



University  
of Victoria

# EngineeRing

University of Victoria, Canada | Vol. 11 No. 1 | Spring 2017



## UVic Engineering alumnus pushing prosthetics research beyond previous limitations — by Mitch Wright

Dr. Robert Gaunt (BEng 2000) grew up in Saanich and graduated from UVic at the top of his mechanical engineering undergrad class. After co-op terms at Saanich's NRC Herzberg Institute of Astrophysics, he began studying at the University of Alberta in 2002 and received his PhD in 2008.

Gaunt did post-doctoral research at the University of Pittsburgh and joined the faculty in 2010. Last year, he was the lead researcher on a Brain Computer Interface study demonstrating technology that enables a paralyzed individual to control a robotic arm, but also provides the all-important sensation of touch by electrically stimulating the correct part of the subject's brain.

It is the first time ever in humans for technology to restore sensation using brain-implanted electrodes linked to a robotic prosthesis.

"The ultimate goal is to create a system which moves and feels just like a natural arm," said Gaunt, an assistant professor of physical medicine and rehabilitation. "We have a long way to go to get there, but this is a great start."

The research, published online in *Science Translational Medicine*, made headlines in major international media. The breakthrough also caught the attention of President Barack Obama at the White House Frontiers Conference, co-hosted by the University of Pittsburgh. Obama spent about 10 minutes with the research team and research subject Nathan Copeland, with whom he chatted, joked, and even fist-bumped via the robotic arm.

"It was a real privilege to spend a few minutes with him," said Gaunt. "He is very interested in science. It was certainly a career highlight."

While the published study encompassed the first six months of trial, the research has progressed an additional 18 months, with continued focus on perfecting both control and sensation—so important for precise management of delicate movements, through providing the brain with constant feedback.

Gaunt says his research is an extension of what he's always imagined doing, back to his undergrad studies at UVic and even high school.

"This really is what I've always wanted to do," he said. "What I got out of UVic, and engineering in general, was it really teaches you how to think very clearly about questions and how to tackle tough problems. That's kind of what I do now, and those experiences in engineering at UVic were really important."

Dr. Robert Gaunt (BEng 2000) is leading groundbreaking research into robotic prosthetics at the University of Pittsburgh.





## DEAN'S MESSAGE

The faculty has experienced significant growth in enrolment, doubling in the last five years, adding new programs such as civil engineering, biomedical engineering and a master of telecommunication & information security (MTIS) at the graduate level.

The faculty has seen several milestones in the first half of 2017. We celebrated the success of the Victoria Hand Project, which won a coveted Google Impact Challenge prize. We honoured Maher Fahmi, MAsc '94, with a Distinguished Alumni Award for his contributions to engineering in Canada. The civil engineering program celebrated its first graduating class and received its accreditation from the Canadian Engineering Accreditation Board.

After almost 30 years with the Faculty of Engineering, Art Makosinski has decided to retire. Art has been responsible for many aspects of the mechanical engineering program since the beginning including: establishing and maintaining the labs, course scheduling, and supervising technical staff. Art will be missed by faculty, staff and students. We wish Art the best as he works on his own projects as a retired engineer.

Tom Tiedje, Ph.D., P.Eng, FRSC, FCAE

# University of Victoria engineering alumni recognized as part of Canada's 150th anniversary celebrations —by Mitch Wright

Throughout 2017, Mitacs—a national, not-for-profit agency supporting graduate-level research—is showcasing 150 researchers whose dedication and vision is expected to shape the country's future.

Sahar Sam and Clayton Hiles were among the first 60 names announced as honourees.

Sam completed her PhD and continues her post-doctoral research into nanoscale technology at UVic. She is working to perfect the fabrication of nanosensors ideally suited to photovoltaic solar cells, but with additional potential applications in low-cost, bendable and flexible screens for cell phones, laptops and computer monitors.

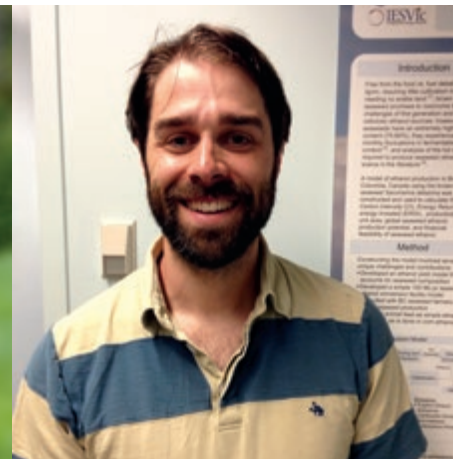
"It is rewarding that industry says we need this and support this," she said. "It confirms that my work is valued and it actually motivates me even more."

Hiles received a Mitacs entrepreneurship award in 2015, recognizing his decision to found Cascadia Coastal Research in 2012 and successfully lead the company through its formative years.

The company specializes in computational modelling of ocean conditions to quantify marine renewable energy resources and assess coastal hazards, such as tsunami or flood risks—invaluable information for coastal building developments, the oil and gas industry, and the marine renewable energy field.

Hiles says the latest recognition provides a welcome boost.

"Running your own business can be trying—it takes a lot of additional effort," Hiles said. "It's nice to have recognized that there is that additional effort and that hopefully, I am making some valuable contributions."



## ENGINEERING HONOURS ITS 2017 DISTINGUISHED ALUMNUS—by Mitch Wright



Maher Fahmi's experience at UVic in the early 1990s helped set the course for his successful career in developing semiconductors for the telecommunications industry.

Fahmi (MAsc '94) is the 2017 recipient of the Distinguished Alumni Award in Engineering. He received his BAsc with Great Distinction in Engineering Physics from the University of Saskatchewan. After serving in the Canadian Navy as a combat systems engineering

officer, he attended UVic for his Masters degree in electrical engineering.

"There were two things unique about the program at the time—the entrepreneurship they offered and the quality of research was very closely tied to industry," Fahmi said, adding that those aspects, along with his advisor's help to focus his research on an area just entering a significant growth phase, enabled him to choose what became a highly successful and rewarding career path.

He worked for several companies before joining Microsemi Corporation, as VP of product development, in 2010. He holds

several patents and has contributed to numerous standards bodies.

Fahmi, who recently moved back to Victoria after 25 years, said receiving the Distinguished Alumni Award is an unexpected honour that creates an opportunity to reconnect with the Engineering faculty and reinforces his belief in maintaining connections with students.

"We in industry benefit greatly from having UVic producing the highest quality graduates and it is incumbent upon us to give back to the institution," he said. "I feel I owe so much to UVic and this is such an incredible honour."

# UVIC ENGINEERING WELCOMES OUR 2017 SCHULICH LEADER

—by Mitch Wright

Helen Supurai has an admirable record of achieving at the highest level. That record continues with her selection as the 2017 recipient of the UVic Schulich Leaders Scholarship in Engineering.

The Schulich Leaders Scholarship program is one of the largest in Canada. Created in 2011 by entrepreneur and philanthropist Seymour Schulich, the scholarships are awarded to 50 students in Canada pursuing undergraduate studies in STEM subjects: Science, Technology, Engineering and Mathematics. The scholarship for Engineering is \$100,000 and \$80,000 for other areas of study.

On the Principal's List at Lake Cowichan Secondary since Grade 10, Supurai's various

community activities show she excels well beyond academics. She participates in environmental cleanups and fundraised for a salmon fry salvation program, and also finds time for stage roles with the Kaatza Lakeside Players.

Supurai also has a taste of life at UVic already, volunteering more than 300 hours as a junior counsellor with Science Venture, the university's science and engineering camp for children.

Although she is also interested in software and biomedical engineering, Supurai is leaning toward mechanical engineering due to a fascination with alternative energy technologies and systems.



"I want to make a difference—preventing further global warming and the resulting climate change are going to require hard work, innovation, and creativity," Supurai said. "Having an engineering degree will put me in a better position to contribute to the solutions, and by helping to develop alternative energies, I could improve people's lives all over the world."

## It's time to develop BC's Wave Energy Advantage —by Robyn Meyer

British Columbia now has enough detailed information about the height, frequency and direction of its coastal waves to start developing and testing wave energy converters in the ocean, according to a new report released at an energy conference at the University of Victoria.

Produced by the UVic-led Pacific Institute for Climate Solutions and co-authored by researchers at UVic's West Coast Wave Initiative (WCWI), *Wave Energy: A Primer for British Columbia* summarizes key research findings about the magnitude of BC's wave energy potential, explains how wave energy converters work, and examines the opportunities and challenges of the sector.

Speaking at the EnVision 2017 conference, the report's lead-author and WCWI programme manager, Bryson Robertson, says it's common knowledge that BC has one of the most energetic wave environments in the world. Robertson says designing a mechanical device to extract usable electricity from wave motion requires specific and detailed information about wave characteristics—and now they have it.

"Waves arriving on BC shores are the result of storms occurring across the vast Pacific Ocean, making waves a highly predictable resource for power system managers compared to other variable renewable energy sources," he notes. "WCWI has found on average a four-hour wave forecast is reliable within a 15 percent margin of error, while wind and solar in the Pacific Northwest are closer to 77 percent and 86 percent respectively."

Robertson says this impressive forecastability means the requirements for a grid back-up power source

would be significantly less, allowing for a more efficient electrical system, and overall lower costs to integrate the same quantities of renewable energy.

The team, led by WCWI director Brad Buckham, developed a computer model of the BC coastline from the Columbia River in the south, to Haida Gwaii in the north. This was combined with years of data from wave measurement buoys, which revealed several "sweet spot" locations for wave energy development. Another advantage they uncovered is seasonal timing, whereby the biggest (and most energetic) waves occur in winter, coinciding with times when local energy demand is highest.

Robertson says now that the WCWI team has built a database of BC wave conditions that's globally unique in its extent and comprehensiveness, it's time to take things to the next level.

"We've seen major advances in solar and wind energy and BC now has the opportunity to play a leadership role in wave energy development," he says. "I see the initial beneficiaries being remote and/or First Nations communities currently dependent on diesel. Longer term, once greater energy efficiencies are gained, wave energy could be part of a suite of renewable energy sources for BC, as well as provide export potential for cleantech companies."

The wave energy primer covers other next-step industry challenges, including the high per-unit cost of energy compared to other renewables, biofouling, gaining social licence, and operating in a hostile ocean environment.

Sybil Seitzinger, PICS executive director, says the demand for electricity will ramp up as the world shifts to electrify transport and other sectors, so investigating the full range of non-emitting energy sources is paramount.





## CIVIL ENGINEERING'S TRAILBLAZERS —by Jody Kitts

When UVic's new civil engineering program launched in 2013 it had a clear focus on sustainability, which inspired three dozen students to choose this path in their engineering education.

The program's emphasis on making the best use of natural resources and lessening environmental burdens—green buildings, sustainable cities, industrial ecology and water resources—was immediately appealing. Over the past four years, the program has grown to ten faculty members in these areas and has recently added a graduate program.

On June 14, UVic conferred degrees in civil engineering to these trailblazers. The faculty recognized Laura Simandl with the civil engineering graduation medal as the top student in her program. As these graduates move on to professional practice or graduate studies, we are proud to count them, and their fellow graduates, as members of the UVic Engineering alumni community.



### Giving Back

Our alumni make a difference by volunteering at events, speaking to classes, hiring co-op students or supporting scholarships. To help change the lives of our current students, you can make a donation today at [uvic.ca/givingtouvic](http://uvic.ca/givingtouvic) or by contacting the Development Coordinator, at 250-472-4210 or [devtcoor@uvic.ca](mailto:devtcoor@uvic.ca).

### Planning a reunion?

The UVic Alumni Association can help by promoting your event to classmates, arranging speakers or providing door prizes. Network and keep involved by exploring the list of groups and upcoming events to find something that's right for you. [alumni.uvic.ca/events/reunions.php](http://alumni.uvic.ca/events/reunions.php)

### Alumni Newsletter

EngineeRing is published twice yearly by the Faculty of Engineering to communicate the faculty's goals, strategic direction and activities in order to connect alumni with each other and the university. Send your story ideas and feedback to Jody Kitts at [kittsj@uvic.ca](mailto:kittsj@uvic.ca)



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