cameras, laser scanners and infrared sensors could reveal far more.

Of course, navigating the underbellies of bridges while keeping the drone steady enough to get high-quality information takes a lot of skill. That's why Narasimhan has set his sights on developing drones that fly themselves. "We want to build as much autonomy as possible into the drones for them to acquire high-quality inspection information without relying on pilot skills," explains the civil and environmental engineering professor.

Once they've succeeded there, says Waslander, the next challenge is creating collision-avoidance systems for dense urban environments, opening the door to drones that deliver everything from packages to pizza.

Robotic rehab

Regaining muscle function after a stroke requires thousands of repetitive exercises. "The problem is that each patient needs a great deal of individual attention," says John McPhee, director of Waterloo's Motion Research Group. His team is developing a robotic alternative that will soon be helping stroke patients at Kitchener's Grand River Hospital.

Sit in front of the screen, grasp the handle extending from the white box and the robot will guide you through the appropriate exercises to help your arm regain mobility.

In the early stages of rehab, you need more help, so the robot works in an assistive mode, McPhee explains. As you get stronger, the robot switches into a resistive mode. And thanks to controllers developed by doctoral



A | Erik Wilhelm, second from left, and Foong Shaohui, also a professor at Singapore University of Technology and Design Engineering, Harsh Bhatt, a recent Waterloo mechatronics engineering graduate, and Abhishek Gupta, a Nanyang Technological University graduate, have put together a swarm of robots that can explore their environment and share what they discover.

B | Dana Kulić is working on algorithms that will allow robots to watch humans perform a task and learn from them.



candidate Borna Ghannadi, it has the intelligence to know when to make that change.

Ghannadi and Sara Greenberg, both members of McPhee's research group, are developing a posture-tracking system to ensure patients using the rehab robot are engaging the correct muscles. Their approach combines the Microsoft Kinect sensor with biomechanical modeling. The biggest hurdle is ensuring the system can achieve enough accuracy, given that no two humans are alike.

"I like difficult problems," says Greenberg, a systems design engineering master's student. And knowing she could help people recover faster spurs on her work.

Prior to coming to Canada in 2013, Ghannadi worked as a mechanical engineer in Iran developing surgical and lower-extremity rehabilitation robots. He said a logical extension of his research was to pursue upper-extremity rehabilitation systems.

"My passion for helping others and tackling challenging problems from an engineering perspective has been a large motivator," says the systems design engineering PhD student.

He chose Waterloo Engineering for his doctoral work because of its reputation and to work with McPhee, the Canada Research Chair in System Dynamics.

"I was also very interested in the recent research partnership between the University of Waterloo and Grand River Hospital," he adds.

Doing their own thing

As robotics research at Waterloo continues to grow, alumni are taking their expertise around the world.

In Erik Wilhelm's gleaming white lab at the Singapore University of Technology and Design, small, wheeled robots decorate his desk. The chemical engineering graduate (BASc '05, MASc '07) has put together a swarm of robots that can explore their environment and share what they discover with each other.

"We try and keep the amount of information we tell the robots about the world to a minimum and let them learn the rest," Wilhelm explains.

More than a dozen Waterloo co-op students have had a hand in the research, which sees the vehicles zipping around the room, pinging data back and forth as they hunt for their quarry: light, objects and sometimes even each other. In the process, they're also noting other objects they encounter, accumulating knowledge they can draw on in the future.

Ultimately, Wilhelm envisions being able to put lots and lots of small, cheap robots into unfriendly environments — think space or deep ocean — where they get on with their job without human intervention. "Everybody's working towards the state where we can take a step back from robots and let them do their thing," he says.



C | Borna Ghannadi, right, and Sara Greenberg are developing a posture-tracking system to ensure patients using a rehab robot are engaging the right muscles.

Saving lives and limbs

Meanwhile, Richard Yim, a 2016 mechanical engineering graduate, is heading to Cambodia at the end of this year to put his landmine-defusing robot to the test.

Roughly the size of a toaster oven, the robot is designed to slice open landmines and melt the TNT in the detonator, rendering them harmless. Developing it has been a lifelong vision for Cambodian-born Yim, who grew up in a world where a stroll in the wrong direction can cost you a limb if you're lucky, your life if you're not.

The robot started as a senior-year Capstone Design project. Yim and his teammates spent endless hours developing a workable prototype. The biggest challenge, however, was stripping the design down to its core components to produce a machine that is easy to use, maintain and repair anywhere in the world.

The result won a \$10,000 Norman Esch Capstone Award and, on the following day, a \$25,000 prize at the Velocity Fund pitch competition. "It was the best week of my university career," Yim says.

Yim and two of his Capstone teammates launched Landmine Boys to commercialize the technology and are collaborating with NGOs to take it global.

"If we could eliminate landmines in the world one year early, we'll save thousands of lives," says Yim, who begins Waterloo Engineering's Master of Business, Entrepreneurship and Technology program this month. "If we can do it 10 years early, we can save hundreds of thousands of lives. And that's what we aim to do."

Leading the way

The Waterloo region is well known for its robotics expertise, due in large part to Waterloo Engineering. Just a few kilometres from campus, Aeryon Labs, 2G Robotics, Clearpath Robotics, Avidbots and Intellijoint, all founded by Waterloo Engineering graduates, have earned reputations as global industry leaders.

The RoboHub will create a nexus for further collaboration and innovation. "I'm very, very excited about this," says Melek — with good reason.

Richard Yim, left, CEO of Landmine Boys, discusses his work with landmine victim **Haem Vanna** in Cambodia.



Class Notes

1962



BOB DAVIES (Mech '62) is 90% retired. He spends summers at his cottage putting additions on buildings and installing wells and septic systems. During the winter, he travels and consults to the plastic and window industry while further developing his Magic Window System.

1963

KEN DUNMOW (EngPhys '63) lives in Orillia where he's been mainly retired since 2010 while still enjoying an I.T. and SR&ED-Claims consulting practice. Previously, he spent 10 years stateside with Corporate-Legal Consulting & Software House working on next-generation compatible product design and business-development of highly-scalable, web-based products for international/multi-location clients.

kdunmow@earthlink.net

1964



RANALD CURRY (EngPhys '64) is a retired instrumentation and electrical engineer who specialized in the design and construction of power plants. Ranald lives in New York and

Victoria Harbour.

rgcurry@yahoo.com

1965

RUSSELL MOORE (Mech '65) retired 15 years ago. Currently, he and his wife Audrey are tutoring Syrian refugees, which include a mother and her three children who are 13, 11 and 9. The family arrived in Peterborough at the end of December 2015 and were featured in Maclean's magazine. They are also tutoring a 23-year-old man who escaped Syria and arrived in Peterborough in mid-February.

1966

Class Reunion | 50 years

October 1, 2016

ALLAN RIDDELL (Mech '66) reports that he has been selling real estate in the Alliston, ON area for the past 10 years. He also enjoys coaching hockey and baseball.

1967

GARY KIDD (Elect '67, '71) reports he is officially retired, but is now working on an instrument to measure the ocean flux of CO2 from a mobile platform ranging from Australia to Antarctica. Additionally, he's working on a breath gas analyzer for CO2, H2O, Ch4 and acetone. Both instruments use IR lasers.

www.gatinstruments.com

1968

GEE TSANG (Mech '68) has travelled widely since retiring and doing subsequent consulting work. In the last year, he visited mainly Spain and Portugal in Europe, primarily China, Japan and Hong Kong in Asia, and islands in the Caribbean.

1969



ROMESH BATRA (Mech '69) received a 2016 Hind Rattan (Jewel of India) Award from the Non-Residents of India (NRI) Welfare Society for outstanding lifelong accomplishments. The annual honour on January 26, the eve of

Republic Day in India, is bestowed on just one recipient for approximately every million non-residents.



RICHARD BEIFUSS (Elect '69) retired from Public Works Canada in 1999 as director of contract claims management/senior arbitrator. He has since been an international lecturer on construction management/arbitration

and is currently an international construction arbitrator.

doctorrichardbeifuss@yahoo.com

GORDON FOY (Elect '69) retired in 2012.
Gordon.foy@telus.net

ADRIAN TREVISAN (Chem '69) retired a decade ago after working for 37 years at Kimberly Clark. He went on to do six years of consulting in the consumer paper business, primarily on machine startups and performance improvements. Adrian and his wife, Isabel, live in Woodstock, Georgia, where they enjoy travelling, golfing and spoiling their grandkids.

1970



NOEL DACOSTA (Chem '70) is retired from active practice. He was honoured by the government of Jamaica in 2012 as a Commander of the Order of Distinction for his contributions to engineering and manufacturing.

MURRAY ETHERINGTON (Mech '70) is retired but still juggling three jobs, Warehouse Safety Inspection, Jade Mining in BC and Tools for Mining, stemming from his corporate career. He lives in Mississauga, where he also does volunteer work.

WILLIAM NELSON (Elect '70, Mech '73) has been commuting since 2000 from the Toronto area to a part-time appointment at San Diego State University. Current projects in California include launching a satellite constellation to monitor air pollution and providing out-of-hospital cardiac monitoring for pro athletes and cardiac patients.

VICTOR SHANTORA (Chem '70, '71) reports that the chemical engineering Class of 1970 is holding a reunion in the fall of 2017. For details contact Vic or Tom Little (Chem '70).
thomaslittle@rogers.com
vshantora@gmail.com

1971

Class Reunion | 45 years
 October 1, 2016



WILLIAM ACAR (MSci '71) is a retired professor emeritus from the College of Business of Kent State University and lives in the North Bay area of San Francisco. He remains an active researcher and writer.
William.Acar@gmail.com



TOM ATKINSON (Mech '71) is retired after working in Canada, the United Kingdom, the United States, Indonesia, Kuwait and Saudi Arabia in positions including manager of mechanical engineering. He also hitchhiked around the world, and has been both a helicopter pilot and a photographer.
www.ravenseen.photoshelter.com



JAMES (JIM) ENGLISH (Mech '71) retired in 2013 after more than 40 years in the international underwater engineering and service industry, working for clients including the military and Hollywood. The recipient of an honorary doctorate and an award for pioneering work in submarine rescue systems, he lives in Lions Bay, BC and continues to consult on special projects.
jimenglish@shaw.ca



FRED PREIS (Mech '71) is nearing retirement as president and founder of AirStream Systems, a supplier of high-tech fans. He recently received an AIST award for the best energy efficiency upgrade in the steel industry.
f.preis@airstreaminc.ca



GIDEON TANKUS (Mech '71) has been associated with the defence and aerospace industry for 35 years, the last 29 of them through his company, G & W Marketing Consultants, with offices in Canada, Europe, the Far East and the Middle East. He moved to Israel in 2006 to be close to his grandchildren, doing a variety of volunteer work there since then, and retired in 2015.
grandpagt@gmail.com

1972



ROBERT GROLMAN (Chem '72) is now fully retired and still skiing, mostly at Bromont.

1973

PETER RETHAZY (Civil '73) reports he's retired, off the clock and worry-free.



JIM YOUNG (Mech '73) recently joined RWDI Air Inc. after 25 years at SENES Consultants Ltd. His new role involves growing weather services at RWDI, as well as expanding his activity in forensic meteorology.
Jim.Young@rwdi.com

1974



DERWYN LEA (Mech '74) began an enjoyable new career in mid-2015 as a professional business coach, a segue into retirement that capitalizes on his 42-year career in project direction for major natural resource developments.
www.arpeggioinc.ca



ERIK SPEK (Mech '74, '76) sold a startup testing lab in 2012 to TÜV SÜD and is now chief engineer at TÜV SÜD Canada, specializing in abuse behavior of lithium ion batteries for electric vehicles.

HARRY VLEUTEN (Mech '74) retired nine years ago.

1975



TERENCE BERG (SD '75) is retired and living in Aurora, ON after a career in management, operations and finance. Current interests include green initiatives, creative apartment space design and management of rental properties.

tberg4793@gmail.com

1976

Class Reunion | 40 years

October 1, 2016

SALEH FARUQUE (Elect '76, '81) has been teaching at the University of North Dakota since 2002 after working for startups and at telecom giant Nortel for 18 years before that. He has been a Fulbright Scholar, received awards as an outstanding professor and written four books, in addition to holding 16 U.S. patents and three Canadian patents.

Saleh.faruque@engr.und.edu

ERIC JELINKSI (Mech '76) teaches nuclear plant engineering, chemical plant design capstone, multidisciplinary capstone, and engineering practice and strategies at the University of Toronto. As a researcher, he specializes in the reprocessing of nuclear spent fuel and robotics for high-hazard applications.

eric_jelinski@sympatico.ca

BRIAN RIUTTA (Civil '76) has been honing his retirement skills after working for Vale (International Nickel Company) for over 36 years. Duties now include camping, fishing, travelling, photography and woodcarving.

riuttafamily@sympatico.ca

IAN YUK-YUEN TSE (Mech '76) has closed his engineering consulting firm, IMT Mechanical Ltd., after 30 years in business and made his health a priority through the pursuit of winter hiking, snowshoeing, gardening, golfing and swimming.

1977



JIM BELAIR (Chem '77) recently moved from Sarnia to the beautiful Comox Valley on Vancouver Island after retiring in 2006. He enjoys kayaking, cycling, snowshoeing, fine woodworking, volunteering and the ukulele.

belairjim@hotmail.com

DAVID MOLL (MSci '77) retired in 2002 from a career that included working for the Government of Canada as a manager hammering out economic development agreements between the federal and territorial governments. He has also worked as a socio-economist and a logistics manager, and now shares the motto 'the world is your oyster' with his wife, Marianne.



THOMAS SMITH (Elect '77) started a successful engineering firm over six years ago. It helps electronics manufacturers obtain required regulatory and safety approvals to ship products globally, as well as providing services such as risk assessment and reliability.

<http://tjstechnical.com>



DAVID WINDLEY (Elect '77) sold his electrical engineering business after more than 20 years and is looking forward to a semi-retirement that includes more travelling, sailing and golfing, plus a new company, POWERDIGM Rx Inc., involved

in power and process optimization.

1978

ROBERTO CHIOTTI (Arch '78) is principal of Larkin Architect Limited and an assistant professor and sustainability officer for the Faculty of Design at OCAD University in Toronto.



SANDOR WEINACHT (Elect '78) retired from Teledyne DALSA in 2014 and has since been a contractor/consultant to PWC in scientific research and experimental development. He also mentors EITs and enjoys time with

his family, especially his six grandchildren.

1979



HUGH ALLEY (SD '79) joined Stantec Consulting in Vancouver in February 2016 as senior industrial engineer doing business development and client work related principally to industrial building design and efficiency.

hughralley@gmail.com

RAMAIAH DIVI (SD '79) is lead engineer of transmission projects at the Alberta Electric System Operator in Calgary. He is currently developing plans to integrate large quantities of renewable generation into the grid to facilitate transition away from coal-fired plants.

ramaiah.divi@aeso.ca

FABRIZIO DONA (Civil '79) retired after 36 years at Bell Canada, where he was a project administrator for the National Fibre Optic Network across Canada and the northern U.S.

fab.dona@sympatico.ca



The right thing to do

As CEO of Danby, a Guelph ON-based appliance manufacturer, **Jim Estill (SD '80)** believes in doing the right thing: for his employees, his customers and the environment. But his philosophy also extends beyond the office.

When Estill saw story after story about refugees fleeing Syria's civil war, he couldn't ignore the humanitarian crisis. "The right thing to do is help," he says. That's why he personally committed up to \$1.5 million to sponsor 50 families.

Estill's generosity attracted national and international attention and prompted 800 community volunteers to step forward. That's when he put his business skills to work, establishing partnerships with local organizations like the Salvation Army, setting up committees to handle everything from housing to mentorship, and developing checklists to ensure each family's needs were met.

As well as benefiting refugees, Estill predicts his efforts to assist people in becoming independent will benefit Guelph in the long term. "This is helping people through a hard time," he explains. "Success on this project is 50 families working, paying taxes, paying rent and speaking English."

But with millions more Syrians still displaced, he hopes the greatest impact will be inspiring others to follow his lead and encouraging the government to move more quickly. "We're just scratching the surface," he says.

ELDO HILDEBRAND (Civil '79) retired from teaching civil engineering at the University of New Brunswick in 2014. He is still involved with the Engineers and Geoscientists of New Brunswick and is an active figure skater with a Fredericton club. Eldo@unb.ca

DON NOAKES (SD '79, '85) is dean of the Faculty of Science and Technology at Vancouver Island University and was recently elected as a Fellow of the Linnean Society of London and Fellow of the American Fisheries Society. Don.Noakes@viu.ca



STEVE VARRETTE (Arch '79) worked for over 35 years in various architectural and environmental positions with the federal

government. Among other awards, he received the Queen's Golden Jubilee Award for dedicated service to First Nations. Now retired, he enjoys travelling and spending time at the cottage with his family.

1980



GORD BRITTON (Mech '80) is CEO and president of INTEGRA Technologies, which has developed services and products to detect, prevent and

correct leaks in the oil and gas industry. The company has 10 locations and 120 employees in North America. gbritton@integratechnologies.com

GARTH COMPTON (Arch '80) recently retired after almost 23 years with John Hopkins Aramco Healthcare in Saudi Arabia, which he describes as a great place to raise a family and an ideal base from which to explore the world. He expected to be back in Canada this summer.

STEVE HUMMEL (Elect '80) has resigned as a professor at the State University of Baden-Wurttemberg in Stuttgart, Germany. He continues to be an award-winning strategy professor at Conestoga College in Kitchener.



HAZEM TAWFIK (Mech '80) was honoured in 2016 for 33 years of service as a teaching and research professor of

mechanical engineering technology at Farmingdale State College in Long Island, New York. He holds four patents in fuel cell technology.

PAUL VERHEYEN (Mech '80) recently retired following a 30-year career with Fiat Chrysler, including his last assignment as senior manager of international finance. He now enjoys travelling with his wife, Tracy, and their family. Verheyen@comcast.net

1981

Class Reunion | 35 years

October 1, 2016



MARK "BUFFWOOD" HODGSON (Mech '81) retired in 2010 after 30 years at Syncrude. The former EngSoc secretary now lives

with his wife, Charlotte, in Airdrie, Alberta.

MICHAEL STEELE (Civil '81) has launched an international charitable foundation to build and support grassroots education programs, with its first project in Bangalore, India. He also funds several technology startups and started a North American medical and recreational marijuana operation. www.thesteelfamilyfoundation.com

EUGENE YUEN (Civil '81) has worked for more than 30 years since graduation in the energy industry and has 'life member' status with the Association of Professional Engineers and Geoscientists in Alberta. euge321@hotmail.com

1982

TONY BENNETT (Civil '82) is director of dam safety and water resources at Ontario Power Generation, president of the Canadian Dam Association and chair of an International Commission on Large Dams committee on public safety.



LARRY BLANCHETTE (Mech '82) is president and CEO of Associated Design Group Inc., a large MEP/FP design engineering firm in the

southeastern U.S. It has worked on projects of up to \$370 million, including reconstruction of the Mercedes-Benz Superdome in New Orleans after Hurricane Katrina.



JEFF GUILBEAULT (Elect '82) is retired after 35 years in the electrical power industry. He lives in Peterborough, ON with his wife, Barb.

jguilbeault2@cogeco.ca



HORST HUENIKEN (Mech '82) is starting a farmland investment company, AGInvest Properties Canada, after previously working as vice-president

and portfolio manager at Dundee Corporation, where he co-managed a portfolio of agricultural companies.

hueniken@sympatico.ca

WAYNE KERR (Mech '82) is director of manufacturing and engineering at Somerville Merchandising. After leaving Waterloo, he earned an MA from York University and an LLB from the University of London.

wkerrca@yahoo.com

1983

GRAEME CESARE CONSIGLIO (Civil '83) recently celebrated his 85th birthday and 55th wedding anniversary with his wife, Pat. He is currently involved in projects in the Arctic and authoring 'Wake Up Canada.'

patgraeme@rogers.com



JUDY FARVOLDEN (SD '83) received an MSc in planning from the University of Toronto this summer to go with a PhD in transportation and

operations research from Princeton University in 1989. She is the founding program director of the new Transportation Research Institute at U of T, returning to the interests that led her into systems design engineering in the first place.



STEVE McINNIS (Chem '83) retired in 2013 after working as a contract administrator at Flowserve in Cainsville, ON.

stevenora@sympatic.ca

1984



JIM CARUTH (Civil '84) has worked in the concrete industry in Vancouver for 25 years and is president of the BC chapter of the American Concrete

Institute after 10 years on its board. He skis regularly and is loving life.

FRANK GERENCSEK (SD '84) is the longtime chairman and CEO of triOS College, which has been recognized for six years in a row as one of Canada's best-managed companies. He received a Queen's Diamond Jubilee Medal in 2013.

Frank.gerencsek@trios.com



LARRY MAY (Arch '84) moved with his wife, Iveta, in 2010 into a house they designed and built in Chatsworth Township, ON, where he practices mainly

commercial and industrial architecture as a sole proprietor.

LarryMay@Xplornet.ca

RAFAEL SOLIS (MSci '84) is a professor emeritus of information and decision sciences at California State University, Fresno. He is semi-retired and teaches one semester per year.

rafaels@csufresno.edu



DAVID STANIFORTH (Civil '84) moved back to Canada with his wife, Claire, last year after 12 years in Europe. He has a new role in a new industry

as vice-president of international expansion at the Business Development Bank of Canada in Toronto.

1985

BARRY COTT (Chem '85, '86) works in the process automation, control and optimization arena at Shell. Since 2008, he's been based in Amsterdam, Netherlands, heading up several engineering and software development departments.

barry.cott@stationstudios.ca



GERASIMOS (MIKE) STANITSAS (Chem '85) has been at Hellenic Petroleum for 27 years and is now senior director, internal audit, responsible for domestic and international R&M activities.

1986

Class Reunion | 30 years

October 1, 2016



BOB DONY (SD '86, '88) recently became president-elect of Professional Engineers Ontario after previously serving as vice-president

and councillor-at-large. He is also the Ontario representative on the Canadian Engineering Accreditation Board and lives with his wife, Lisa (BMath '86), in Waterloo.

JEAN-MARC PATENAUDE (Elect '86) moved to Sherbrooke, QC a year ago after 19 years in Silicon Valley for a better quality of life and a more family-friendly community.

jeanmarcgp@gmail.com



Engineering a good politician

Before October 2015, when he ran for and won his Quebec riding of Pierrefonds-Dollard, Liberal MP **Frank Baylis (Elect '86)** ran something else: a company.

Launched by his entrepreneurial mother, what started out as a cottage business importing medical products back in 1986 is now Baylis Medical, a 300-employee leader in the design, manufacturing and sale of high-technology cardiology, oncology and vascular products. Baylis says his Waterloo Engineering background and the entrepreneurship course he took eventually helped the company move from reselling devices to developing its own.

Although Baylis has been working behind the scenes in Liberal party politics for 30 years — fundraising and acting as a financial agent, among other tasks — it wasn't until his three children were in university that he was ready to run. Kris Shah, company vice-president and fellow Waterloo electrical engineering graduate, stepped in as president when Baylis headed to Ottawa.

While taking a seat in the House of Commons and speaking up for his constituents might seem far removed from his days at Waterloo, Baylis says his engineering background is still very relevant.

"Engineers have a certain way of looking at the world," he says. "If we see something broken, we want to fix it or design a new way to do it. That can make for very good politicians."



DAN RAJCZAK (Chem '86) recently returned to Cincinnati, Ohio, to take on a new role as CEO of the Totes-Isotoner Corporation. Dan spent the first 26 years of his career with Procter & Gamble and was most recently COO for the Shaklee Corporation in the San Francisco Bay Area.

MARY TREMAIN (Arch '86), **LISA RAPOPORT** (Arch '88) and **CHRIS POMMER** (Arch '88), are the founding partners of Toronto-based PLANT Architect Inc., which won a 2016 Governor General's Medal in Architecture for the Nathan Phillips Square Revitalization. The same project received a 2016 National Urban Design Award (Medal), and the Peace Garden at Nathan Phillips Square won a 2016 Canadian Society of Landscape Architects (CSLA) National Award of Excellence. The 13-acre strategic renewal preserved and enhanced the character of Toronto City Hall's iconic, 1960s Modernist plaza, while transforming it into exemplary 21st-century civic space.

lisa@branchplant.com



HAROLD WONG (Elect '86) is a senior quality assurance systems analyst in the air navigation systems industry for the federal government. He performs engineering audits across Canada, a role he describes as a "dream job" after years in the aerospace and defence industry.

harrywong6052@hotmail.com

1987



PAUL DOWSETT (Arch '87) founded SUSTAINABLE.TO Architecture + Building in Toronto in 2009 and reports making leaps and bounds towards establishing the new normal for how we think about building sustainably in a post-carbon world.

paul@sustainable.to



GRAHAM STRATFORD (Chem '87) loves working as a senior web developer at Queen's University. His most recent project was learning Spanish for a trip to Panama.

gramie2@email.com

1988

DWAYNE CULP (SD '88) started Culp Engineering in 2015 and is rounding out a great year in the Houston area.

Dwayne@CulpEngineering.com

PETER FONG (Mech '88) is a technical manager at Toyota Motor Manufacturing Canada (TMMC), which has won numerous J.D. Power Awards and produces high-quality Lexus and Toyota vehicles.

peter.fong@tmmc.ca



TAMARA WILSON (Chem '88, '94) is regional quality manager for BWAY Corporation's engineering division, ensuring plants are supported for required management systems: UN, food, industrial, consumer packaging, new product launches. She is building a retirement home on the Bruce Peninsula.

1989

ANDREW BILLINGS (Chem '89) accepted a position in 2016 as senior business systems analyst at Telus Health (Emergis). andrewbillings@gmail.com



DIMITRI PAPATHEODOROU (Arch '89) is a painter, musician and architect. He both practices and teaches architecture in Toronto, where he is known for a quiet, thoughtful approach. His paintings reflect the same qualitative approach to light and space.

dpapathe@ryerson.ca



NICOLE REID (Mech '89) graduated in 2016 from Knox College at the University of Toronto with a Master of Divinity degree. She is establishing a new worshipping community within the context of a pregnancy and family center in Dunnville, ON.

1990



GLEN BANDIERA (SD '90) has been appointed associate dean of postgraduate medical education and promoted to full professor of medicine at the University of Toronto.

BandieraG@smh.ca

1991

Class Reunion | 25 years

October 1, 2016



PETER ARMBRUSTER (Civil '91) is COO of Activa, one of the largest builder/developers in the Region of Waterloo after key acquisitions in 2014 and 2015. It is on track to close 500 homes in 2016. parmbruster@activagroup.ca

1992

KEN CLARK (Mech '92) is a partner in the law firm of Aird & Berlis LLP in Toronto, and has been working as a lawyer since 2001. He practices intellectual property law, including patents, and keeps his materials textbooks in his office to stay grounded.

kclark@airdberlis.com



BELINDA ELYSEE-COLLEN (Chem '92) has been an account manager at Dempsey Corporation in Toronto since 2014 and is hoping to connect with classmates ahead of their 25-year reunion in 2017.

belyseecollen@gmail.com



MARK HAWLEY (MSci '92) is vice-president of Pride Signs after previously leading business turnarounds, one of which earned the E&Y Entrepreneur of the Year Award. He volunteers on the board of the Cambridge Tour de Grand and was a judge of the 2016 Capstone Projects.

hawleymarkk@gmail.com



STEVE HOLLIS (Mech '92) launched a startup for an innovative home security device, Korner, which was recently featured on the Today Show and on Fox News thwarting a real burglary.

1993



AJAY GHANDHI (Comp '93) is vice-president of product marketing for Informatica, a \$1-billion revenue cloud software company based in Silicon Valley. He lives in Palo Alto, CA with **CHARU GUPTA** (Elect '92), who runs a real estate development startup after spending eight years

at Google and Facebook, and their two daughters. They recently completed a 32-day trip covering Abu Dhabi, Dubai and India meeting family, touring and attending three weddings.

Ajaygandhi86@yahoo.com

1994



MARCELO S. ALENCAR (Elect '94) has published a new book called 'Probability Theory.' He is a member of the board of IEEE ComSoc Sister Societies and received the Professor Attilio Giarola Medal, the top award given by the Brazilian Microwaves and Optoelectronics Society (SBMO).



TED SHERIDAN (Arch '94) acquired International Passive House Designer Certification and just completed the Guilford Sound Artists' Residence Hall, the first

internationally certified institutional Passive House project in Vermont.
tsheridan@ryallporter.com

1995



GRAHAM WHITING (Arch '95) is in his 12th year of growing Whiting Design, the leader for modern, sustainable house design in Waterloo Region. He reports that his wife, Kasia, and their three kids keep him happy and busy.

1996

Class Reunion | 20 years

October 1, 2016



JON EVANS (Elect '96) recently published a book of travel writing called 'No Fixed Address.' He's a columnist for TechCrunch, the author of five widely published novels and a principal engineer for HappyFunCorp in San Francisco.
jon@rezendi.com



RÉDA FAYEK (SD '96) has been named a Fellow of Engineers Canada (FEC) and received the Ontario Volunteer Service Award for more than a decade of service with the Professional Engineers Ontario (PEO) Experience Requirements Committee (ERC).

R.Fayek@IEEE.ORG

BERNARDO PEREIRA (BES '93, Arch '96) is associate architect with Miguel Barroso at Urbactiv - Sustainable Mobility, based in Lisbon, Portugal. He is working intensively on the city's large-scale bicycle infrastructure expansion pilot project in the central uptown area, in addition to consulting work on other projects.

1997



DEREK TUMULAK (Comp '97) has been vice-president of product management at Vormetric, a leader in data security, since 2012. Strong revenue growth and product innovation led to its highly successful acquisition by Thales in 2016.
derektumulak@gmail.com

1998

DORON MELNICK (SD '98) is a partner, management consulting, at KPMG Canada, specializing in business transformation programs. He has recently been working with clients in the life insurance industry, leading to welcome visits to Waterloo. Doron lives in Toronto with Shana Haberman and their three children.



MARK TIGCHELAAR (Civil '98) started GeoSolv Design-Build, a turnkey geotechnical contracting company offering innovative foundation solutions to problem soils, 10 years ago. He reports that the company, which has hired dozens of Waterloo co-op students, has saved clients millions of dollars.

STEPHEN YOUNGE (Comp '98) lives in Boulder, Colorado with his family of five. He recently started a new software engineering office for Apptio, a Seattle-based cloud B2B software company.
stephen.d.younge@gmail.com

1999

MARK GRIFFIOEN (Mech '99) was named corporate director of operations for Bailey Metal Products Ltd. in 2016.
mark.griffioen@bmp-group.com



REJEAN LAU (Elect '99) has been working in the energy sector on a gas membrane project funded by the Ontario Centres of Excellence/NSERC for the University of Ottawa and Dundee Energy LP.
rejeanlau@gmail.com

RYAN VANDERPUTTEN (Civil '99) and his family moved back to Calgary last summer. He is now the director of transportation planning for the City of Calgary.
ryan.vanderputten@outlook.com



Sharing how to crack the code

Stephanie Rozek (Elect '00) knew she was making progress during an ambitious, year-long initiative to boost “digital literacy” when she explained her work and people started nodding with recognition. Spreading the basics of computer programming, the heart of the Year of Code Waterloo Region, was obviously increasing awareness as well.

“That has to be a sign of success, that other people besides my family know what I’m doing,” jokes Rozek, who is now hoping to advance similar objectives as executive director of a new not-for-profit called Hive Waterloo Region.

Convinced of the importance of at least a rudimentary understanding of the technology that is transforming our world, Rozek co-founded a company, Hackademy Canada, to demystify it for both children and adults.

Its success led to the charitable Year of Code campaign, a broad, public push that was backed by numerous sponsors and directly reached more than 20,000 residents in schools, libraries and other forums before wrapping up in late June.

“Code, in a way, is the new literacy for the 21st century,” Rozek says.

Affiliated with a global network of the same name, Hive WR will key in on increasing both digital literacy and representation of women in the tech sector, a passion since her student days at Waterloo Engineering.

2000



MATT HAN (Elect '00) is an apprentice lineman at BC Hydro in North Vancouver after previously working as a field construction manager. He describes his new job as the best one he has ever had.

2001

Class Reunion | 15 years

October 1, 2016



DILINY DE ALWIS CORLOSQUET (Chem '01) is a senior product manager at BioRAFT and moved back to the Toronto area in 2015.
dcorlosquet@gmail.com

2002



POUYAN (LEON) FARASATI (Comp '02) is director of product management for Qualcomm Technologies Inc., within the IoT business unit, where he is responsible for enabling and scaling Qualcomm® Snapdragon™ processors into broad embedded computing products.
leonf@qti.qualcomm.com

2004

ALI ABEDI (Elect '04) is a professor at the University of Maine, where he is working as principal investigator on a NASA-funded project to develop a wireless leak detection system for the International Space Station.
abedi@ieee.org



CHRIS HADLOCK (Mech '04) founded an engineering consulting company, Hadlock Consulting, in 2013. It specializes in sustainability and energy optimization of new and existing buildings.
chris@hadlockconsulting.ca



JASON LAM (Mech '04) worked with the Toyota Motor Corporation in Japan and North America, then completed his MBA at INSEAD Business School in France/Singapore. He now works as senior manager at Amazon Europe headquarters.
Jason.Lam@insead.edu



CHARLES THOMAS (Arch '04) works in Iskandar, Malaysia as CEO of an international business incubator and accelerator, The Hangout, that is currently accepting applications from startup companies worldwide.
charles@imagineeringinstitute.org

2005



TRAVIS (TJ) KELLEY (SD '05) was promoted to major and given command of the Canadian Forces School of Military Mapping in 2014. He was previously operations officer for the 5 Combat Engineer Regiment and deployed to Haiti as part of Canada's contribution to the UN mission there.
travis.kelley2@forces.gc.ca



ERIK WILHELM (Chem '05, '07) is an assistant professor at the Singapore University of Technology and Design. His research covers sensors for state inference and robotics, and his team, which included five Waterloo co-op students, recently deployed 43,000 wearable sensors to Singapore's students.
www.edgebotix.com

2006

Class Reunion | 10 years

October 1, 2016



DAVID BUTLER (BET '06) has taken startups from concept to success, leading them through financing, existence, survival and growth. In September, he will be attending one of the leading law schools in the United Kingdom.
dbutler23@hotmail.com



JEFF MOULTON (Mech '06) and Christina Moulton (nee MacNeil) (SD '06) have spent two years cruising on their sailboat, from Georgian Bay to the Caribbean, to the Canadian Maritimes and back to the Caribbean. They are currently sailing home.



NAVAL SHAH (Comp '06) is working at Google in Mountain View, California as an uber tech lead on Google Apps for Work.
naval.shah@gmail.com

2007

DARREN CHEUNG (Elect '07) recently joined the Canada Revenue Agency as a research and technology advisor administering the federal Scientific Research and Experimental Development tax incentive program.

darren.cheung@gmail.com



ADRIAN KWAN (Mech '07) has worked as an engineer at Hasbro Inc. in Los Angeles since 2014. He previously worked as an engineer at Spin Master

Toys and TCG Toys in Toronto.

2008

SOPHIA FOLLICK (Chem '08) has worked in investment banking, private investments and portfolio management as a manager with CPPIB since 2011. Previously, she was a management consultant at Deloitte specializing in financial services.



SIMON LANCASTER (Mech '08) works at Apple as a product designer. He lives in San Jose, California with his wife, Bei, their two sons and seven chickens. He frequently

returns to Waterloo for co-op recruiting.

simon.lancaster@gmail.com



BRIAN (BONG JOO) LEE (Mech '08, '11) has worked as application engineering specialist at Romet Limited since 2014. He was previously a mechanical

designer at ABC Group Inc.

b25lee@uwaterloo.ca

MIKE SPENDLOVE (SD '08) moved to Infusion's New York City office for 2016 to work as development manager and help build a new management structure. His newest and hardest project has been raising his year-old daughter.

2009



JENNIFER CUA (Comp '09) is a senior consultant for banking services in CGI. She is also the managing partner of a micro-investment company

and an avid foodie Instagrammer.

[@TastesOfToronto](https://www.instagram.com/TastesOfToronto)

ALI HUSSAINI (Mtron '09) performs research in upper limb prosthetic devices with the Institute of Biomedical Engineering at the University of New Brunswick in Fredericton.



NEDA PARNIAN (Elect '09) started her role as research science manager at Intel in 2016 and has been an adjunct professor at ICICS in UBC since

early 2015. Previously, she was a product manager at Motion Metrics Int. Corp.

neda.parnian@gmail.com



ALEX SCOTT (Elect '09) recently joined Amazon's London office. He is part of the European Union MBA leadership program

and previously studied for his MBA at the London Business School.

M. ALI ÜLKÜ (MSci '09) has been working at Rowe School of Business at Dalhousie University in Halifax, NS as a tenured associate professor of supply chain management and analytics since 2014. He is also associate director of the Centre for International Trade and Transportation at Dalhousie.

ulku@dal.ca

2010



PHUONG DINH (Mech '10) is building Mijem, a social C2C company to connect, share and trade 'gems,' whether they are shoes, vintage video games, electronics,

handbags or just about anything else.

pdinh@uwaterloo.ca



AMIR HAJIMIRAGHA (Elect & Comp '10) has worked as director of technical projects and smart grid integration at BBS Access in Singapore

since 2015. He has also been an adjunct assistant professor at the University of Waterloo since 2013.

ahajimir@ieee.org



JAMES HUISKAMP Civil '10) joined Jp2g Consultants in Ottawa, ON in 2015 as a project manager in their new structural engineering group.

jamesh@jp2g.com

HEMAMALINI VEDACHALAM (Elect & Comp '10) has been working as a software engineer in F5 Networks since 2011 and recently received the F5 Star Award for performance excellence. Previously, she was a software engineer at Atheros Canada Corporation.

hemavmalini@yahoo.com



A spirited career

Back in October 2015, on a palm tree-lined street in Orlando, Florida, **Melissa Upjohn (MBET '09)** stood in a crowd of journalists and partygoers, and watched a man burst out of a cannon. Twice.

It didn't faze her. After all, she was the one at the helm of the event, a night to celebrate the launch of Cannon Blast, a new Captain Morgan spiced rum from Diageo. As its brand manager, it was all part of the job. Upjohn, named a Marketing Magazine "30 Under 30" in 2013, recognizes how unusual her job is.

"It's the kind of stuff most people don't get to put on their résumé too often," she jokes.

Advertising campaigns, viral marketing and working with distributors seem a world away from her honours BSc in biology at Waterloo. But time spent at 2G Robotics during Waterloo Engineering's Master of Business, Entrepreneurship and Technology (MBET) program helped shape Upjohn's career by giving her technology confidence.

She's made her mark on the beer and alcohol industry with innovative and creative social media campaigns for Guinness, Smirnoff and Tanqueray, and doesn't let anything like a new Facebook algorithm slow her down.

"My MBET degree really gives me an edge," she says. "I'm super willing and hungry to jump on the next and the latest things."

MIRON VRANJES (Comp '10) is currently building the user experience for HoloLens at Microsoft after previously working as a product manager on Windows 10 and Surface.

2011

Class Reunion | 5 years

October 1, 2016

MIKE MCCAULEY (Mtron '11) reports being at Google X working on early-stage moonshots.



ZOHAIB SIDDIQUI (Elect '11) has been working as a power generation engineer at Diavik, Canada's largest diamond mine, on a remote island in the Northwest Territories. Daylight in summer: 24 hours. Daylight in winter: five hours. zohaibahmed15@hotmail.com



MARK STEENHOF (Civil '11) has been a structural manager at Steenhof Building Services Group for the last two years. He is married to Stephanie and is also completing an MBA at Queen's Smith School of Business. msteehno@gmail.com

JEREMY VANDERMEER (Elect '11) has been working on integrating renewables into remote diesel grids at the Alaska Center for Energy and Power in Fairbanks since 2014.

jbvandermeer@alaska.edu

2012



OMAR ALSHEHRI (Mech '12) has received the King Saud University Award for Scientific Excellence for his master's research at UW.

oalshetri@ksu.edu.sa

ALFONSO CHENG (SD '12) has been a software engineer at LiveRamp in downtown San Francisco since 2015 and is enjoying the well-funded startup culture.

IGOR NAPOLSKIKH (Mtron '12) has been a software engineer at 3D Robotics since 2015, integrating computer vision into flying robots. igor.nap@gmail.com

DAVID NGUYEN (Mtron '12) reports that he and Marla have a healthy baby boy.



SENTHU SIVASAMBU (Elect & Comp '12) joined IBM Canada as a software architect in 2015 and works on Watson cognitive solutions. Previously, he was a consultant with Sapient Global Markets. sivasambu@msn.com



MEHDI VAFAEI (Elect '12) obtained his professional engineering licence in Ontario after acquiring more than six years of engineering experience. mahdivafaei@gmail.com



MOHIT VERMA (Nano '12, '15) started as a Banting Postdoctoral Fellow in the Whitesides Research Group at Harvard University in 2015 after completing his PhD in nanotechnology engineering at Waterloo.

mverma@gmwgroup.harvard.edu

2013



SUHAIL AL-DHARRAB (Elect & Comp '13) is an assistant professor at King Fahd University of Petroleum and Minerals in Saudi Arabia. He is currently a visiting scholar at the Georgia Institute of Technology.

suhaild@kfupm.edu.sa

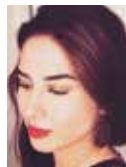
ERNEST CHI (Elect '13) works in corporate strategy and M&A at William Morris Endeavor, a global talent agency based in Los Angeles. Previously, he worked in investment banking at Goldman Sachs in the technology, media, and telecom group based in San Francisco.

ernest.chi@gmail.com



RAMEEZ HASLANI (BET '13) is a business analyst with Mount Pleasant Group of Cemeteries. He also runs a staffing company and provides labor market impact assessment (LMIA) approved job offers.

rameezmbet@gmail.com



SARA JALALI (BET '13) is the multimedia designer at Infrastructure Ontario. She launched a creative section focused on documentary video production within the business strategy and communications department. Her work has been featured by the Toronto Star and Spacing magazine.

SALLY LEE (MSci '13) has been working as an organizational change management consultant since 2015. Previously, she consulted at Deloitte for multiple international firms.



DARYOUSH SHIRI (Elect '13) has worked as a researcher on heat (phonon) transport in nano-materials at Chalmers University of Technology in Göteborg, Sweden since late 2015. He previously worked at IQC as a postdoctoral fellow.

shiri@chalmers.se



BABAK SHOKOUI (Nano '13) founded Nanodevice Solutions Inc. (NDS) in 2014. NDS is a semiconductor startup based in Waterloo and specializes in fabrication of specialty Atomic Force Microscope (AFM) probes.

bshokouhi@ndsolns.com



KANNAN VISWANATHAN (Mech '13) has worked as a mechatronics engineer at Jet Power and Controls in Edmonton since 2014. Previously, he was a vehicle testing engineer at TRW Automotive.

kannan.uwaterloo@gmail.com

2014



AARON CHOI (Mech '14) has been working as a project controls coordinator at Valard Construction Ltd. since 2014.
aaronchoi5@gmail.com



KAMAL HOSSAIN (Civil '14) received a Natural Sciences and Engineering Research Council of Canada postdoctoral fellowship award based on research ability or potential, and communication, interpersonal and leadership abilities. He received \$90,000 to support his research for two years.



CAITLYN HOWE (Env '14) works in water resources at D.M. Wills Associates Ltd. She deals with hydraulics, floodline and dam projects, including the development of new guidelines for trenchless technologies.
chowe@dmwills.com

JACK LIAO (SE '14) has been a software engineer at Airbnb, Inc. since early 2016 after completing a master's degree at Carnegie Mellon University.

THET THET MON (Mech '14) is doing wind energy projects at the University of Calgary after working as a mechanical design engineer at Converde Energy Inc., a research and development company.
thet.mon2@ucalgary.ca



ERIC SETHNA (Civil '14) is product manager at Mattermost, a Silicon Valley startup developing open-source, self-hosted, team communication software.
ericsethna@gmail.com



BRIAN SINCLAIR (SD '14) is fulfilling a dream by rock climbing and hiking around North America. He previously worked as a machine learning software engineer at Thalmic Labs in Kitchener.
sinclair.brian@gmail.com



IGGUNG SO (Arch '14) has been working as an architectural designer in New York City since 2014. He expected to be pursuing his Master of Architecture at Harvard University by the fall of 2016
igsung.so@gmail.com

DIANTHÉ VAN WEERDEN (SD '14) has been working with RWDI's building performance (CFD) team since 2015.



VAHID B. ZADEH (Mech '14) is the chief algorithms officer at PUSH Design Solutions Inc., a leading fitness technology company based in Toronto.
vahid@trainwithpush.com

2015



MOHAMMED ALSHAREEF (Elect & Comp '15) is an assistant professor at King Abdulaziz City for Science and Technology (KACST) in Riyadh, Saudi Arabia. Last summer, he was a visiting professor at the University of California, San Diego.



AHMED AWAD (Elect & Comp '15) has been a technical expert and business developer at Siemens Canada Limited since graduation.
asamir@uwaterloo.ca



DANIELE DOVIZIO (Mech '15) started working in early 2016 as a CFD consultant at NRG, Business Unit R&D, in Petten, Netherlands.
topizio85@gmail.com



AIDAN GALLAGHER (Nano '15) works at Apple as a manufacturing design engineer. He is involved with research, development and production of cosmetic surface finishes across the product line.

STEPHANE LEE (Comp '15) has 'retired' and is living in California while working at Tesla Motors.



MALCOLM OCEAN (SD '15) has continued running his productivity app startup, Complice. Now that it's ramen profitable, he's turning his attention to mitigating risks humanity faces from nascent technologies such as artificial intelligence and synthetic biology.



MIZANUR RAHMAN (MSci '15) joined Rogers before graduation as manager of spectrum and coverage optimization to provide analysis and trade-off recommendations to optimize network, spectrum, access and technology investments.
mizanur@ieee.org



SAMAN SAHRAEIJAD (Mech '15) has been co-founder and mechanical engineer at CubeXLab, an automated inspection solutions provider, since 2015. Previously, he was a mechanical design engineer at AVP Solutions, an inspection machine manufacturer.
saman.sahraei@cubexlab.com

NATHAN ZAVITZ (Nano '15) was recently hired as a controls and diagnostics engineer with the Canadian Regional Engineering Centre.
Nathaniel.1.zavitz@gm.com



ERIC ZOU (Civil '15) joined the Wyview Group, a major builder and developer in the Toronto area, in June 2015 and became project manager in October 2015. He's currently managing two development projects with construction value over \$350 million.
Eric@wyviewgroup.com



ZUBI ZUBAIR (MSci '15) is a project manager for Bell Canada, managing engineering vendors and budget for network infrastructure across Ontario. He's interested in pursuing entrepreneurship and is looking for like-minded people.
abdullah.zubair@uwaterloo.ca

In Memoriam

The Faculty of Engineering expresses deepest sympathy to the family and friends of the following graduates who have passed away:

Stephen Babey (Elect '75)
Lynn M. Baxter (Civil '70)
Jerry K. Bender (Civil '92)
N.S. Chandler (Mech '95)
Michael Davies (Mech '92)
Fiorella A. Dinoi (Arch '98)
Gary G. Goddard (MSci '75)
Robert L. Hajas (Elect '70)
Donald Heath (SD '83, MSci '86)
Paul P. Koenderman (Mech '71)
Brian K. Lee (Mech '04)
James F. Leppard (Civil '76)
David F. Lister (Elect '74)
Olatokunboh Oshinowo (Chem '67)
Barry J. Reid (Chem '63)
John D. Robinson (Elect '88)
David P. Rokas (Civil '01)
Donald B. Shaw (SD '77)
Robert J. Telford (Mech '71)
Gordon A. Thompson (Civil '71)
William W. Thomson (Mech '81)



Greetings Alumni

You asked for an alumni networking platform and we listened. We recently launched our exclusive Waterloo Engineering alumni, faculty and student networking Hub through the Ten Thousand Coffees web platform, a company founded by a University Waterloo graduate.

Like LinkedIn, it's a digital platform, but exclusive to Waterloo Engineering. It's designed for a personal approach so you can schedule a face-to-face coffee meeting or phone or Skype meeting with a fellow alumni engineer or current engineering student. You can also be matched automatically to another engineer based on your interests and goals.

The idea behind the Waterloo Engineering Hub is to help you build and expand your global network, gain industry insight, explore research and partnering relationships, and exchange ideas. The more alumni who join, the more powerful the Waterloo Engineering global network becomes! Join today at: tenthousandcoffees.com/hub/waterlooengineering.

As always, please send me your story suggestions for future issues of WEAL and eWEAL. Also, if you are visiting our campus, let me know and I'll be happy to treat you to a cup of coffee and show you the newest buildings on campus.

Sincerely,

Gosia Brestovacki

gosia.brestovacki@uwaterloo.ca

Senior Alumni Officer

Faculty of Engineering

LinkedIn: [linkedin.com/in/gosiabrestovacki](https://www.linkedin.com/in/gosiabrestovacki)

Ten Thousand Coffees: tenthousandcoffees.com/profile/gosia-brestovacki

Upcoming Events

OCTOBER
1
2016

Waterloo Engineering Class Reunions in 2016

Time: Various, all day
Locations: University of Waterloo

Feel like you're a student again by attending a lecture from the Back-to-the-Classroom lecture series featuring Professor Larry Smith and Professor Mihaela Vlasea or the Dean's Reunion Lecture featuring Dean Pearl Sullivan and Associate Dean of Outreach Mary Wells.

Explore campus by attending the Open House in Engineering 5 and take a student-led tour featuring cutting-edge labs. Then, celebrate the anniversary of your graduation with several special events taking place in the evening, which may include an Iron Ring Ceremony, the Reunion Dinner at Federation Hall or the Oktoberfest Dinner and After Party at the Bomber.

This year's reunions include:

- 50-Year Reunion for the Class of 1966
- 45-Year Reunion for the Class of 1971
- 40-Year Reunion for the Class of 1976
- 35-Year Reunion for the Class of 1981
- 30-Year Reunion for the Class of 1986
- 25-Year Reunion for the Class of 1991
- 20-Year Reunion for the Class of 1996
- 15-Year Reunion for the Class of 2001
- 10-Year Reunion for the Class of 2006
- 5-Year Reunion for the Class of 2011

Register for reunion events at:
uwaterloo.ca/engineering/alumni/reunions

OCTOBER
15
2016

Go ENG Girl

Time: 9 a.m. – 1 p.m.
Location: University of Waterloo

This annual event gives girls in Grades 7 to 10 the opportunity to learn about the amazing world of engineering.

For the latest Waterloo Engineering alumni events, visit uwaterloo.ca/engineering/alumni

NOVEMBER
12
2016

Annual Alumni Dinner in Hong Kong

Time: Evening
Location: Hong Kong, China

Join your University of Waterloo classmates at this annual alumni dinner in Hong Kong.

JANUARY
20
2017

Waterloo Engineering Alumni Ski Day

Time: 8:30 a.m. – 5:30 p.m.
Location: Osler Bluff Ski Club,

Town of the Blue Mountains (near Collingwood), ON

Join your University of Waterloo classmates at this breathtaking private ski resort to ski and snowboard for the day, followed by an après ski.

MARCH
17/18
2017

Waterloo Engineering Capstone Design Symposiums

Time: Various
Location: University of Waterloo

You're invited back to campus to check out Waterloo Engineering student design innovation. Each undergraduate program presents capstone projects on a different day.

SEPTEMBER
30
2017

Waterloo Engineering Class Reunions in 2017

Time: Various, all day
Location: University of Waterloo

The Classes of 1962, 1967, 1972, 1977, 1982, 1987, 1992, 1997, 2002, 2007 and 2012 are invited back to campus to celebrate the milestone anniversary since your graduation. Mark your calendar!

Reunion Class Reps Wanted!

Volunteer to be a Reunion Class Rep for your upcoming class reunion and be part of the action! Register today by emailing engineering_alumni@uwaterloo.ca or calling the Alumni Officer at 519-888-4567, ext. 36838.

Finessing Solutions

Alumna works to extend lives of cancer patients

Barb Paldus (BASC '93, Electrical Engineering and Applied Math) thrives on challenge. When, at age 17, she walked into the Waterloo Engineering undergraduate office to enroll in classes, she was asked "For which program?", to which Paldus responded "What's the hardest one to get into?"

Not content to simply study electrical engineering, she pursued an applied math degree at the same time. Her exceptional grades earned her a spot in graduate school at Stanford, where she developed a spectrometer a million times more sensitive than existing instruments. Doctoral degree in hand, she set about commercializing her invention. It was a crash course in everything from raising capital and building effective teams, to accounting and marketing, not to mention developing real-world applications.

Today, cavity ring-down spectroscopy is used for everything from detecting pipeline leaks to ensuring that every banana in a shipment ripens at the same time. "To me, that was the coolest part about starting companies," says Paldus. "You could actually take a technology and use it to make a difference."

Combining biology with engineering

After six years, however, she was no longer satisfied to let venture capital investors run the company while she served as chief technology officer. She handed in her notice and

scrutinized her non-compete agreement to see which fields were open to her. The answer was biology.

Despite knowing nothing about the subject, Paldus co-founded Finesse Solutions in 2005 with Dr. Mark Selker to develop measurement and control systems for pharmaceutical bioreactors. Essentially, the Silicon Valley-based company creates equipment that turns cells into miniature drug factories. A decade later, Finesse boasts 120 employees and revenue growth that regularly exceeds 40 per cent a year.

Now, Paldus and Selker are focusing on developing miniature cell factories for immunotherapy: taking T-cells from a cancer patient's blood and training them to attack the tumours. Their goal is to develop a desktop machine to make that process possible within hospitals, providing highly personalized medicine and radically extending the life expectancy of people with advanced cancer.

"If we can do that, then we will have truly revolutionized biotech," she predicts.

Paldus credits Waterloo with providing a broad education, emphasizing practical applications and, perhaps even more importantly, teaching her to never give up. "That in itself is precious," she says.

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