

# INGENUITY

FACULTY OF APPLIED SCIENCE ENGINEERING NEWS / FALL 2010 / WINTER 2011

## FROM PROBLEM TO PRODUCT

Although "peak oil" dominates the news as the most critical challenge we face in the 21st century, phosphorus depletion will have a catastrophic effect on the world's food supply.

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## AN EPIC JOURNEY

Discover how a team of UBC Engineering students went from concept to Nova Scotia with their e-car.

8



a place of mind

THE UNIVERSITY OF BRITISH COLUMBIA



## Dean's Message

As you read through these pages of *Ingenuity*, you will see many reasons to be proud of our UBC Engineering community. Threaded throughout, a theme of innovation, entrepreneurship and leadership emerges. One goal brings it all together—effecting positive change in our world. One word comes to mind—trailblazers.

From our first female student, who persevered to achieve her degree, to our faculty, who discover solutions to critical challenges facing society, to our successful alumni paying it forward—each has worked tirelessly to clear a path so that the going may be easier and the future may be brighter for those who follow. These trailblazers have enabled a journey for the next generation to make a greater difference in our world.

Our record of contributions at UBC Engineering is impressive. We cannot recognize each and every one of our alumni, students and professors who has made a difference, but we hope to honour all as we recognize a few. Last year featured our first Engineering Excellence Celebration, where we indeed set the standards high for a fun evening, a break from our daily routines, to shine the spotlight on a select few of our alumni who reflect the enormous contributions of UBC engineers to various aspects of our lives, and to welcome our graduating students to the UBC alumni community. By all counts, the celebration was a smashing success.

I sincerely hope you can join us this year for a fun evening, to reminisce about engineering traditions and recognize engineering contributions. Watch for detailed information early in the new year.

I continue to be overwhelmed by and grateful for the continued engagement and support of our alumni. I would love to hear your feedback, advice and suggestions. Please feel free to email me at [tyseer.aboulnasr@ubc.ca](mailto:tyseer.aboulnasr@ubc.ca).

*"A theme of innovation, entrepreneurship and leadership emerges. One goal brings it all together—effecting positive change in our world. One word comes to mind—trailblazers."*

*Dean Tyseer Aboulnasr*

Tyseer Aboulnasr, P. Eng.  
Dean, Faculty of Applied Science

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### ON THE COVER



*Struvite—also known as magnesium-ammonium-phosphate—clogs wastewater pipes. Yet it also provides a sustainable source for the vital nutrient phosphorus; mined reserves of phosphorus are rapidly being depleted.*

*Photo by: Martin Dee*


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Printed in BC, Canada, on a Forest Stewardship Council certified paper that is 100% recycled. A total of 183 kilograms of greenhouse gases (GHGs) were emitted during the transportation of the paper. These GHG emissions together with GHGs emitted during the printing process of *Ingenuity* will be offset through investments in energy efficiency and non-fossil fuel technologies.

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# FROM PROBLEM TO PRODUCT

Ten years ago, the Greater Vancouver Regional District (now known as Metro Vancouver) brought UBC Civil Engineering Professor Don Mavinic a costly maintenance problem—wastewater-treatment pipes clogged with a crusty sludge. At the time, he had no idea the pipe held the basis for a solution to one of the world's most critical challenges—phosphorus depletion.





Ostara's Pearl® Nutrient Recovery Process recovers otherwise polluting nutrients such as phosphorus and ammonia from wastewater and transforms them into an environmentally friendly fertilizer called Crystal Green®.

Although "peak oil" dominates the news as the most critical challenge we face in the 21st century, phosphorus depletion will have a catastrophic effect on the world's food supply. Mined sources of high-quality phosphorus, an essential nutrient for plants and animals (the "P" in NPK fertilizer), are predicted to run out in the next 30 to 40 years.

"I'm not concerned about peak oil," says Mavinic. "There are alternative forms of energy. But there is no alternative to phosphorus. Life—our life—depends upon it."

In his quest to solve Metro Vancouver's costly problem, Mavinic performed a chemical analysis and found that the crusty sludge was composed of  $MgNH_4PO_4 \cdot 6H_2O$ , or magnesium-ammonium-phosphate, known as the mineral struvite.

At about the same time, Mavinic received funding from BC Hydro's Strategic Environmental Initiatives Program (SEIP) and, along with Research Associate Fred Koch and BC Fisheries researcher (and former grad student) Ken Ashley (MAsc '89, PhD '02), began investigating sustainable sources of phosphorus to restore degraded productivity in hydro-influenced rivers, lakes and reservoirs in British Columbia. Because reservoirs fluctuate widely in elevation, they lose their near-shore insect production due to freezing and desiccation, trap nutrients and block salmon migration, which are natural sources of phosphorus.

Consequently, hydro projects that involve reservoir formation and river damming mean that many reservoirs, rivers and lakes eventually become depleted in phosphorus and require nutrient replacement to support the natural diversity and abundance of aquatic life, and terrestrial food webs via salmon carcass-scavenger linkages.

The convergence of these two challenges aligned a source and a need, which led to the discovery of an innovative system for recovering and recycling phosphorus from wastewater.

"I didn't know much about these chemical reactions at the beginning. It took a team of us to figure it out," says Mavinic. "I called on Professors John Grace from



PHOTO CREDIT: MARTIN DEE

Professor Don Mavinic (left) and Fred Koch show two forms of struvite—problematically clogging a pipe (right) and as a useful fertilizer (left) recovered from wastewater using the process they discovered.

UBC Chemical and Biological Engineering and Noboru Yonemitsu from Civil Engineering to draw on their expertise as we developed a fluidized bed reactor to extract phosphorus from wastewater.”

In their system, wastewater pumps upward from the base of the reactor, which looks like a stack of four giant kitchen funnels (see illustration on facing page). It agitates by in situ turbulent mixing and “struvite crystals magically form,” says Mavinic.

A self-admitted tinkerer with a childlike curiosity, Mavinic constantly questioned the design along the way: “What if we add another chamber here? How will that effect the mixing and pH balance?”

In the final design, a bit of magnesium chloride and sodium hydroxide added to the mix helps optimize the process. Small pearl-like struvite pellets suitable for agricultural applications float, while larger pellets, desired by BC Hydro and BC Fisheries, sink to the bottom of the reactor.

In 2003, the research team began working with UBC’s University-Industry Liaison Office and filed a

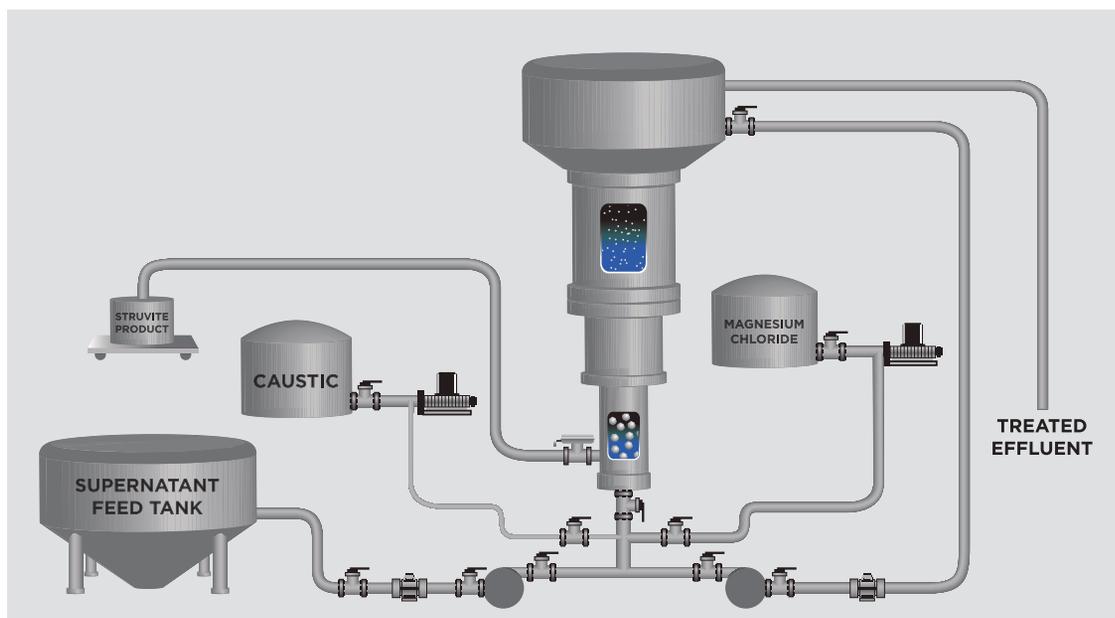
patent with Mavinic, Koch and Yonemitsu, along with graduate student Ahren Britton, named as inventors.

In May 2005, a UBC spinoff company was formed. Ostara Nutrient Recovery Technologies Inc. commercialized the technology through its Pearl® Nutrient Recovery Process. Pearl reactors have been piloted at wastewater treatment plants across North America and used in trials across the globe. A single reactor can produce more than 500 kilograms a day of high-quality Crystal Green®, the fertilizer marketed by Ostara.

“Plants love it,” says Mavinic. “It’s ideal in that it sits on or in the soil until plants need it. Then they drink it in.”

The slow-release nature of the pellet fertilizer virtually eliminates runoff of phosphorus into the water system, providing a fertilizer that is environmentally friendly both in terms of how it is created and its impact.

Removing phosphorus from wastewater can also prevent environmental catastrophes. An overabundance of phosphorus causes algae blooms in lakes, streams and oceans, depleting the oxygen supply and killing aquatic life.



*“It’s a fundamental shift in how we view waste,” says Mavinic. “It’s not a problem, it’s a resource. It’s a plethora of possibilities.”*

“Balance is the key,” explains Mavinic. “Phosphorus is essential for life, including aquatic ecosystems, but too much will choke water life. That’s why it’s called a ‘limiting nutrient.’”

For wastewater-treatment plants, struvite encrustation has traditionally been a costly nuisance. But thanks to the implementation of the UBC-generated technology, the Pearl Nutrient Recovery Process saves wastewater-treatment plants about \$100,000 a year in cleanup costs.

This past fall, Mavinic received two major national innovation awards: the Ernest C. Manning Awards Foundation’s Dave Mitchell Award of Distinction; and, with industry partners Ostara, EPCOR Water Services Inc., Metro Vancouver, Stantec Inc. and Clean Water Services, the Natural Sciences and Engineering Research Council of Canada (NSERC)’s 2010 Synergy Award, for trailblazing research that led to industry partnerships and economic development.

The research has formed the basis for more than 15 master’s and three PhD theses over the past decade. The support of BC Hydro, NSERC, Metro Vancouver,

Stantec and Ostara has been crucial to the development of the technology, along with the support of numerous municipalities, including Penticton, Metro Vancouver, the City of Edmonton and Clean Water Services from Oregon for providing testing environments for the reactors supporting the development of the technology.

Mavinic feels that this is only the beginning of what’s possible for phosphorus recovery. Livestock—which excretes 18 to 20 times as much phosphorus in waste as humans—presents a greater untapped resource. Along with UBC Civil Engineering Professor Victor Lo and colleagues in the Faculty of Land and Food Systems, the team is testing peroxide microwave technology, which removes nutrients and sequesters valuable carbon (available for methane production) from pig and dairy waste. The patent-pending microwave technology is also licensed to Ostara. “It’s a fundamental shift in how we view waste,” says Mavinic. “It’s not a problem, it’s a resource. It’s a plethora of possibilities.” ■

#### Global access to struvite recovery

Under the direction of Civil Engineering Professors Don Mavinic and Jim Atwater, Elizabeth Tilley investigated urine separation and struvite recovery for use as a fertilizer as her master’s thesis. As a UBC Bridge Program Fellow, she completed an internship at the Swiss Federal Institute of Aquatic Science and Technology (Eawag), where she stayed on as a researcher focused on developing countries.

At Eawag, Tilley was instrumental in setting up a struvite pilot plant (based partly on UBC research discoveries) in Nepal that allowed villagers to produce fertilizer locally. Now undertaking a PhD in Switzerland, Tilley will work in Durban, South Africa, on a project funded by the Bill & Melinda Gates Foundation. There she will investigate the economic aspects related to the production of struvite from urine. Tilley and Mavinic plan on future collaboration to provide the developing world with access to valuable fertilizer.



ENGINEERING STUDENTS

After the grueling Coquihalla Highway, the Prairies proved to be a breeze for UBC Electric Car Club.

# AN EPIC JOURNEY

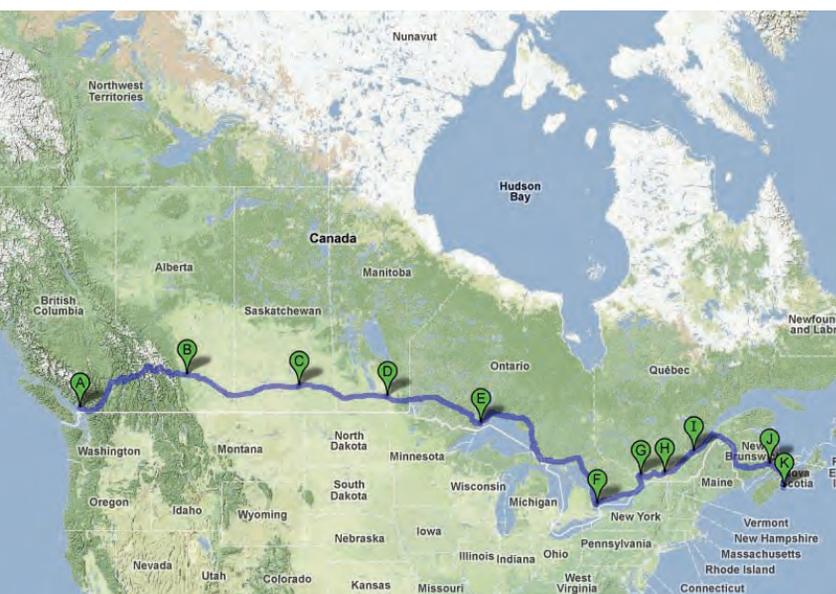
## UBC Electric Car Club crosses Canada.

Facing dismal summer job prospects in 2009, a group of UBC Engineering students put their talents to work, hoping to gain the all-important “hands-on” experience. Their idea—build their own electric vehicle.

“We’re starting to realize what impact fossil-fuel vehicles have,” says fourth-year ECE student Ricky Gu, president of and key driver behind the UBC Electric Car Club (UBCECC). The UBCECC sees pollution reduction as the key benefit of electrical vehicles (EVs), lauding the EV system as being “so simple and elegant and green.” Motivated to make a difference, club members were put in touch with Mining Engineering Professor John Meech, an expert in process controls. Meech enthusiastically took on an advisory role and was able to join UBCECC under the UBC Thunderbird Robotics club umbrella.

With funds from the UBC Engineering Professional Activities Fund, the UBCECC bought a 1972 Volkswagen Beetle to convert—“UBC engineers have a quite a reputation for hanging VW Beetles off bridges, and we thought it would be kind of neat to drive one across for a change,” says Meech, smiling. Initially the team was composed of Electrical Engineering students, but interest grew and the club soon included Mechanical Engineering, Integrated Engineering, Engineering Physics and even Engineering graduate students.

By November 2009, the club had its car—the “E-Beetle”—purring around Vancouver, connecting with local EV associations. But the UBCECC’s ultimate goal was to enter the Zero Emissions Race, to circumnavigate the world in 80 days on its own electricity. To participate, the car needed over 10,000 kilometres of



MAP COURTESY: GOOGLE MAPS. PHOTO: ORIENT PHOTO/ISI

testing under its belt. The UBCECC mapped out a trip from Vancouver to Halifax—the vast country giving them ample ground to test the E-Beetle’s mettle—and from Halifax planned to ship the car to Switzerland in time for the race. However, one month into planning, the race was called off (later to be reinstated but too late for UBCECC). Undeterred, they decided to go ahead with a cross-country trek. Gu had felt confident, saying, “We built the car pretty much from scratch, so if anything did go wrong, we could fix it.”

With 96 lithium iron phosphate batteries donated by Thundersky Batteries, and a three-phase AC induction motor, the E-Beetle was supported remotely by a core team of six members. Their first hurdle would be the demanding Coquihalla Highway, with its steep elevation the most challenging stretch of highway on the entire cross-country trek; the E-Beetle completed this leg of its trip with juice to spare.

No epic journey is without trials—an incorrect charging harness resulted in a 50-percent increase in charging times, requiring a fix in Toronto; they were delayed two days in Montreal waiting for Hurricane Earl to pass; and a loose bolt resulted in the drive shaft nearly falling off outside Quebec City.

In 14 days, using existing infrastructure, the E-Beetle completed the first ever cross-Canada trip in an electric

vehicle, a range of 300 km at 100 km/h and 500 km at 50 km/h. Their 6,472-kilometres feat was so successful that media in Canada, the United States, the United Kingdom, Switzerland, China and Germany covered the story. Their next goal is to “Circuit the Continent Electrically—90 North American Cities in 90 Days.”

Gu attributes their success to “never giving up” and to the incredible support the UBCECC continues to receive from UBC’s President’s Office, Vice President of Finance Office and Faculty of Applied Science, as well as from private donors and sponsors. Meech credits the team as an “amazing group of people, to work together and coordinate the trip.” He also credits the team’s success to contributions from alumni—Bill Chyplik (BASc ’70 Electrical Engineering) and Curtis Lapadat (BASc ’90 Engineering Physics). Both exemplify what “giving back” is all about and have been untiring in their time and direct assistance in solving technical issues and contributing in-kind support.

When asked what it feels like to drive an EV, Gu lights up and says, “You get something called an EV grin”—the joyous expression of EV drivers, knowing their vehicle isn’t burning fossil fuel. ■

UBCECC’s 2010 journey across Canada including a stop in front of the Parliament Building in Ottawa.



Road safety expert  
Professor Tarek Sayed

# BUILDING SAFER ROADS

## Video analysis can help traffic planners learn lessons from bad drivers.

Close calls on the road can do more than just smarten up bad drivers. UBC Civil Engineering Professor and road safety expert Tarek Sayed has devised a way to automatically track and analyze near misses, using the findings to improve highway operations and traffic design and ultimately reduce the number and severity of crashes.

"This is a new technique which we first developed at UBC, that is currently being applied in several projects worldwide," says Sayed.

Sayed is currently running pilot projects of the "computer vision and automated safety analysis" in Vancouver, Edmonton, Penticton, Calgary, Cairo and Kuwait City.

The upfront investment for the video monitoring is low—only \$300 for an ordinary digital video camera mounted on a pole. The camera records motorists for one to three days, depending on traffic volume.

Sayed then analyzes the video data using a software program and analytical techniques he developed with research associate Nicolas Saunier (now Assistant Professor at École Polytechnique de Montréal) and graduate student Karim Ismail (now Assistant Professor at Carleton University). The program's algorithms isolate types of potential collisions and their degrees of severity.

"We also use traffic-conflict techniques to better understand the split-second responses and behaviour of drivers during conflicts," he says.

Partnering cities have embraced this innovation, says Sayed. "The biggest advantage of video recording and automated analysis is that it reduces the amount of time required to collect data from years to mere days." Road-improvement programs have traditionally evaluated collisions over a period of two to three years, using records from police reports and insurance claims. In some cases, accident statistics would be supplemented by human observers hired and trained to record and evaluate the frequency and type of traffic conflicts.

"Historical collision data and human observation are not always reliable or available," says Sayed. "In contrast, video sensors provide rich, detailed, inexpensive and permanent observations of traffic scenes."

He adds that with such robust and precise data, decision makers can then more easily set priorities for highway improvements or design changes. "It's possible to assign an average cost per incident and evaluate the safety benefits."

For example, after seeing Sayed's data, the city of Edmonton installed a right-turn traffic light at the Yellowhead/Victoria Trail intersection, one of its top crash-prone locations, and saw the number of collisions

*“The biggest advantage of using video recording and automated analysis is that it reduces the amount of time required to collect data from years to mere days.”*



PHOTO: JUDY HARRIS

## A new breed of road engineers

drop by 95 percent. And in Oakland, California, Sayed evaluated motion patterns for “pedestrian scramble,” a mode that halts traffic in all four directions to allow pedestrians to cross an intersection, and found that there were significantly fewer potential conflicts after the scramble was created.

In 2003, in anticipation of the 2010 Olympic Games, the B.C. Ministry of Transportation enlisted Sayed’s help in choosing the safest designs for the redevelopment of the scenic Sea-to-Sky Highway between Vancouver and Whistler—a road notorious for its rocky, steep and mountainous topography. “Compared with the old Sea-to-Sky highway, the new design has been able to reduce accidents by 50 percent.” ■

Source: UBC Reports, November 2010

“Forgiving and caring highways” may sound fanciful, but Sayed argues that building roads that anticipate and prevent accidents is a smart way to go.

Worldwide, car accidents claim 1.3 million lives each year. Annually, car accidents cost the Canadian economy five percent of the GDP, or \$62 billion. Moreover, 95 percent of car crashes are attributed to driver error.

“I’m not saying that we should ignore bad driving,” says Sayed, “but road-safety countermeasures are a cost-effective solution that can save lives and money.”

He explains that current standards guiding highway design and planning stem from the 1950s, when mobility and standardization, rather than

safety evaluation, were priorities. But Sayed says UBC “is doing very well in this area” by helping to nudge standards into a new direction; having supervised more than 50 graduate students, Sayed is producing a new breed of engineers keen to build “smart” roads.

Civil Engineering Professor Gordon Lovegrove, one of Sayed’s former students, has set up a sustainable road-safety lab at UBC’s Okanagan campus: [www.publicaffairs.ubc.ca/2010/07/01/prof-launches-first-sustainable-road-safety-lab/](http://www.publicaffairs.ubc.ca/2010/07/01/prof-launches-first-sustainable-road-safety-lab/).

Source: UBC Reports, November 2010



**Figure 1**  
A sample of an automatically detected rear-end collision before improvement to the intersection of Yellowhead/Victoria Trail, Edmonton (Courtesy of Tarek Sayed)



**Figure 2**  
A sample of automatically detected pedestrian-vehicle conflict in a before-and-after safety study of a pedestrian scramble phase in California (Source: Ismail, Sayed and Saunier, 2010)



**Figure 3:**  
Automatic analysis of pedestrian-vehicle conflicts in downtown Vancouver (Source: Ismail, Sayed and Saunier, 2009)

# Newsworthy

## Media Top Hits

The news items in this section represent a portion of UBC Engineering’s recent media coverage. For a complete listing, visit the News & Events section at [www.engineering.ubc.ca/news-events](http://www.engineering.ubc.ca/news-events)



### BETTER TRAFFIC SYSTEMS REDUCE ACCIDENTS, PROMOTE SUSTAINABILITY

Civil Engineering Professor Gordon Lovegrove, who researches sustainable road safety, says that a critical mass of cyclists is key to a significant and sustainable change in road safety for motorists and cyclists.

Once there is a critical mass of bicycles, drivers become more aware of cyclists as road users and change their driving habits accordingly, explains Lovegrove.

Lovegrove will open a sustainable road-safety research lab at UBC’s Okanagan campus in September 2011. It will be the first of its kind in the world, and he hopes research from the lab will be used by city planners and engineers to build safer and more sustainable communities.

*THE GLOBE AND MAIL; CBC NEWS*

### INNOVATIVE PROGRAMMING SUPPORTS THE “GLOBAL ENGINEER”

As more students flock to the field of engineering, universities across the country are advancing the concept of the “global

engineer” and broadening the educational experience, offering courses in areas such as finance or entrepreneurial studies.

At UBC, a campus-wide initiative called entrepreneurship@UBC was dreamed up to inspire and support young entrepreneurs, and engineers can partake in this innovative fervour by enrolling in the New Venture Design course (APSc 486), which gives them the skills—from writing a business plan to doing market research—to start their own enterprise.

One former student in the course, Winnie Lai (BASc’10), co-founded Clinicbook before she finished her degree in engineering physics last spring. The website helps Canadians find health care through a universal directory; Lai is currently developing an online booking system for dental appointments.

UBC offers other unique engineering programs, such as the Master’s of Engineering in Clean Energy Engineering.

*MACLEAN’S 2010 PROFESSIONAL SCHOOLS RANKINGS*

### SAFETY EXPERT SPEAKS ON MINE RESCUE

Throughout the fall, Mining Engineering Professor Rimas Pakalnis spoke with media about the rescue of trapped workers in the mine collapse in Chile. A 700-meter-deep hole was drilled to allow a rescue capsule to be lowered to the miners and bring the men back to the surface. The miners were successfully rescued in October, after being trapped underground for 69 days.

Pakalnis has been advocating for much stronger mine-safety standards in South America and Asia for years. He says a mine

disaster like the one that happened in Chile is unlikely to happen in Canada. BC has very high safety standards that would make it unlikely for anything like the mine disaster that happened in Chile to happen here.

*GLOBAL NATIONAL NEWS; CHQR RADIO; CTV*

### ANTARCTIC ROBOT GOES WHERE OTHERS DON’T DARE

A high-tech underwater robot built by UBC researchers is now surveying ice-covered ocean regions in Antarctica. The mission looks at the effect of ice shelves on the mixing of sea water.

Two PhD candidates from UBC’s Autonomous Underwater Vehicle and Fluid Mechanics research group within Civil Engineering are in Antarctica to operate the bot. Andrew Hamilton, one of the PhD students, says the data collected will provide valuable information from uncharted parts of the ocean to climate modellers.

“These deployments are expected to return important data from largely uncharted ocean environments,” says Hamilton.

*DISCOVERY NEWS; CBC; THE CALGARY SUN; THE VANCOUVER SUN*

## STUDENTS/ALUMNI

## Building entrepreneurship networks

Plug and Play, the first major event for the recently launched entrepreneurship@UBC initiative, proved beneficial for recent UBC entrepreneurs. Six companies founded by UBC student and alumni entrepreneurs presented their businesses to a panel of venture capitalists and distinguished UBC alumni in Silicon Valley on August 31, 2010.

The companies joined UBC President Stephen Toope, Deans Tyseer Aboulnasr (Applied Science) and Daniel Muzyka (Sauder School of Business) and University-Industry Liaison Office Managing Director Angus Livingstone at the event, which was held at the Plug and Play Tech Center in Sunnyvale, California. Fifty-four UBC student and alumni companies applied to take part in the event. Approximately half were founded by students and half by alumni who graduated since 2007.

“The number and outstanding quality of the applications is a reflection of the creativity and resourcefulness we have come to expect from UBC students and alumni,” said Professor Toope. “We are delighted to facilitate opportunities for UBC entrepreneurs to advance innovations that impact local and global communities.”

Four of the six companies that attended were founded by engineering students or alumni.

Aeos Biomedical, based on a business idea generated by Colin O’Neill (BASc ’10, IGEN), Wylie Spencer (BCom ’10) and Nicolas Seto (BCom ’10) as students,

presented the company’s primary product, Target Tape, which increases accuracy in medical applications ranging from thoracic to plastic surgeries.

Clinicbook, founded by Winnie Lai (BASc ’10, ENPH) and Robin McFee (fourth-year ECE student) and Joel Matsumoto (BSc ’10), offers a pain-free path to health care, with online booking and “live wait times” for walk-in clinics.

Dragonfly Instruments, created by engineering students Lin Watt (CHBE) and Tagg Jefferson (IGEN), has developed an innovative on-site water-testing device for environmental field technicians to achieve lab-quality test results in minutes rather than weeks.

Veridae Systems, founded by Bradley Quinton (PhD ’08, ECE), vastly reduces the time it takes engineers to get their microchip designs to production.

UBC entrepreneurs received valuable feedback on their ventures and presentations, networked with alumni and experienced the entrepreneurial energy and lifestyle of Silicon Valley.

“We were able to experience the vibe of the entrepreneurial community. Being exposed to that type of startup culture is invaluable to entrepreneurs,” said Winnie Lai, Clinicbook co-founder. “UBC is clearly putting the effort into cultivating a similar community in Vancouver that fuels innovation and bridges resourceful networks.” ■

## STUDENTS

## UBC engineering announces its first annual high school engineering competition

Start the creative juices flowing—UBC Engineering is introducing its first ever High School Engineering Competition. The competition, slated to take place in spring 2011, will test high school students’ problem solving and design skills and will reward creativity and vision.

The purpose of the competition is to give students the opportunity to demonstrate their math and science skills while exploring the many interesting facets of the field of engineering. The competition, much like a triathlon, will comprise three parts; teams of three to five members will

compete in each part. With junior and senior levels, high school students of all ages will be eligible to compete.

A multidisciplinary group of UBC Engineering faculty convened to design the challenge components, which consist of a problem-solving challenge, a programming challenge and a poster-design challenge. For students unable to attend the competition at UBC, there will be an additional competition element, giving students the chance to enter a design challenge by submitting a video of their solution. This will allow students from afar to compete as well. The competition will be held annually and funded through support from donors and sponsors.

To sign up to receive more information, please visit [www.engineering.ubc.ca/competition](http://www.engineering.ubc.ca/competition). ■

## Clean-energy researcher wins NSERC Innovation Challenge Award



Dr. Alfred Lam receiving his award from the Honourable Gary Goodyear, minister of state for science and technology, at the NSERC awards ceremony in Ottawa.

Alfred Lam (PhD '09, CHBE), a member of UBC's Clean Energy Research Centre (CERC), was awarded an NSERC Innovation Challenge Award this fall. The award honours graduate students who have demonstrated an entrepreneurial spirit and have identified a commercial application for their thesis research results.

Lam and his PhD supervisor, Professor David Wilkinson, CERC director, have developed a membraneless direct methanol fuel cell (DMFC) power system that is expected to deliver industry-leading energy density, extended run-time and instantaneous "off-grid" recharging capability through a simple fuel-cartridge replacement. A patent on the system is pending.

"The introduction of next-generation portable electronic devices is severely limited by the reduced run time between recharges," says Lam. "With power demand outpacing advancements in traditional battery technology, device manufacturers are aggressively pursuing advanced power systems capable of providing greater on-board energy and recharging speed."

The novel design simplifies the conventional DMFC architecture through the implementation of a 3-D electrode and replaces the polymer electrolyte membrane (PEM), a standard in DMFC design for over 25 years, with a liquid electrolyte and an open spacer made from simple "off the shelf" materials. This approach, along with an integrated method of power control, possesses significant competitive advantages not possible with conventional PEM-based design and represents a significant advancement towards a cost-effective fuel cell for the next generation of portable devices. ■

## RESEARCH

## Researcher receives funding to develop green engines



Professor Steven Rogak explains his fuel injector research to Andrew Saxton, Member of Parliament for North Vancouver

Thanks to the Automotive Partnership Canada (APC) program, UBC Mechanical Engineering Professor Steven Rogak will lead a program to develop ultra-low-emission natural-gas engines with industrial partner Westport Innovations Inc. Cash and in-kind contributions from APC and Westport will total \$1.1 million over five years.

"Our goal is to develop a fuel injector that will make natural-gas engines competitive with diesel engines by eliminating dangerous particulate emissions without sacrificing efficiency or adding cost," said Rogak, associate director of the UBC Clean Energy Research Centre.

Partnering with UBC on this initiative, Westport—a Vancouver-based, UBC spinoff company—will match federal funding and provide essential in-kind contributions. Westport, co-founded by UBC Mechanical Engineering Professor Philip Hill, develops technologies that enable vehicles to operate on clean-burning alternative fuels.

The prototype fuel injector leverages Westport's high-pressure direct injection technology, enabling heavy-duty diesel engines to run primarily on natural gas while retaining the advantages of diesel engines—reliability and high thermodynamic efficiency.

"Natural gas has the potential to reduce greenhouse-gas emissions by more than 20 percent, compared with conventional engines," said Rogak. "But until our society places a higher price on carbon emissions, it is essential that the cleaner engine technology be able to compete with the incumbent technology on cost and performance."

Prototyping a fuel injector involves a large number of high-precision parts, such as gas-tight sliding needle valves and nozzles, which include an array of injection holes less than half a millimetre in diameter. The timing and duration of injections must be controlled to within approximately 50 microseconds to provide accurate results.

To evaluate fuel-injector prototypes, Rogak tests gaseous emissions with the single-cylinder research engine (SCRE). The SCRE—with its engine, compressors and controls—represents more than \$1 million of infrastructure and costs more than \$80,000 per year to operate, due to its sophisticated instrumentation and technician costs.

One benefit of the project thus far has been the development of the injector visualization chamber, which can determine injector flow and spray characteristics at realistic fuel and background pressures.

Automotive Partnership Canada is a five-year, \$145 million federal initiative to support collaborative research and development to drive the Canadian automotive industry to greater levels of innovation. ■

## FACULTY

## New award shines spotlight on exceptional high school teachers

The UBC Faculty of Applied Science is launching a new way to recognize teachers for going above and beyond their in-class duties with the first annual McEwen Family Teacher Recognition Award. Throughout the fall, UBC Engineering students nominated high school teachers who supported them in overcoming obstacles to reach their potential as university students and aspiring global citizens.

The award was established through a \$36,750 donation by Vancouver biomedical engineer Jim McEwen (BASc '71, PhD '75), who believes strongly in the importance of celebrating our teachers—the unsung heroes of our communities.

“The intent of the award is to shine the spotlight on teachers who resolutely help students from all backgrounds discover their talents and rise above challenging life circumstances to succeed,” said McEwen. “Nominating a teacher is a way for engineering students to reflect back on their life journey so far and demonstrate their appreciation for their supporters by paying it forward.”

The winner of the McEwen Family Teacher Recognition Award will receive \$5,000 to spend on school enrichment activities, programs or development. The teacher will also be asked to nominate a high school student to receive a \$5,000 scholarship to attend UBC. The engineering student who nominated the winning teacher will receive \$250 in recognition of his or her efforts. UBC Engineering will celebrate the winning teacher and student nominator at the annual Engineering Excellence Celebration, March 18, 2011. ■

## EDUCATION

## Mining alumni create the John “Blue” Evans Student Enrichment Fund

The John “Blue” Evans Student Enrichment Fund will support priority student initiatives, such as conference participation, clubs, field trips, and teaching facility upgrades and supplies, in the Norman B. Keevil Institute of Mining Engineering at UBC.

Mining Engineering alumni from the 1970s came together to honour former department head John “Blue” Evans and contributed nearly \$120,000 to create the John “Blue” Evans Student Enrichment Fund. The fund will support priority student initiatives, such as conference participation, clubs, field trips, and teaching facility upgrades and supplies in the Norman B. Keevil Institute of Mining Engineering at UBC.

Blue’s former students wanted to honour his many contributions to their professional and personal lives. Blue imparted practical advice to his students about the important issues they faced—selecting a program, courses and internships, getting good grades and scholarships, balancing studies and life, and approaching it all with vision and integrity. He guided his students in their transition from teenagers to professional engineers.

“Blue was a great teacher, mentor, supporter and role model for young adults aspiring to become engineers. He put so many on a trajectory for a successful career,” says Alf Hills (BASc '77), who led the fund-raising efforts together with Bill Weymark (BASc '77). “Blue’s students felt very strongly that we give something meaningful back to the Mining Engineering



department that represents what he stood for, and serves as an example for future mining classes.”

On behalf of current mining students, the Norman B. Keevil Institute of Mining Engineering wishes to extend its sincere appreciation to Blue’s former students for establishing the fund and contributing generously to support valuable student-enrichment initiatives for years to come. ■

## Awards & Achievements

Chemical and Biological Engineering Professor **John Grace** received the Meritorious Achievement Award from the Association of Professional Engineers and Geoscientists of B.C.

Chemical and Biological Engineering Professor **Ezra Kwok** received the Technical Chapter Chair Award from IEEE Vancouver.

Civil Engineering Professor **Don Mavinic** received the Dave Mitchell Award of Distinction from the Ernest C. Manning Awards Foundation and an NSERC Synergy Award for Innovation.

Civil Engineering Professor **Tarek Sayed** received the Award of Academic Merit from the Transportation Association of Canada.

Electrical and Computer Engineering Professor and Dean **Tyseer Aboulnasr** has been named one of the 100 Most Influential Women in B.C. by the *Vancouver Sun*.

Electrical and Computer Engineering Professor Emeritus **Ian Cumming** has been named a Fellow of the IEEE.

Electrical and Computer Engineering Professor **Guy Dumont** has been chosen as a Distinguished Scholar in Residence by the UBC Peter Wall Institute.

Geological Engineering Professor **Oldrich Hungr** received the Meritorious Achievement Award from the Association of Professional Engineers and Geoscientists of B.C.

Materials Engineering Associate Professor **Akram Alfantazi** received the UBC Killam Award for Excellence in Mentoring.

Materials Engineering Professor **Frank Ko** received an Honorary Fellowship from The Textile Institute.

Materials Engineering Professor **Matthais Miltzer** received the Henry Marion Howe Medal from ASM International.

Materials Engineering Professor **Tom Troczynski**, his research team, Clayburn Refractories and Teck Metals have been highlighted by NSERC as an example of the benefits of industry partnering with university researchers.

Mechanical Engineering Professor **Yusuf Al-tintas** received the R.A. McLachlan Memorial Award from the Association of Professional Engineers and Geoscientists of B.C. and has been named Fellow of the Royal Society of Canada.

Mechanical Engineering Professor **Elizabeth Croft** has been appointed the NSERC Chair for Women in Science and Engineering, B.C. and Yukon Region.

Mechanical Engineering Professor **Antony Hodgson** received the Award for Teaching Excellence from the Association of Professional Engineers and Geoscientists of B.C.

Mechanical Engineering Professor **Bud Homsy** received an Honorary Degree from the University Paul Sabatier in Toulouse, France.

Mechanical Engineering Manager of Undergraduate Affairs and Special Projects **Jennifer Pelletier** received a UBC President's Staff Award of Excellence.

Mining Engineering Professor Emeritus **Janusz Laskowski** received the Antoine M. Gaudin Award from the Society for Mining, Metallurgy and Exploration (SME).

Mining Engineering Associate Professor **Rimas Pakalnis** has been selected as a distinguished lecturer for the Society for Mining, Metallurgy and Exploration (SME) Henry Krumb Lecture Series.

UBC School of Engineering Facilities and Finance Assistant **Karen Seddon** received a UBC Service Award of Excellence.

## Looking for a path to take your career forward and effect positive change?

Beginning fall 2011, UBC will offer a new Master of Engineering (MEng) in Engineering and Public Policy (ENPP) program for engineers interested in exploring the development of technology while at the same time taking into consideration the social, legal, ethical, political and economic factors influencing those technologies.

Choose from a variety of courses such as entrepreneurship, project management and clean-energy engineering, as well as technical engineering subjects. Develop new skills in as little as 12 months of full-time study.

Call **604-822-8386**, email: [gradprog@apsc.ubc.ca](mailto:gradprog@apsc.ubc.ca) to learn more.



Engineering

[www.engineering.ubc.ca/graduate](http://www.engineering.ubc.ca/graduate)

## FACULTY

## “Helping people” attracts women to science and engineering

Across the globe, women make up more than half the world’s population. And at UBC, women make up just over half of the undergraduate population.

So why is it that only 18 percent of UBC Engineering undergraduates are women? And why, after graduation, do attrition rates for women in engineering and high-technology careers soar as high as 40 percent?

Mechanical Engineering Professor Elizabeth Croft has some ideas.

Recently named the NSERC Chair for Women in Science and Engineering for the British Columbia and Yukon region, Croft’s focus will be on increasing the participation of women in science and engineering and providing role models for women active in and considering careers in these fields.

In other parts of the world, such as Eastern Europe and South America, women represent roughly 50 percent of the student body in these fields. To start, says Croft, North American institutions need to address and change young women’s perceptions that it’s not “normal or cool” to study engineering.

Croft also acknowledges differences in how young men and women approach career choices. For example, women are typically drawn to what they perceive as “helping” professions. To many young women, engineering doesn’t obviously fit into that category, observes Croft, despite the fact that engineers envision, design and build the medical, environmental and consumer technologies that help people live healthier, greener and more connected lives.

Croft integrates community-service learning in curricula so students immediately recognize via hands-on experience how their skills and knowledge benefit others. This fall, 130 students earned credits while working on community and industry projects. The experience connects what students learn in the classroom with the impact it makes on their community.

“There is great demand for highly trained scientists and engineers to sustain economic development, and we need to attract and foster a diverse talent pool with a global perspective,” says Croft. “We cannot truly succeed as a profession—and, ultimately, a society—if we do not have the opportunity to attract and retain the brightest minds, male or female.”

To support workplace change, Croft is partnering with industry and existing networks for women in science and technology. She aims to help the traditional technical workplace find ways to accommodate the nonlinear



trajectory for employees who may need flexibility to raise families, care for aging parents or nurture personal growth.

“This may end up benefiting all workers,” says Croft.

Croft has spearheaded several initiatives to support women in engineering, including UBC’s Engineering’s Mentoring (formerly Tri-mentoring) Program, which connects students with engineering professionals, provides a sense of community and support and can help reduce feelings of isolation while increasing self-confidence. She also co-founded UBC’s Women in Engineering program, which organizes speakers, brown-bag socials and a retreat.

“Gender or ethnicity should not inhibit people from pursuing a career in which they can truly make a difference in our world,” says Dean Tyseer Aboulnasr.

“With NSERC and industry support, coupled with Dr. Croft’s leadership, we will continue to build an inclusive and diverse community and work to inspire a new generation of professionals. Our future depends upon engineers and scientists who will develop the technology necessary to address the challenges facing us all. It only makes sense that those engineers and scientists reflect the diversity of our society,” she says.

NSERC contributed \$350,000 in support of the chair for five years, with industry sponsors contributing matching funds.

Lead sponsors include BC Hydro, Dr. Ken Spencer (BASc ’67, PhD ’72), WorleyParsons Canada Ltd., Teck Resources Limited., Stantec Consulting, and Henry F. Man (BASc ’83). Contributing sponsors are Ms. Catherine Roome, Mr. Stanley Cowdell (BASc ’73), the APEGBC Division for Advancement of Women in Engineering and Geoscience, Nemetz (S/A) & Associates Ltd., and Glotman Simpson Consulting Engineers. Karen Savage, P.Eng (BASc ’86), and Golder Associates Ltd. have also supported the chair. ■

# Our People



ALUMNI

## The Lone Flower: Rona Alexandra Hatt Wallis (BASc '22), 1901–1982

In 1922, Rona Hatt graduated from UBC with a degree in chemical engineering and became the first woman to graduate from the Faculty of Applied Science.

The youngest of 12 siblings, she was the only one to attend university. When she began her studies in 1917 at age 15, UBC's enrollment was just over 350 students; tuition for the year was \$18.

Although her original career choice was nursing, that option was not available at UBC at the time. Hatt enjoyed chemistry during the common first-year of study at UBC, and a friend suggested that she enroll in chemical engineering. Her friend and three other young women planned to enroll in the same program, but when she returned to UBC the following fall, Hatt discovered she was the only woman registered in chemical engineering.

Despite having been raised with five brothers, Hatt admitted that she was intimidated by all the men surrounding her. Often treating her as a little sister, her classmates played tricks on her during her first year out of jealousy because she was frequently ahead of them. But Hatt summoned the courage to continue going to class.

Classmates weren't the only ones who attempted to discourage her. One of her professors would say to her, "Margaret Healey [another woman who had previously enrolled in engineering] couldn't do these courses! What makes you think you can?"

She walked daily each way from her home in Kitsilano to the UBC buildings near the Vancouver General Hospital—about five miles round trip—and attended classes Mondays through Saturdays from 9 a.m. to noon, as well as classes and labs weekdays from 1 until 5 p.m. or later. Having entered engineering without the necessary high school prerequisites, such as woodworking, she had many courses to make up.

Engineering in those years differed vastly from today. Among the classes and skills Hatt had to master were courses on coal engines and forging. She shoveled coal into the boilers along with the men in her class. A 1919 *Vancouver Sun* article expressed amazement that a woman could do this.

Her later years at UBC were easier than her first. In 1919, veterans returned from World War I, and many joined her class. She took it upon herself to help them catch up with their coursework, and the gentlemen formed a protective circle around her. This experience helped her immensely later in life, when she worked with World War II veterans at Victoria College.

Helping people was one of Hatt's passions. Despite the fact that she felt it was too late to change her educational path when the School of Nursing opened at UBC in 1919, she used her knowledge and skills to nurse neighbors back to health during the 1918 flu pandemic.

After graduation, Hatt worked in the chemical engineering stores for two years, until she met her future husband, H. Douglas Wallis, a 1924 UBC chemical engineering graduate. She continued to use her education in later years working as a substitute teacher at Victoria High School, marking chemistry exams and teaching lab courses at Victoria College for a year or two after World War II. She also marked and later rewrote the chemistry Grade 12 correspondence course for BC. And her son John (BA '55, MA '63) noted that she cooked with "more knowledge" than many others.

Hatt's legacy lives on as part of UBC. Her determination inspired her children, grandchildren and great-grand children, and many attended UBC, including her great-grandson Christopher Wallis (BASc '10), who also graduated from chemical engineering.

The Faculty of Applied Science proudly offers the Rona A. and H. Douglas Wallis Memorial Scholarship in Chemical Engineering. This scholarship, endowed by their son John, provides \$1,400 annually to a female undergraduate student in chemical engineering.

Although it would be 25 years before another woman graduated from UBC with a degree in engineering, Rona Alexandra Hatt Wallis's bravery, commitment and perseverance paved the way for women in engineering at UBC.

In her 1922 yearbook, she is named the "lone flower" in her class—a woman in a field of men. ■

Source: UBC Library audio file available at [www.library.ubc.ca/archives/audio/UBC\\_AT\\_889.mp3](http://www.library.ubc.ca/archives/audio/UBC_AT_889.mp3)

## ALUMNI



## Soaring to the summit

When Ossama Hassanein (MAsc '74, MBA '76) was a graduate student in electrical and computer engineering at UBC in the 1970s, people weren't using the words mentorship and entrepreneurship, but they were living them.

At UBC, Hassanein was inspired by the accomplished people around him and by the supportive and egalitarian environment, where his professor was also his squash partner and his thesis supervisor became a personal friend. State-of-the-art computers were available and accessible. Grants, research assistantships and teaching assistantships ensured the necessary funding to allow him to focus on his studies.

"As a consequence, I became a free man. I had the opportunity to be the man I wanted to be, to spread my wings, to reach higher heights," said Hassanein.

Hassanein was born and raised in Alexandria, Egypt. He chose UBC for his graduate studies because of its reputation as a top electrical and computer engineering school, and because of the comparatively mild climate and nearby ocean. He completed the requirements for his master's and PhD in electrical engineering at UBC, earned his MBA at UBC and went on to earn a PhD in business administration at California Coast University.

Early in his career at Bell-Northern Research, Hassanein was the junior member of a team tasked with designing a vision for the "office of the future." He was offered the opportunity to relocate to Silicon Valley, where he quickly became familiar with venture capital and emerging trends. Doors opened. He accepted a job at Berkeley International (a private equity boutique) in San Francisco. His first investment—Oracle—was a lucky one. The same year Oracle went public (1986), his company listed on the London Stock Exchange.

"My first experience was exceptionally rewarding," said Hassanein. "It's nice not to bump against the wall on the first initiative one takes. But let's not forget, we're creatures of opportunities, not their creators."

In the 1980s, Hassanein led the mezzanine financing of more than 80 Silicon Valley-based IT companies, including Oracle, LSI Logic, Linear Technologies and Cirrus Logic. Their combined market value today exceeds \$140 billion. In the last 20 years, he became

chairman or co-founder of six leading-edge digital start-ups in the U.S., U.K. and France whose combined market value at exits exceeded \$2 billion.

Currently, Hassanein spends about half his time mentoring entrepreneurs. As a charter member of the C-100, a Silicon Valley-based association dedicated to mentoring Canadian entrepreneurs and linking them with angel investors, he helps by improving business plans and examining challenges businesses face. Hassanein is also chair of TechWadi, the largest network of Arab American high-technology executives in Silicon Valley. TechWadi, which means "valley of technology" in Arabic, brings entrepreneurs from the Middle East to Silicon Valley for internships on building successful companies.

"Entrepreneurs need not only an advisor or a consultant, but someone who cares—who engages heart and mind and money to help them achieve their goals and their dreams," said Hassanein.

As UBC launches entrepreneurship@UBC, an initiative to provide capital, mentorship and education to entrepreneurs, Hassanein calls this the "Golden Age" when students should take advantage of all the support on campus. In the university environment, students can take the time to understand trends and test business ideas and be inspired by others.

"Build a high-performance team with diversity embedded," advises Hassanein. "Focus on crafting a relevant and sustainable differential advantage or value proposition."

Partnerships with industry leaders are essential—"you can't do it all alone."

"Know your customers, and develop a keen understanding of how to best meet their needs," he continues. "Use or create an effective monetization model. Change the model if it does not work; persistence pays when you're right, not wrong."

"If you fail, restart. Share the joy, the pain, the spoils. Spread the wings of passion and compassion. Aim for the summit," he says. "You'll get there eventually." ■



## STUDENTS

## Let there be light

Naeem Mawji loves to solve problems. A fourth-year chemical engineering student, he's solving a problem that affects 43 million people in Tanzania.

Roughly 97 percent of rural Tanzania does not have electricity. Without it, people depend on kerosene-fueled lamps for lighting. Every day, 75 people die of respiratory issues, and burns from the lamps cause serious problems for people and property.

"It's not just a health problem," says Mawji, a native of Tanzania. "Electricity allows people to store food, work longer hours and process grains into flour, which can be sold for more money."

Mawji—and his company, Carbon X Energy,—aims to secure Tanzania's future by alleviating poverty and improving the quality of life through rural electrification.

Growing up with a father who was a civil engineer, Mawji became fascinated with engineering early. During Grade 11, Mawji joined his uncle's electrical shop as a technician and became enthralled with solar technology. In 2006, he received UBC's International Leader of Tomorrow Award, a scholarship that recognizes international students who demonstrate superior academic achievement and community service.

"With my community network and my electrical training, I knew I was positioned to bring about positive change," he says.

As Mawji cracks the electricity challenge, he finds obstacles at every stage. For starters, bringing power to villages scattered off the main grid isn't cost-effective for the national energy provider.

"It's the classic chicken-and-the-egg conundrum," explains Mawji. "Without industry, the demand isn't high enough to provide incentive for distribution, but without power, industry cannot develop."

With sunshine abundant in eastern Africa, Mawji proposes conventional low-voltage electricity (230 V) for rural communities through solar-photovoltaic and hybrid mini-grid systems. "The technology is quite simple," he says.

Community engagement and trust are essential for implementing the technology. Thanks to his father's 20 years of experience working in rural areas, Mawji has an in with villagers. During the summer of 2009, he proved his rural-electricity concept by supplying key locations, such as an elementary school, in the village of Masurura with sample electricity—electricity that could feasibly be used in homes made of thatch and mud.

But how do you wire a hut made of thatch and mud?

"The structure of most of the homes in the villages makes it very difficult to wire and connect them to a mini-grid," says Mawji. "We intend to use a simple ready board to solve this problem."

The ready-board technology includes fuses, breakers, sockets and lights in a single unit. "Essentially, it's a light in a box," explains Mawji.

The self-contained technology bypasses the need to wire an incompatible structure.

Early on, Mawji discovered another challenge: How do you bring power to the people or know the market potential if you don't know where they are?

Before the summer of 2009, rural Tanzania had not been completely mapped. Because of other pressing social and political challenges, it simply hadn't been a government priority. Using GPS technology embedded in his smartphone, Mawji mapped all of Masurura—166 homes—in two days. With Google Maps, he geo-tagged each home and recorded population data.

Along the way, Mawji spoke with villagers about the benefits of electricity in terms they could relate to—financial terms. For example, households typically have two cell phones—one for each working parent. Most villagers charge their phones every other day, paying a small fee of 300 Tanzanian shillings (roughly \$.21 CAD) per hour. He explained that by using electricity from solar power to recharge their phones, they

would spend a fraction of what they currently pay and could use the savings to invest in a Coca-Cola refrigerator and sell cold Cokes for profit.

With the distribution challenge solved, how would people with low and variable incomes pay for electricity?

The solution resides in prepaid energy smartcards. Like prepaid phone cards, prepaid energy cards enable villagers to use mobile banking to pay for their power. Villagers get a prompt on their prepaid meter if their energy is running low and can use their phone to buy more power.

But how do you finance the initial investment in low-income areas and expect it to be sustainable?

For the Masurura project, Mawji secured grants from the World Bank through the Tanzanian government's Rural Energy Agency to finance the initial infrastructure investment.

"The next step is to encourage the local private sector to invest in the technology," says Mawji. "The market will ensure that it works and becomes a sustainable solution."

"There's nothing new about any of the technology we're using," says Mawji. "The innovation lies in bringing together existing technologies and modeling appropriately to solve a greater challenge."

Mawji's next phase focuses on developing a biomass reactor for energy. Combining solar and biomass would be ideal for both day and night energy needs, he explains. He's currently working on a feasibility study and economic analysis with six of his classmates; by April, their design will be complete.

"My goal upon graduation this spring is to take the biomass power-generator design and build it," says Mawji. "For my future, I envision engineering help for self-help solutions." ■

If you would like to connect with Mawji to work on the biomass power generator, contact him via [www.carbonXenergy.com](http://www.carbonXenergy.com).

*With files from: UBC Reports, November 2010*



*"There's nothing new about any of the technology.... The innovation lies in bringing together existing technologies and modeling appropriately to solve a greater challenge."*

PHOTO COURTESY OF MAEEN MAWJI

# Alumni Updates

This fall we saw foliage, football and friends of UBC Engineering on campus. Enjoy the highlights of recent events and mark your calendars for upcoming events!



## A Message from the Director of Development and Alumni Relations

I would like to take this opportunity to tell you about our Engineering Advisory Council and something wonderful they did for UBC Engineering this fall. Not all alumni will be familiar with the council, a group of distinguished representatives from the engineering profession, industry and government—most of whom are UBC alumni—who advise the dean of applied science on the activities of UBC Engineering, including its academic programs, teaching, research and service. The dean recently approached the council with a problem—the government funding was in place for the NSERC Chair for Women in Science and Engineering, but the matching industry funding was lost because of the economic downturn. Recognizing the value of the chair to the future of engineering, the Engineering Advisory Council immediately sprang into action, raising \$270,000 in less than three weeks and saving the chair.

In this edition of *Ingenuity*, you will learn about Mechanical Engineering Professor Elizabeth Croft's goals and plans as she embarks on her new role as NSERC Chair for Women in Science and Engineering for the British Columbia and Yukon region. We also share with you stories of other alumni who are giving back to UBC Engineering with a vision

for the future. Mining Engineering alumni from the 1970s created the John "Blue" Evans Student Enrichment Fund as a tribute to their special department head. Jim McEwen (BASc '71, PhD '75) established the McEwen Family Teacher Recognition Award to honour high school teachers who go the extra mile to ensure their students realize their dreams, despite difficult life circumstances.

I personally found this edition of *Ingenuity* inspirational, and I hope you do too. There are so many different ways for alumni to be involved with UBC Engineering and, through your involvement, make a difference for the next generation. Please call us at 604-822-8335 or visit us online at [www.apsc.ubc.ca](http://www.apsc.ubc.ca) for more information and inspiration.

Andrea Wink, BA (Hon.), CFRE  
Director,  
Development and Alumni Relations  
Faculty of Applied Science

## Announcements

### UBC Engineering Alumni Achievement Awards

Do you know a UBC alum who is making a world of difference? By nominating, you help acknowledge the contributions alumni are making. We will proudly announce award recipients at the upcoming Engineering Excellence Celebration 2011, to be held on March 18. Save the date! To nominate a UBC Engineering alum for one of the three alumni awards—Lifetime Achievement, Community Service, Young Alumnus (under 35 years)—please go to [www.apsc.ubc.ca/awards/alumni\\_awards](http://www.apsc.ubc.ca/awards/alumni_awards)

### Have You Got Mail?

Have we got your email address? If not, you may be missing out on invitations to exciting opportunities such as class reunions, the Engineering Excellence Celebration 2011, public lectures and more. To reduce our environmental impact and save costs, we use email for many of our invitations and promotions. It wouldn't be the same without you, so please ensure we have your email so you can join us!

Update your contact information at [www.apsc.ubc.ca/alumni/contact](http://www.apsc.ubc.ca/alumni/contact) or email [alumni@apsc.ubc.ca](mailto:alumni@apsc.ubc.ca).

## Going green...

The Faculty of Applied Science and UBC Engineering are dedicated to going green and becoming more sustainable in our practices.

If you would like to receive *Ingenuity* electronically rather than in print, please visit: [www.engineering.ubc.ca/goinggreen](http://www.engineering.ubc.ca/goinggreen)



Engineering | ALUMNI

# Event Highlights

## JOHN "BLUE" EVANS TRIBUTE EVENT

JUNE 25, 2010

UBC Mining Engineering alumni who were mentored by former Department Head John "Blue" Evans in the 1970s have created a tribute to Blue to celebrate his legacy. A group of former students, colleagues, friends and family gathered with Blue and his wife, Alice, at their care home in Richmond to celebrate the establishment of the John "Blue" Evans Student Enrichment Fund. See article on page 15 for details.

## EUS PRESIDENTS LUNCHEON

JULY 13, 2010

The UBC Engineering Undergraduate Society was honoured to host the inaugural EUS Presidents Luncheon. More than a dozen past presidents and executives from 1952 to 1987 gathered to reconnect, reminisce, and learn about current student activities. In particular, attendees learned of the Engineering Student Centre, a 10,000 square foot building, for which students will be contributing \$2.5 million through student fees; Applied Science will raise the remaining \$2.5 million through donations. For more information on the project or future society events or to view video, photos and the presentation from the reunion, please visit [www.ubcengineers.ca/esc](http://www.ubcengineers.ca/esc).



## CHBE 1960 REUNION

AUGUST 24, 2010

Chemical Class of 1960 celebrated their 50th anniversary with a tour of the Chemical and Biological Engineering Building and its modern facilities, followed by a luncheon. The event was spearheaded by Class President Ross Craigie. Many marveled at the changes that have taken place on campus and in the laboratories and classrooms over the past 50 years, but everyone was thrilled to see one familiar entity from 1960: Professor Emeritus Norman Epstein, who taught engineering fundamentals in the basement of the old Chemistry building back in the late 1950s.



## CIVIL 1949 REUNION

SEPTEMBER 16, 2010

Fifteen members of the Civil Class of 1949 gathered with guests at the Beefeaters Chop House and Grill in Nanaimo for their annual reunion. Classmates celebrated their health, their memories of UBC and their growing bursary, which is now supporting two students just a few months after its establishment.

## MENTORING AT UBC ENGINEERING KICK-OFF EVENT

OCTOBER 21, 2010

The UBC Engineering Mentoring Program launched its eighth year with its annual Kick-Off event, bringing over 60 industry and alumni mentors and 130 undergraduate and graduate students together as they embarked on their year of learning from one another. For more information, visit [www.cpsd.apsc.ubc.ca/mentoring](http://www.cpsd.apsc.ubc.ca/mentoring).

## ICICS INDUSTRY AND ALUMNI DINNER

NOVEMBER 4, 2010

The Institute for Computing, Information and Cognitive Systems (ICICS) held its annual industry dinner at the Royal Vancouver Yacht Club. Director Professor Panos Nasiopoulos hosted the evening and announced new partnerships with Telus, KPMG, Intellectual Ventures and Motion Metrics.

## CIVIL ENGINEERING PUBLIC LECTURE

NOVEMBER 17, 2010

Did you know that global phosphorus reserves are rapidly dwindling? Professor Don Mavinic, winner of the Dave Mitchell Award of Distinction from the Ernest C. Manning Awards Foundation, addressed this important issue in his talk, "A Green and Sustainable Solution to Global Phosphorus Depletion" highlighting the work of a team of UBC environmental engineers. Over 120 alumni and guests attended and celebrated Mavinic's most recent accolade, the NSERC Synergy Award for Innovation.

## ENGINEERING OPEN HOUSE

NOVEMBER 27, 2010

The annual Engineering Open House kicked off with a pancake breakfast hosted by Engineers Without Borders (EWB). High school students enjoyed networking with young alumni, who advised them on everything from Frosh-Week tips and midterm survival techniques to career opportunities beyond graduation.

## BIOMEDICAL ENGINEERING: GRAND ROUNDS

OCTOBER 5 AND NOVEMBER 4, ONGOING

The Biomedical Engineering Grand Rounds lecture series got off to a great start this year. Professor Emeritus Charles Lazlo, Electrical and Computer Engineering, presented "Perspectives on Biomedical Engineering: Five Decades and Counting" and celebrated former program director Dr. Ezra Kwok. Dr. Robin Coope, Engineering Technology Development Group Leader at the BC Cancer Agency Genome Centre, presented "Giving Form to Ideas: Technology Development at the BC Cancer Agency and Beyond."

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# Upcoming Events

Here's a snapshot of some upcoming events but there will be more. Visit our web calendar or subscribe to our monthly e-newsletter at [www.apsc.ubc.ca/news-events/newsletters](http://www.apsc.ubc.ca/news-events/newsletters)

## UPCOMING ALUMNI EVENTS

### GEOLOGICAL ENGINEERING INDUSTRY AND ALUMNI DINNER

JANUARY 22, 2011

The GEOROX Engineering Club will host its annual dinner for students, alumni, industry and guests. To reserve your ticket, contact [georox.ubc@gmail.com](mailto:georox.ubc@gmail.com).

### 15TH ANNUAL MINING ENGINEERING ALUMNI DINNER

JANUARY 29, 2011

The Norman B. Keevil Institute of Mining Engineering invites alumni, industry and friends to join students and faculty at the annual dinner, which celebrates student achievement and features a keynote speech from Jim O'Rourke, CEO of Copper Mountain Mining Corp. Contact [info@mining.ubc.ca](mailto:info@mining.ubc.ca).

### OLD RED NEW RED

FEBRUARY 3, 2011

Ever wonder what the greatest UBC Engineering prank of all time was? Some claim it's the Statue Stunt of 1963! Stephen Whitelaw (AGIE '65) and Art Stevenson (CHEM '66) will tell the story of the stunt that duped the entire campus and university art community. We invite ALL of you to join the current Engineering student body to make this the largest ORNR ever! Visit [www.engineering.ubc.ca/ornr](http://www.engineering.ubc.ca/ornr).

### ENGINEERING EXCELLENCE CELEBRATION 2011

MARCH 18, 2011

Committed to making a world of difference, UBC Engineering is proud to have many alumni, faculty and students positively impacting the world. We are honoured to recognize the success of our community, and we invite you to join us in doing so at our annual gala. You won't want to miss this stellar event! For more information, visit [www.engineering.ubc.ca/engineeringexcellence](http://www.engineering.ubc.ca/engineeringexcellence).

### ENGINEERING PHYSICS SOCIAL NIGHT

MARCH 28, 2011

Join students, faculty and alumni for the 10th annual Engineering Physics Social Night. Hosted this year at UBC's Cecil Green Park House, the event offers an opportunity to connect with Fizz colleagues and alumni. Director Dr. Andre Marziali will share highlights and the latest news from your UBC Engineering program. Contact [vpevents@ubcfizz.com](mailto:vpevents@ubcfizz.com) for more information.

### IGEN INDUSTRY NIGHT

MARCH 31, 2010, 5:00 TO 9:00PM

During Industry Night, second, third and fourth-year Integrated Engineering students exhibit their projects to industry judges who engage students in conversation.

### ALUMNI WEEKEND

MAY 27-29, 2011

Alumni Weekend, held during spring convocation, is an opportunity for everyone to attend UBC. UBC Engineering will host its annual Engineering Reception—all alumni and guests are invited. To commemorate important anniversaries, we will take photos of all 10-year anniversary classes. Calling grads of 1951, 1961, 1971, 1981, 1991 and 2001—join your classmates for a reunion and a class photo! [www.engineering.ubc.ca/alumniweekend](http://www.engineering.ubc.ca/alumniweekend).

## UPCOMING EVENTS

### CLEAN ENERGY RESEARCH CENTRE SEMINAR SERIES

JANUARY TO MARCH

Monthly CERC seminars highlight different aspects of energy on the supply and demand sides. Visit: [www.cerc.ubc.ca](http://www.cerc.ubc.ca).

### BIOMEDICAL ENGINEERING: GRAND ROUNDS SEMINAR SERIES

JANUARY TO MARCH

Monthly seminars showcase various topics in biomedical engineering. Visit: [www.bme.ubc.ca/news-events](http://www.bme.ubc.ca/news-events).

### CELEBRATE RESEARCH WEEK

MARCH 4-11, 2011

Join UBC Engineering at Celebrate Research Week, a weeklong showcase of research excellence across UBC. For details visit: [www.celebrateresearch.ubc.ca](http://www.celebrateresearch.ubc.ca).

### HIGH SCHOOL ENGINEERING COMPETITION

LATE SPRING

High school students start your design engines—we're looking for students who love solving math and science problems. You can even submit a video entry. Visit: [www.engineering.ubc.ca/competition](http://www.engineering.ubc.ca/competition).



Engineering

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