



## Building civil engineering leaders with hands-on experience

UVic's Civil Engineering program took in its first cohort of 45 students in September. The new program is seeing strong student demand, with intake capped at 50 students for September 2014. A search is underway for a lab supervisor and two more faculty members. Lab space for teaching and research is currently the biggest challenge. In the short term, the undergraduate materials labs will be held in Lot 7, in a temporary structure next to the Technology Enterprise Facility.

Students take courses and labs ranging from intelligent transportation systems, green building design, hydrology and marine engineering, to structural analysis, engineering law and policy. With a problem-based learning approach, combined with mandatory co-op terms, students will graduate ready to compete for the jobs they want. "We build hands-on, experiential learning into the curriculum, giving students experience with design and team-work right from

the beginning of the program," says Dean of Engineering, Dr. Tom Tiedje.

David Berry is a member of the inaugural class of UVic's Civil Engineering program who started his second year in September, and has been on co-op since January. Berry's placement at the Greater Victoria Harbour Authority has far surpassed what he was hoping for. "I'm having a great time," says Berry. "I'm busy all the time, doing a lot of different projects." He started out doing photo journals, attending meetings, and doing CAD drawings of property layouts, and has moved on to managing several projects, including the installation of two 200 ton bollards on the cruise ship terminal dock, and another project to fill in holes on the Ogden Point breakwater from cruise ship prop wash. Now he's helping design the dock that will replace the Undersea Gardens in the inner harbour. The best part of the job, according to Berry, has been the exposure he's had

to a variety of different engineering projects. "I'm talking to engineers all the time. They're really focusing on teaching me as much as they can, which is awesome."



*David Berry and co-worker on a work site with the Greater Victoria Harbour Authority.*



*Dr. Rishi Gupta*

Sustainability is a core theme in the Civil Engineering curriculum, and Dr. Rishi Gupta is a driving force behind this approach. Dr. Gupta's research focuses on finding more sustainable ways to build with concrete and asphalt, and monitoring those systems to ensure their structural integrity. Centuries ago, Egyptians used animal hair in lime mixtures, which held the lime together when it started to crumble. The same concept is now being applied with different kinds of fibres. Dr. Gupta is researching how various mixes of concrete with fibres of steel, plastic, and glass can reinforce concrete structures and increase their service life. This new technology is being tested in concrete and mortar mixes to increase its post cracking tensile strength to prevent injuries from falling bricks or concrete from structures, especially after a natural disaster.

Every ton of cement produces an equal amount of CO<sub>2</sub>, because lime and silica have to be heated to 1500 degrees Celsius during the production process. Dr. Gupta is focusing on various ways to reduce energy use. One current industry approach is to add 20% fly ash, which is a by-product from coal burning plants, to the concrete mixture. He wants to take this further and is adding higher percentages of fly ash, other types of industrial wastes or foaming agents to add more air to the cement mixture, and testing its load-bearing capabilities. One of Dr. Gupta's projects was to create a special foamed lightweight concrete mix that was combined with light gauge steel to create a composite construction system. He is now investigating the synergies between the two materials in this system and optimizing the sizes that will eventually reduce the amount of concrete and steel framing, thereby using fewer resources.

## MESSAGE FROM THE DEAN



UVic Photo Services

Welcome to the spring 2014 edition of *EngineeRing*. Last fall our Civil Engineering program took in its first group of students and the strong uptake has been gratifying. Across the faculty we are tackling the challenge of finding space for students as the demand for engineering programs at UVic increases. Applications for 2014/15 are already up by 43% from last year.

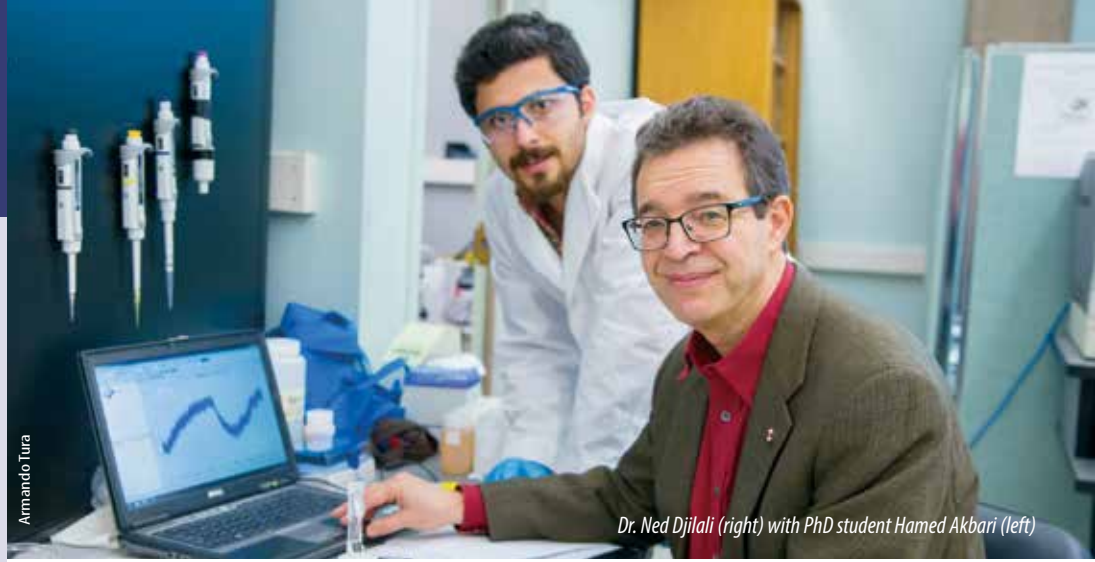
Forty students attended the annual Western Engineering Competition in Edmonton this past January and performed exceptionally well, with 4 teams achieving top 3 finishes in 3 categories. In this issue you'll find more details on the competition.

Three of the teams went to Western University for the national competition in March.

Sadly, we lost a fellow colleague and former Dean, Dr. Jim Provan last November. His contributions to the field of Engineering and to UVic's Engineering program are a proud legacy.

Our students and faculty are grateful for your continued support. Your contributions are important for the success of the faculty, and much appreciated. I encourage you to keep in touch, and to be involved with the Faculty of Engineering and the university. We hope to see you at an alumni event in the coming year.

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



Armando Tura

Dr. Ned Djilali (right) with PhD student Hamed Akbari (left)

## Mechanical engineering faculty member Dr. Ned Djilali elected Fellow of the Royal Society of Canada

In September 2013, Dr. Ned Djilali, who holds a Canada Research Chair in Energy System Design and Computational Modelling, was elected Fellow of the Royal Society of Canada in recognition of his work in advanced computational modelling and clean energy technology. Dr. Djilali's work encompasses topics from aerodynamics and electrochemical energy conversion, to water purification and crystal growth

of semi-conductors. He is particularly renowned for pioneering computational fluid dynamics based fuel cell models, for addressing fundamental transport phenomena questions, and for the invention of novel fuel cell architectures. He has made significant contributions towards a cleaner, more sustainable energy future.

## Engineering co-op student of the year: Angus Rittenburg

Angus Rittenburg was named Co-op Student of the Year for the Engineering Computer Science and Mathematics/Statistics Co-op Program. Eager to embark on a wide range of workplace experiences, Angus, a mechanical engineering student, has completed five work terms with five very different and innovative engineering companies, working on: electric bikes at Grin Technologies in Vancouver, BC, low cost cars for Africa at Mobius Motors in Kenya, rockets at SpaceX in Hawthorne, California, vehicle batteries at Tesla Motors in Palo Alto, California, and large-scale robots at eatART in Vancouver, BC. Angus has selected work terms that allow him to contribute to positive change, whether that's developing cleaner transportation, increasing transportation safety, or stimulating socio-economic growth. He is known for his positive attitude and endless energy, and in his spare time Angus has been an active volunteer with UVic's EcoCAR and ECOSat student teams.



Angus Rittenburg

## UVIC CLEANS UP AT THE WESTERN ENGINEERING COMPETITION By Doug Thomson

University of Victoria Engineering students competed at the Western Engineering Competition (WEC) from January 15<sup>th</sup> – 19<sup>th</sup> in Edmonton, Alberta, and did exceptionally well, with four teams achieving top three finishes in three categories.

Nigel Syrotuck, a fourth-year student, dominated in engineering communications, securing UVic first place in the category. His topic discussed using nanowire technology to detect cancer in cells.

In the junior design category, the teams were tasked to make a flood defense system. UVic B Team, Tim Erdmer, Cooper Gradishar, Kieran Armstrong, Neil McLagan, won third place in the category. UVic A, David Bernard, Trevor Richardson, Malcolm McEachern won second place!

Austin Warren and Adrian MacRae, UVic's innovative design team, won second place for their project named West Coast Nova. Their project was a novel approach to battery powered portable vaporizers.

These successes happened despite a close call on the way to the competition when the bus the students were traveling on went off an icy road near Mt. Robson, BC in the middle of the night. While no one was hurt, it was a harrowing start to what turned out to be a great conference. The three winning teams went on to compete nationally at the Canadian Engineering Competition in March.



L-R: Evans, Moffatt and Pearson.

## Chris Reid — Recipient of the 2014 Faculty of Engineering Distinguished Alumni Award

## Yes, actually — it *is* rocket science!

For three mechanical engineering students with a passion for aerospace, what could be better than a Do-It-Yourself rocket-design competition?

Winning it, of course.

In the summer of 2013, second- and third-year students Michael Pearson, Simon Moffatt and Harry Evans—the Stratodyn team—designed a 3D printable rocket engine and won first place in an international competition open to anyone; competing against novices, school-based teams and professional engineers alike.

The Silicon Valley non-profit Open Space University created the DIY rocket competition to promote innovation and cost effectiveness in small payload delivery into space, and explore the possibilities of 3D printing for the space industry. Pearson stumbled across the competition online and enticed fellow UVic AERO team members Moffatt and Evans to work with him.

"Space is only about 100 km straight above us, so it's close," says Pearson. But the problem is, once you get there, a rocket will just fall straight back down to the ground if it's not propelled fast enough. We needed to design a rocket engine that would propel a rocket 28,000 km per hour at those altitudes to stay in orbit."

It took four months for the team to put together the design, post it online, and have it printed by New York City-based sponsor company Shapeways.com. The company specializes in metal 3D printing. The team was able to complete the entire project online. Out of 12 teams competing, the UVic team took first prize, which included \$5,000, an offer for a free business-development consultation, and a tour of the NASA research center in Mountainview, California.

When asked what they would do with the prize money, the team unanimously agreed they would use it to travel to

Silicon Valley to meet the group running the competition and tour the NASA facility. For these three students who love aerospace, it's an opportunity they wouldn't dream of passing up.

And these three aren't just ordinary students. Pearson is a member of the autonomous submarine student design team (AUVic) and the autonomous aircraft student team (UVic AERO). In addition, he is a host of UVic's weekly astronomy open house that invites the public to use Canada's largest teaching telescope. Moffatt builds airplanes in his spare time and he is the president of the UVic AERO student team and serves as the mechanical lead on the satellite design team (ECOsat-2). Once finished his mechanical engineering degree, he plans to pursue graduate studies in astronautical engineering. Evans is an avid pilot and currently is building his own airplane. He is the RC Test Pilot on the UVic AERO team and has worked for a number of aerospace companies as an Autonomous Aircraft Pilot. With all of that talent, they could start their own company, which is something they hope to do in the future.

While there aren't many options for aerospace engineering in Canada, UVic is a natural place to start for students like Pearson, Moffatt and Evans. The strength of UVic's mechanical engineering program provides the foundation for any further specialization these students may want to pursue. And if they take Stratodyn to the next level and build a company, what would they build? Aerospace designs for anything from "rocket engines to space habitats," says Moffatt. "If you have good engineering, you can pretty much do what you want."

For more information on the DIY rocket competition, go to: [www.openspaceuniversity.org/#/rocketchallenge](http://www.openspaceuniversity.org/#/rocketchallenge)

Chris Reid was awarded the 2014 Faculty of Engineering's Distinguished Alumni Award at a ceremony on February 5th, 2014, as part of UVic's Alumni Week. The event, held at The Hotel Grand Pacific on Victoria's inner harbour, honoured 14 alumni representing each Faculty.



Chris is a technology entrepreneur and life-long learner. He currently serves as Executive Chairman of Hydrexia, an early stage technology company creating hydrogen storage systems, and is an entrepreneur in residence at Foresight, a BC accelerator for hardware and clean energy ventures.

After graduating from UVic in 1995, Chris worked with the fuel cell development program at the Institute of Integrated Energy Systems at UVic (IESVic) after which he and a partner spun out an energy consulting firm. Before that, Mr. Reid developed core technologies for two early stage companies and worked as a plant engineer for a major manufacturing company.

In 1998, he founded Cellex Power, an energy product company commercializing hydrogen fuel cells for the material handling industry. In 2007, Cellex was acquired by Plug Power after which Chris served as the General Manager of Canadian operations for the next several years.

Mr. Reid holds a Bachelor of Science degree in mechanical engineering from the University of Manitoba and a Master of Applied Science degree from the University of Victoria, and he is a director of the Working Opportunity Fund (EVCC) Ltd.

## IN MEMORIAM OF DR. JAMES (JIM) W. PROVAN *By Dr. Zuomin Dong*

Our beloved colleague and friend, Dr. James (Jim) W. Provan passed away on November 15th, 2013 at the Royal Jubilee Hospital in Victoria due to the complications of Scleroderma.

Dr. Provan joined the Faculty of Engineering at UVic as the Dean and Professor of Mechanical Engineering in 1993 from McGill University and became an Emeritus Professor in 2006.

Jim was a cheerful leader, mentor, dear colleague and friend to many of us at UVic.

He received his BSc in Chemical Engineering from Strathclyde University Glasgow, Scotland and started his academic career at McGill back in 1970, after receiving his MSc and PhD of Mechanical Engineering from University of Colorado and serving as a Research Associate briefly at McGill.

Jim was an internationally known scholar on the modeling and control of fatigue and on the statistical fatigue reliability of mechanical components. As an academic leader, he made paramount contributions to the profession and the

institution involved. Jim has served as the Chair of the International Association for Structural Safety and Reliability, Director of the Canadian Association for Internship Program, Associate Dean Academic for the Faculty of Engineering at McGill, Dean of Engineering at UVic from 1993 to 1997, and Warden of Camp 23 Iron Ring.

A special gathering to celebrate Jim's life was held in November 2013 at the University Club.

# FROM CAMPUS TO INCORPORATED: Engineering grads launch Audilent Technologies Inc.

When Sean Cunningham, Carissa Ouellette and Matt Holland started working on their final engineering design project last September, they had no idea that it would become the foundation for a new company, but they knew they were onto something really exciting. The three electrical engineering students began their joint “3D Stereo Navigation” project, an audio-based GPS mobile application for the visually impaired, and soon discovered that what they were working on had never been done successfully in the academic or commercial world.

The idea behind the audio-based GPS mobile application was to replace a guidance caregiver. Ouellette wanted to take it a step further and replace confusing spoken directions with a sound beacon based on their GPS coordinates to guide them to their desired location. At the time, they had no idea of the technical challenges they would face to make this happen, so they restructured the project to test the technology on a large, less vulnerable audience.

As the trio continued with research and development, their project advisors became increasingly excited about the innovative work being done, and advised them to begin thinking about market potential and how to wrap

their technology into a product. Through the Gustavson School of Business’s Innovation Centre for Entrepreneurs (ICE) program, they came up with a business plan outlining how spatial audio could be introduced into the music industry.

Specifically, they decided to create a product for the entertainment industry that would help them develop and test calibration filters for customizable 3D sound. As Cunningham explains, they’re building a “starter product for customizable, virtual surround sound that will stimulate the market enough to get the interest of big content creators.”

They entered PlanIt! 2013, a Uvic business plan competition, and won second place overall. From there, the wheels kept rolling. “While finishing our degrees, we continued on with the ICE program, filed a provisional patent, were incorporated as Audilent

Technologies, and were accepted into VIATeC’s Venture Acceleration Program,” says Ouellette.

When asked if she was surprised at their success, Ouellette says “yes, and no. I’m not surprised because of the confidence I have in our team, but I hadn’t expected the overwhelming support we received from our advisors—and from the tech community in Victoria, which has been pivotal in getting us to where we are now.”

*L–R: Ouellette, Cunningham and Holland.*



## ALUMNUS THOR KELL IS DJ FRACTAL By Dr. George Tzanetakis

To some they all sound the same, but to others they are highly skilled virtuosi. There is no denying that Electronic Dance Music (EDM) DJs are in high demand and have enormous influence in how music is created and consumed today.

Thor Kell, an alumnus of the Combined Music and Computer Science program at Uvic, is currently pursuing a Masters degree in music technology at McGill University. During his studies at Uvic, Thor did internships at well-known music technology companies Echonest in Boston, and SoundCloud in Berlin. He now also

performs as DJ fractal. Together with Dr. George Tzanetakis, Canada Research Chair in the Computer Analysis of Audio and Music, they published a paper entitled “Empirical Analysis of Track Selection and Ordering in Electronic Dance Music using Audio Feature Extraction” describing their analysis of two years of playlists from the BBC’s Essential Mix, a well known radio show featuring some of the best DJs in the world.

The work was presented at the International Conference of the Society for Music Information Retrieval (ISMIR) in 2013 in Curitiba, Brazil.

The origins of this work lie in the course project Thor did during his senior year at Uvic, for CSC 475: Music Retrieval Systems, a course taught by Dr. Tzanetakis. This year the course has been opened to outside participants with 230 students from around the world joining the 30 students from Uvic taking the course. The unique combined major in computer science and music at Uvic, of which Thor is a graduate, has now been running for 9 years with approximately 40 students in the program.

Thor Kell’s music: [soundcloud.com/fractal](https://soundcloud.com/fractal)

## 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 [www.uvic.ca/givingtouvic](http://www.uvic.ca/givingtouvic) or by contacting Chrystal Phan, Development Coordinator, at 250-472-4210 or [cmphan@uvic.ca](mailto:cmphan@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. [www.alumni.uvic.ca/events/reunions.php](http://www.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 Julie Sloan at [jsloan@uvic.ca](mailto:jsloan@uvic.ca).



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