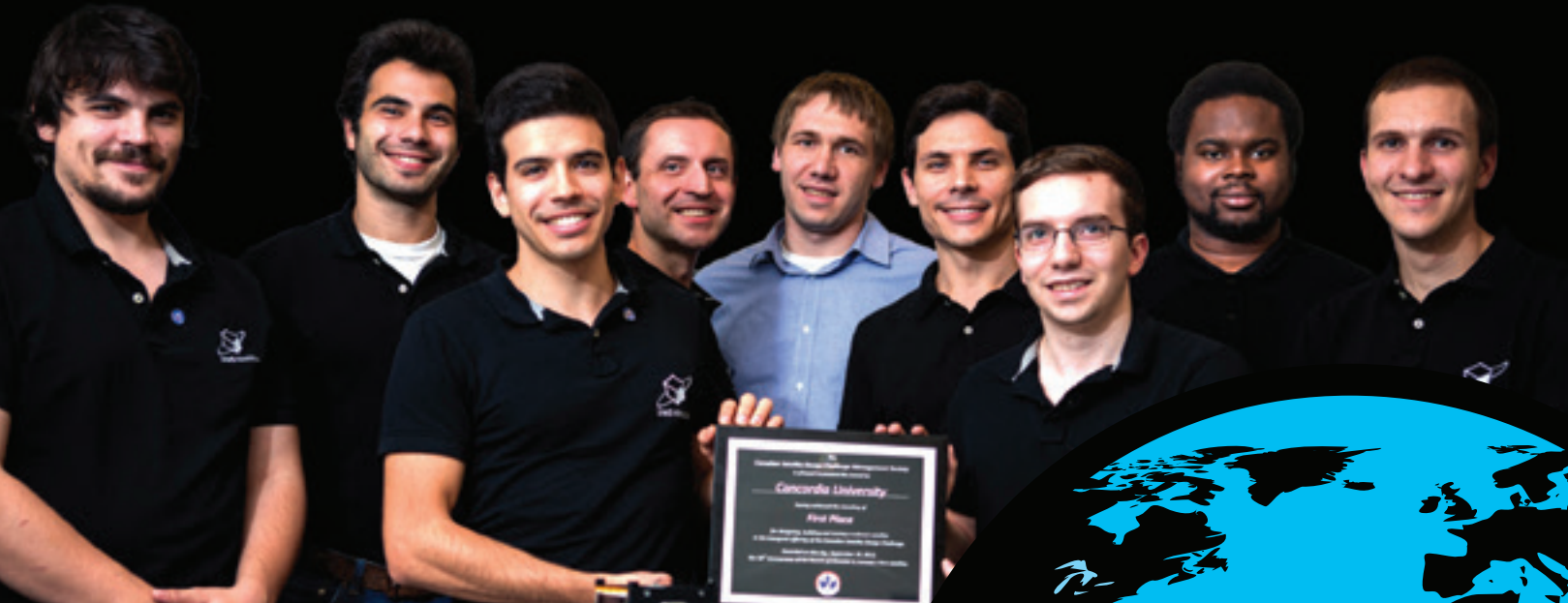


Give towards **BIG THINKING**



From left to right: Alex Teodor Ionita, Ivan Ivanov, Stefanos Dermenakis, Robert Jakubowicz, Alex Potapov, Tiago Leao, Nick Sweet, Shawn Stoute and Gregory Gibson

A gift to the Faculty of Engineering and Computer Science can help members of Space Concordia send their satellite into orbit, provide momentum to a student entrepreneur or nurture academic excellence through scholarships or bursaries.



Promote **BIG THINKING**

Designate your gift towards your faculty or some 500 areas of choice. Contact Suzanne Belanger, from Concordia's Advancement and Alumni Relations, at 514-848-2424, ext. 7024, or suzanne.belanger@concordia.ca

concordia.ca/alumni-giving

CONCORDIA ENGINEERING

NEWS



INNOVATING WITH
TECHNOLOGIES
NEW AND OLD

INSIDE

Message from the Dean	1
Faculty News Highlights	2
Undergraduate Student Profiles <i>GHITA SENNOUNI AND GUILLAUME COURCY</i>	4
Innovating with Technologies New and Old	6
Climate Change Technology Conference	10
Software Solutions for Welcome Hall Mission	11
Alumni Profile <i>ALEX POTAPOV</i>	13

Concordia Engineering News is published twice a year by the Faculty of Engineering and Computer Science at Concordia University.

Editor: Laurence Miall
Design and Photography: University Communications Services
T13-12848

Submit all editorial and advertising inquiries to:
Concordia University
Faculty of Engineering and Computer Science
Communications Advisor, Sir George Williams Campus
1515 St. Catherine W., EV 002.280
Montreal, Quebec, Canada H3G 2W1

Email your feedback to laurence.miall@concordia.ca
Please visit our website: www.encs.concordia.ca

Cover photo features Dr. Luis Rodrigues, Bahar Sateli, and James Bambara

MESSAGE FROM THE DEAN



This edition of Concordia Engineering News celebrates some of the innovative uses of technology by our faculty members and students. It is a fitting theme for this time of year, as another student cohort graduates from Engineering and Computer Science. These students will embark on careers in a rapidly-changing world in which innovation will always be a key attribute. Many of them will invent, design and develop the systems and tools needed by an increasingly technologically-dependent society.

The breadth of our Faculty's activities never ceases to impress me. Whether it is software engineers harnessing the power of Natural Language Processing, or building engineers reviving the centuries-old practice of anaerobic digestion and adapting it to current needs, or an avionics expert bringing the latest consumer electronics into the classroom so that students can learn about navigation—all of these innovative practices, which are discussed in-depth inside, showcase our dedication to innovative, applied, and socially relevant research and training.

In recent news, the Faculty is celebrating a series of successes by student teams in various competitions. With several more student teams competing during the coming weeks in automotive competitions, I have a good feeling there will be yet more strong performances – and maybe even trophy-wins – to celebrate. The strong student associations in our Faculty encourage experiential learning and teamwork, which are integral to our overall culture.

Faculty members have also thrived on the national and international scene and there are a couple of research highlights I'd like to mention here. Our two training and research institutes are making significant progress in their respective missions. The Concordia Institute for Aerospace

Design and Innovation (CIADI) has enshrined research as one of its core activities and there will be further developments to report as we head toward CIADI's twelfth anniversary in the fall. Meanwhile, the Concordia Institute for Water, Energy and Sustainable Systems has welcomed its first graduate students and in future editions of this newsletter, the focus will turn to exploring the exciting projects that are underway.

I also want to take this opportunity to share with you the news that after my term as Dean ends on July 31, 2013, I will be returning to what first brought me to academic life – teaching and research. Concordia University has established an advisory committee that is searching for my successor.

I have been Dean and Professor in Engineering and Computer Science since August 2008 and it has been a pleasure to work with such talented faculty members and staff. During my term we have collectively made big strides forward. The students we train have more opportunities than ever to pursue their diverse interests, and our growing research excellence is recognized nationally and internationally.

Thank you for your help and support and for contributing to our Faculty's ongoing growth and success. Our training and research functions are increasingly world class, and with those essentials in place, I am sure that the future holds in store many more feats of innovation and ingenuity from our faculty members, students and alumni.

Robin A. L. Drew
PhD, FCAE, FEIC, ing
Dean and Professor
Faculty of Engineering and
Computer Science
Concordia University

FACULTY NEWS HIGHLIGHTS

Cedric Marsh (1924-2013) was a world class scholar who made lasting contributions to the field of building engineering and was a founding member of Concordia's Centre for Building Studies. Marsh passed away, **January 21, 2013** at the age of 88. His numerous contributions to the field of structures and structural dynamics include design methods for buckling, the aluminum design codes, seismic control and dampers and earthquake resistant structures, to name just a few.

On **January 22, 2013**, the Government of Quebec gave official approval for the new PhD program in information systems engineering, offered by the Concordia Institute for Information Systems Engineering.

A resourceful group of students won Rookie Team of the Year at the Great Northern Concrete Toboggan Race, hosted by the University of British Columbia, **January 23-27, 2013**. Their toboggan, weighing 247 pounds, accelerated to a maximum speed of 24 km/h before crossing the finish line on Mount Seymour in North Vancouver. The team also placed third in the competition's slalom category.

Faculty students excelled in the 2013 Quebec Engineering Competition. One team garnered first place in the Scientific Communication category and another won third place in Junior Design at the competition held **January 24-26, 2013**, at the Université du Québec à Chicoutimi.

Stanley Kubina (1925-2013) was a gifted electrical engineer who contributed enormously to his discipline at Concordia and across Canada. He died **February 13, 2013**, aged 87. Among numerous other accomplishments, Kubina was head of electrical engineering at Loyola College. When Loyola amalgamated with Sir George Williams University to create Concordia University, he became director of engineering on the Loyola Campus and also served on the new university's Board of Governors.

March 2-31, 2013, The Faculty piloted a new series of educational courses taught by full-time faculty members on every Saturday of the month. The courses were targeted to members of the Ordre des ingénieurs du Québec (OIQ), who must now obtain 30 hours of professional development every two years.



FARIBORZ HAGHIGHAT, LALEH YERUSHALMI AND Omid ASHRAFI

March 5, 2013, Concordia University announced that Laleh Yerushalmi, Fariborz Haghighat and Omid Ashrafi from the Department of Building, Civil and Environmental Engineering had developed a new dynamic method to better predict the greenhouse gas emissions content of wastewater from the pulp and paper industry. Their findings, published in Environmental Science and Pollution Research, have implications for any business wishing to reduce its carbon footprint.

Catherine Mulligan from the Department of Building, Civil and Environmental Engineering was named one of Concordia's Sustainable Champions for her groundbreaking research efforts and her leadership in establishing the Concordia Institute for Water, Energy, and Sustainable Systems. She was honoured at a gala held on **March 5, 2013**.

At the Computer Science Games, **March 15-17, 2013**, Concordia's two teams brought back six trophies. Concordia students finished 1st place in the Corporate Challenge, 2nd place

in Database Scripting, and 3rd place in the categories of Sports, Team Software Engineering, Gaming, and Artificial Intelligence. The competition was hosted by Laval University and over a dozen university teams from across Canada participated.

Concordia's chapter of Engineers Without Borders (EWB) organized numerous informative and engaging activities for Global Engineering Week, **March 18-22, 2013**. Special guests included Dean Nieuwsma from Rensselaer Polytechnic Institute, Victoria Lakiza from the firm SMI-Enerpro, Rachel Spieran, a consultant who provides community engagement and stakeholder consulting services, and Domenico Grasso, vice president for research and dean of the Graduate College at the University of Vermont.

Following the success of Space Concordia in the Canadian Satellite Design Challenge, electrical engineering student, Nick Sweet was selected among hundreds of applicants for the CalTech Space Challenge,

March 25-29, 2013. He was the only Canadian university student chosen for this prestigious event.

It has been announced that Dean Robin Drew will be inducted as a Fellow into the Engineering Institute of Canada (EIC). The honour is in recognition of his exceptional contributions to engineering in Canada. EIC President Jean Zu will present the recipients at the Institute's Annual Awards Banquet at the Westin Hotel in Montreal on **May 28, 2013**.

Suong Hoa, professor in Mechanical and Industrial Engineering and also the NSERC Industrial Research Chair in Automated Composites Manufacturing, will be inducted into the Canadian Academy of Engineering. The ceremony takes place **June 20, 2013**.



GHITA SENNOUNI

PERSISTENCE PROPELS STUDENT TO PRATT AND WHITNEY

It's the rare transformational moments that help define a career path. Industrial engineering student, Ghita Sennouni, recalls how her Grade 9 math teacher at Montreal's College Stanislas pushed her to do her absolute best. Math was a subject she had always enjoyed, but she had never previously stood out like she did with that teacher's strong encouragement. She rose to all the challenges he set. Prior to that, this stellar student had kept her talent for math a closely guarded secret.

"It's something you try to hide," she says, with a laugh. Math has become the cornerstone of so much of what Ghita has done, both in her classes and in her internship with Pratt and Whitney. Her industrial placement with the aerospace company, part of her work experience as a member of the Concordia Institute for Aerospace Design and Innovation (CIADI), took her to the Mirabel Aerospace Centre every morning at the crack of dawn. Ghita describes herself as fortunate in her timing, because Pratt and Whitney was working on the PW1000 engine, which will be used in Bombardier's new CSeries aircraft.

Ghita took part in applying lean manufacturing concepts to the

engine assembly project. She measured the time it took for operators to complete certain tasks. Consistent with lean principles of efficiency, she had to determine what activities were value-added, and which were not. She loved the work.

"I had such an amazing work experience," she said. She is enthused about the prospect of possible further work in the aerospace industry.

Ghita was born in Rabat, Morocco. In 2001, she moved with her mom to Montreal, joining her aunt who already lived in the city. At home, the languages spoken were Arabic and French. When she graduated from high school, she knew that she wanted to pursue post-secondary education in Montreal and that she wanted to learn English.

A predominantly Anglophone university seemed the obvious choice. She enrolled in English classes and eventually took and passed the required TOEFL test. In 2008, she came to Concordia, fairly certain that actuarial mathematics would be her subject. But in what became another transformational moment, she soon realized she wasn't enjoying her

studies – that her gift for math was not being deployed in an area she loved – and her grades, temporarily, suffered.

She was at the time taking engineering classes. Student advisor, Marcelle Trotman, helped turn things around.

"She gave me pep talks," says Ghita. "She helped me believe I could do this."

Ghita committed to industrial engineering and by her third semester she had more than doubled her grade point average. She has never looked back since. Her academic ambitions were quickly followed by leadership ambitions. She became involved in student life and was the director of internal affairs for the student-run Engineering and Computer Science Association.

"I love to feel part of something – part of a group," she says.

Ghita graduates in the spring of 2013. There are undoubtedly numerous more positive transformations ahead for this stellar student.

GUILLAUME COURCY

A MECHANICAL ENGINEERING STUDENT ON THE MOVE



The pace of Guillaume Courcy's life so far is remarkable. Even the narrating of it somewhat boggles the mind. Originally from Drummondville, Quebec, the mechanical engineering student has an anecdote or two from numerous places in the world. He's been a barman at a remote guesthouse in Scotland, a valet at a high-end restaurant in Vancouver, and a security guard at a perfume factory on the Côte d'Azur. Now he's embarking on a new adventure: finishing his degree and setting his sights on a career.

"I have a very non-engineering background," admits Guillaume.

His enthusiasm for walking many different life-paths is immediately clear. He enjoys the music of Drummondville rockers, Les Trois Accords. (He is related to the singer). He's been to numerous gigs by the band. Not ever content to sit on the sidelines, though, while a student at Bishop's College in Sherbrooke, he was stage manager for theatrical production of *Leaving Home*, a Canadian classic by playwright David French.

"I was in charge of taking director's notes and then leading rehearsals," says Guillaume. "I also was part of the technical aspects of the production."

This is the first time he hints at the fact that, despite appearances, he really was interested in a technically-oriented career all along. "I always wanted to be an aerospace engineer," he says. "When I was four years old, I was making planes out of Lego."

Guillaume was a mature student at the University of Ottawa, his first official exposure to engineering,

before moving on to Concordia. He is disarmingly frank about how much he wanted to be at Concordia.

"It was my first choice," he says. "Concordia is young, it's aggressive, and it's daring."

Of course, Concordia's proximity to the aerospace industry helped make his choice clear. Since enrolling at the university, he has also enjoyed many opportunities to be involved with student life. He participated in several competitions as a member of the student chapter of the Society of Automotive Engineers (SAE). He also benefitted from Concordia's Institute for Cooperative Education (Co-op), not once, but twice. His first internship was in Brussels, where he assisted a university researcher with his heat exchanger project. He now works part-time for Bombardier, an experience that started out as a Co-op work term.

"Co-op is amazing," he says.

He will be graduating in spring 2014 and plans to keep on learning. Aerospace will forever be a passion, but he is also drawn to entrepreneurship and has contemplated studying at Concordia's John Molson School of Business. Wherever he goes, he is confident that an engineering education has equipped him well. He can succinctly sum up what Concordia has given him.

"You learn how to learn," he says. "You learn how to research, and what questions to ask to get to the solutions."

That's a skillset that will serve him well anywhere.

INNOVATING WITH TECHNOLOGIES NEW AND OLD

CELESTIAL NAVIGATION AND FLIGHT SIMULATION

GOOGLE EARTH AND IPADS LATEST TOOLS IN THE LONG TRADITION OF FINDING YOUR WAY AROUND EARTH

Imagine being on a ship in the middle of a vast ocean, trying to find the way home. For centuries, seafarers guided their vessels with the help of a sextant, an instrument that measures the elevation angle of an object. A sextant made it possible to calculate with relative accuracy any object's given location with reference to celestial bodies—the sun, moon or stars—and the horizon. Nowadays, an iPad sextant application, available for free, makes this time honoured navigation method available to anyone. But you'll need to know some fairly complex mathematics in order to not get lost.

"I wanted to teach my students to locate their position based on the stars, because this is the oldest navigation method," says Luis Rodrigues, associate professor in the Department of Electrical and Computer Engineering. "It helps them appreciate and understand new technologies. It also teaches them spherical trigonometry, which is very hard, but using the iPad makes it interesting and engaging."

Concordia Libraries' new iPads were made available to Rodrigues' students on a ten-day loan. Armed with a map of the night sky for mid-January, a student would go outside, hold up the iPad to the night sky, and line up the gadget's straight edge with a star. The iPad's sextant could then tell the student the star's elevation. By repeating the process for two more stars, and after some trigonometry, the students would be able to figure out their approximate location on earth.

"Unfortunately the weather wasn't on our side," Rodrigues says, with a smile. "It was cold and cloudy."

Despite the uncooperative winter weather, the students were still able to use the iPads for other purposes, such as measuring the elevation of buildings and other landmarks. Rodrigues plans to use the iPads again in the fall.



Rodrigues, who obtained his undergraduate and master's degrees from the Universidade Técnica de Lisboa in Portugal, and his PhD from Stanford University in California, has conducted extensive research in avionics and control systems for over 15 years. He can describe this field succinctly: it's about the electrical systems that guide aircraft, and the automation of these systems.

Rodrigues came to Concordia in 2003. He was instrumental in bringing a flight simulator to the University in 2007, and it has been in active duty in the basement of the Hall Building ever since. Built and donated by the Montreal company, Mechtronix, which was started by Concordia alumni, the simulator's market value can be measured in the hundreds of thousands of dollars. The ever-ambitious Rodrigues wanted to give students as much flight simulation time as possible, and booking the use of the expensive piece of equipment every time was for many years his only option. In discussion with his master's student, Kyungjae Baik, who had a particular interest in Google Earth, an alternative to the expensive flight simulator was found.

"To successfully do flight simulation, you need to see what a pilot would see," explains Rodrigues. "Using Google Earth made this possible. All you need is a computer, an Internet connection, and a joystick [to simulate a pilot's yoke]."

To make the flight experience as real as possible, some kind of way had to be found to integrate Google Earth with two additional vital tools, MATLAB and Simulink, standard computer software used by universities for research. These tools can provide information about an aircraft's location. Kyungjae Baik programmed a sophisticated interface that allowed the information from MATLAB and Simulink to be shared with Google Earth. The end result was a flight simulation experience that was of high quality and, of course, highly accessible.

Navigation has changed enormously over the centuries. But what has never changed is the importance of having top-notch teachers, like Rodrigues, helping to guide every new generation of navigators.

AT THE INTERSECTION OF WORDS AND ONES AND ZEROES

BAHAR SATELI BLAZES A TRAIL IN NATURAL LANGUAGE PROCESSING AND WIKIS



"My story begins at the age of twelve," says Bahar Sateli, a PhD student in the Department of Computer Science and Software Engineering. "My brother used the computer all the time. I said, 'I want to do what you're doing.' He explained to me, 'This is programming.'" This was the beginning of Sateli's passion for computers that lasts to this day.

The Iranian student, who lived with her family in Tehran until 2009, is now a member of Concordia's Semantic Software Lab, which was founded by her doctoral supervisor, René Witte, in 2008. Under his mentorship, she has developed an open source

architecture that integrates Natural Language Processing (NLP) with the MediaWiki software that is used by such websites as Wikipedia.

NLP, while complex, has profound real world applications. Imagine asking your smartphone to summarize the salient details of a 2000-word feature news story. Now imagine that your smartphone produces a 100-word précis that is as accurate as anything a human would write. This is the power of the novel wiki-NLP architecture, and Sateli is at the forefront of its development and implementation.

At Concordia, Sateli's research has resulted in two novel applications, IntelliGenWiki, for genomics, and ReqWiki, for software engineering. IntelliGenWiki helped genomicists identify relevant research abstracts 67 per cent faster than conventional reading. ReqWiki helps with the writing of requirements documents,

an integral part of the software development process. The application reduces ambiguities and ensures that different parties can understand each other better. This has serious potential in an industry where millions of dollars can be lost due to misunderstandings of what exactly a software developer agreed to do (or not to do).

These cutting-edge applications are a natural evolution from the very first program that Sateli wrote when she was twelve years old. Ever mindful of bringing computing solutions to everyday life, she created a menu program that enabled the user to make various food orders,

i.e. one hamburger and one coke, and then the computer would be able to calculate and print out the appropriate receipt.

"Later, I got access to the Internet," says Sateli. "This was huge. I had my first website when I was 16. It had Britney Spears on it."

She laughs, abashed now, but the devotion to the Internet went well beyond just mere fandom. She would stay up late programming, collaborating with others online, and often came to school worn out. But she never fell behind academically. Her marks were so good that she skipped a grade and eventually went on to the private institution, Tehran's Islamic Azad University. Around this time, the idea of moving to Canada seemed very appealing. On September 2, 2009, Sateli joined her brother—also a software engineer—in Montreal. She remembers the exact time she touched down at the airport, four o'clock in the afternoon.

There was a lot to find out about her new home, and Sateli learned fast. Already she was highly fluent in English. Her mother, a retired professor, had been very influential in this regard. Sateli made a lot of friends in the Montreal tech community because she participated frequently in Hackathons. These are events in which programmers meet up and work collaboratively on solving problems. "I go to these a lot," says Sateli. She has also completed an internship with iLanguage, the Montreal start-up founded by Concordia alumnus, Virginia Cook. This company aims to put the power of Natural Language Processing at the service of consumers, using the Android platform for smartphones.

"My passion is software that will do the job for you," says Sateli. "Software that is intuitive and ubiquitous in your day to day activities."

When explaining how she came so far in her field, Sateli is quick to credit her supervisor, but also both of her parents. "My mom taught me the finesse you need to do a project well. My dad taught me determination. To stick with a project until you've finished it."

Innovation, it turns out, is equal parts inspiration and dedication.

FROM ENVIRONMENTAL POLLUTION TO ENERGY SOLUTION

JAMES BAMBARA REIMAGINES TECHNOLOGY THAT DATES BACK CENTURIES

It takes unconventional thinking to curb a dependency on conventional energy sources. Which is why James Bambara is innovating with technologies in ways never tried before. The PhD student, supervised by Andreas Athienitis in the Department of Building, Civil and Environmental Engineering, has a plan to turn an environmental problem into an energy solution.

"In Canada, we import nutrient-rich food and we turn it into waste," says Bambara. "Why not use anaerobic digesters to treat the waste and convert it into electricity, heat and fertilizer?"

Anaerobic digestion is a natural process whereby organic material from plants and animals is broken down in an oxygen-free atmosphere by microorganisms that release biogas which consists mainly of methane and carbon dioxide.

In the 13th century, explorer Marco Polo found the Chinese using anaerobic digesters to produce biogas for use in cooking, heating and lighting. Daniel Defoe, the author of the famous novel, *Robinson Crusoe*, wrote about biogas technologies in seventeenth-century England. Today, anaerobic digestion research aims mainly at optimizing the performance of digesters and using new technologies, such as combined heat and power engines (CHPs), to get more energy out of the biogas.

What has never been tried before is to integrate an anaerobic digester with a greenhouse so that, in effect, anyone with a green thumb can produce their own energy and fertilizer. This energy and fertilizer

can then be used to grow more food, and so a vital lifecycle is perpetuated. Bambara is working on this concept and plans to test it at Concordia's Loyola campus, where the Solar House and adjacent permaculture projects have already offered exciting research and training opportunities.

It's been a remarkable journey for a student who, for quite a while, was uncertain how exactly to apply his skills and passion.

Bambara admits that by the time he enrolled in the Pure and Applied Science program at College Jean-de-Brébeuf, the question of how to eventually apply his scientific education was still unclear to him. His journey had rather an improvised quality. Always an enthusiast for building, Bambara, with the help of some friends, once built a two-story house on his family's property overlooking Lac Simon, north of Montreal. He describes it as a great opportunity to apply the fundamental building principles that schools teach.

In 2006, he came across the building engineering program at Concordia University. After meeting Andreas Athienitis, he got involved in the project to integrate solar thermal and photovoltaic technology at the John Molson School of Business (JMSB). At one point, he even found himself hanging over the top of the JMSB skyscraper, lowered by rope, so he could replace a solar panel. "It was pretty scary," he says.

The JMSB project formed the basis of Bambara's master's thesis. He has

also been inspired by Paul Fazio, founder of the building engineering program. From Fazio, he found out just how polluting buildings can be and decided to explore various alternatives to improve their design.

Bambara has an entrepreneurial side and is currently developing a project with a business partner that is starting to realize its potential. The basic idea of his product offering is an inflatable crop production system, which tackles several agricultural problems in one go. The innovative design achieves superior growth while using minimal natural resources to manufacture, and requires less energy to operate when compared to conventional agriculture techniques. Bambara sees enormous potential for the technology in extreme climates and the developing world.

With so many new ideas, the main problem is the time to carry them all out. But Bambara is not only determined, he is motivated by the urgency of environmental problems. "When I was a kid, I would often go out into nature. I became conscious we humans were ruining this."

Rising to this challenge will take the innovative energy of Bambara and countless more like him.



CLIMATE CHANGE TECHNOLOGY CONFERENCE 2013

FACULTY TO HOST INTERNATIONAL GATHERING

BY MARK WITTEN



Photo: David Ward

How can small wind turbines be best designed to produce energy for office buildings in urban settings? Can fuel storage systems for zero-emission hydrogen fuel cell cars be engineered to minimize safety risks for occupants and the environment? Is it feasible to build a rooftop greenhouse on a commercial building that can produce vegetables and surplus energy to heat an adjoining building in a cold climate like Montreal?

Those are just three examples of engineering innovations for sustainability to be presented at the EIC (Engineering Institute of Canada) Climate Change Technology Conference 2013, hosted at Concordia University from May 27 to May 29. Concordia engineering graduate students have an opportunity to present their papers at a leading-edge Canadian and international forum for the exchange of ideas on climate change.

"The students are excited about their work and it's very motivating for them to present their results to an audience like this," says Marius Paraschivoiu, professor in mechanical and industrial engineering. Paraschivoiu is the main conference organizer and holds a research chair in the production and storage of clean energy.

The conference features peer-reviewed presentations from leading scientists on a wide range of topics such as mitigating greenhouse gas emissions, the Canadian Arctic, extreme events and disaster management, and net-zero energy buildings. "This is the first time the conference is being held in Quebec. We want to get engineers and engineering students talking about climate change, and to learn more about the opportunities for them to contribute practical solutions and have an impact in many different ways," says Paraschivoiu.

A global view on climate change and economic issues is offered by keynote speaker Donald Johnston, who was a cabinet minister in the Canadian government and secretary-general of the Organization for Economic Co-operation and Development (OECD), where he created the OECD Ministerial Round Table on Sustainable Development. Other notable speakers include Norwegian Ambassador to Canada, Mona Elisabeth Brother, and a roster of international and Canadian experts in the Food and Population, Water and Energy plenary sessions.

Diane Bastien, a doctoral student in building engineering with a specialization in solar energy, helped

to review the papers submitted and organized three sessions for the Net-Zero Energy Buildings and Communities track at the conference.

Bastien is presenting a research paper on the potential net energy benefits that can result from attaching optimally designed solariums or rooftop greenhouses to large commercial and institutional buildings and houses in Quebec.

"I developed a model to design rooftop greenhouses attached to buildings so they become net energy producers rather than energy sinks. By careful design and using high quality materials, it's possible to retrofit existing buildings with greenhouses to generate surplus heat and grow vegetables while offering additional floor area," says Bastien.

The award-winning student also found that covering one per cent of commercial and institutional buildings in Quebec with rooftop greenhouses could provide enough vegetables to feed 300,000 people without increasing the province's total energy consumption. Bastien used building simulation software to model the net energy impacts of different designs. This summer she plans to build a small solarium and run experiments to assess the energy impacts in Concordia's spectacular new Solar Simulator-Environmental Chamber lab, a facility that will be showcased to conference participants.

Graduate students from Paraschivoiu's lab are presenting papers on hydrogen storage system safety and vertical axis small wind turbines to produce energy on small farms and in cities. While some concepts presented at the conference — like Bastien's rooftop greenhouse — are applicable today, others will take more time to be realized. "Our lab generally works on medium-term solutions, not short-term or long-term. We do research for technologies that will happen in the next 15 or 20 years, not 200 years," says Paraschivoiu.

SOFTWARE SOLUTIONS FOR THE WELCOME HALL MISSION

BY MARK WITTEN

As she handed out food supplies to people at Montreal's Welcome Hall Mission in the summer of 2011, Olga Ormandjieva could identify with the many newcomers to Canada. "I'm an immigrant too and I remembered the hard times of my first few years in Canada," she says. "I just wanted to help." The associate professor of computer science and software engineering arrived in Canada from Bulgaria 17 years ago with three kids and began her PhD at Concordia shortly afterwards. Her daughter Maya, now a teenager, also volunteered with the Welcome Hall Mission.

Ormandjieva learned that the Mission's Family Services department, which distributes food to 800 to 1,000 Montreal families every week, needed to replace its 15-year-old Family Services Tracking System, which was originally developed to replace a manual index card system. It served the mission well and was a model of efficient design. However, technology developments, as well as changes in Family Services, rendered the system obsolete. "Technology has advanced a lot, and staff were worried the system could fail at any moment," says Ormandjieva, who also serves as program director for computer science and software engineering at Concordia's Institute for Co-operative Education (Co-op).

She proposed to Tania Togias, Welcome Hall Mission's family services director, and IT coordinator Gordon McPhee, that Concordia software engineering students collaborate with them on a large-scale project to build new, improved software for the FSTS. The new software would help Mission staff more efficiently and easily keep track of clients who qualify for services, book service appointments, manage events, and generate statistical data for the reporting required by governments and donors.

All 35 students in the third-year software engineering mini-capstone course, SOEN 390, worked in competing teams to build a new version of FSTS, under the

supervision of two doctoral students, Ming Zhu and Tamer Abdou, in the winter of 2012. They produced five fully functional prototypes. "The competition and presentations really added a lot to the students' motivation. The client chose the prototype with a user interface that was really easy to work with, which was also easier to maintain," explains Ormandjieva.

The project has been an eye-opener for most students. "They are very enthusiastic about the FSTS project, not only because it gave them an opportunity to work on a real project for a real client, but also because of the good cause," she says.

Co-op funded the FSTS project by supporting the work of two students, Cassie Wong, a second-year computer science student, and Oleksandr Dymov, a second-year software engineering student. Wong and Dymov did their first Co-op work term in the fall of 2012, completing the remaining work on important functions of FSTS such as client files and event management. "My job was to work on the details of those functions to make sure the end result was what the client wanted," says Cassie.

The project was a huge confidence and momentum builder for both Dymov and Wong. "When I started, I was under-qualified," Wong says. "I learned so much in the work term that I'll have confidence in my technical skills and soft skills, like people and organization skills, for future employers." She confesses she was surprised at the number of food bank recipients and impressed by the number of volunteers who help out. "I've never had any experience with non-profits before. Seeing what they do is touching."

The new FSTS system is in the testing phase and Welcome Hall Mission will be using it this summer. "Our staff are absolutely thrilled with the results," says McPhee, who has already proposed an encore project—another golden opportunity for Concordia students to acquire valuable experience and to help out with a worthy cause.



ALUMNI PROFILE



ALEX POTAPOV: TO SPACE CONCORDIA AND BEYOND

BY MARK WITTEN

When Alex Potapov quit his job as a Canadian Tire auto mechanic, he was looking for a new challenge. In 2006, he enrolled in Concordia's mechanical engineering program and set his sights on becoming an automotive engineer. But Potapov had no inkling then that he would play a pivotal role on a successful mission to win the Canadian Satellite Design Challenge, making Concordia the first Quebec university to design and build a satellite that will be launched into space. Nor did he ever imagine the competition would be a launching pad for a dynamic career as a payload design engineer with MacDonald, Dettwiler and Associates (MDA), a leading satellite company and employer in the aerospace industry.

"I'd never considered anything to do with the aerospace industry," says Potapov. "I came into the Space Concordia project in my final semester knowing absolutely nothing about space. It's such an alien environment and the more I learned about it the more fascinated I became. I soon realized I wanted to stay in the field."

Shortly after coming on board, Potapov was asked to become mechanical team lead. His previous hands-on experience building a race car for an international competition,

through the Concordia chapter of the Society for Automotive Engineers, prepared him for the role. "I learned everything I know about teamwork and leadership from the race car project," he says. The problem-solving skills he learned in courses helped too. "The program taught me to think in a different way and how to solve problems in engineering."

Concordia's low-cost CubeSat satellite, which placed first among entries from 12 Canadian universities, was chosen for its mature design and performance in rigorous testing at the Canadian Space Agency's David Florida Laboratory in Ottawa.

"We had to design a structure that was lightweight, but strong enough to withstand the very violent forces of being blasted off the planet. We used a pessimistic design philosophy, making the satellite as simple and failure-proof as possible. When we won, I felt overwhelming joy and it was surreal," Potapov recalls.

While working on CubeSat, he spoke several times with an MDA manager about the satellite design and led a group presentation to the company, asking for sponsorship. "My current manager was very interested in the design. He stayed after the presentation and asked me questions," says Potapov, who was

offered a job and started work as a payload engineer in April 2012, a few weeks before graduating.

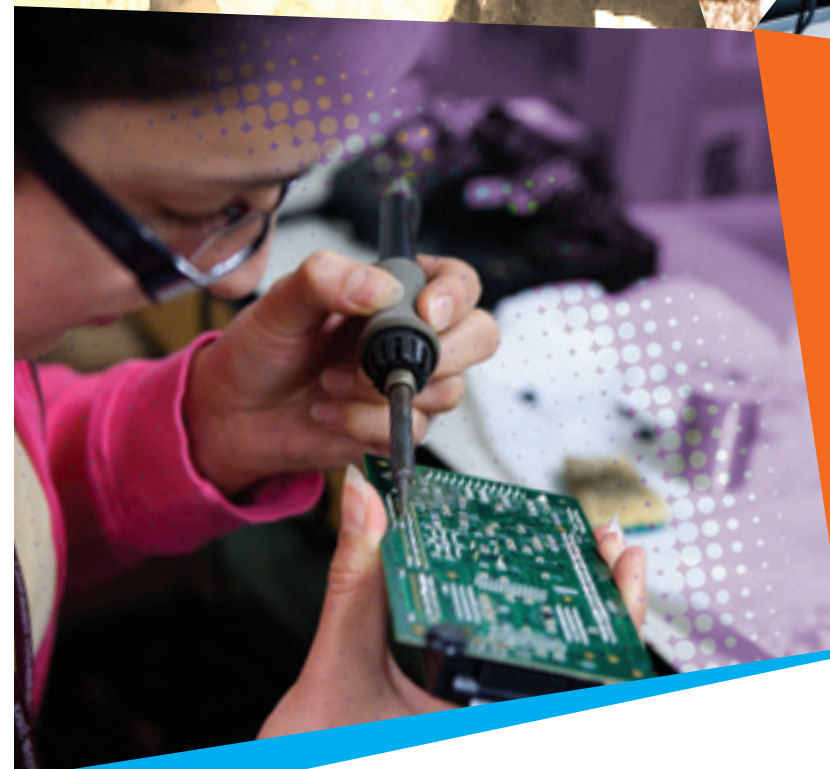
He's now a designer on a subsystem of the spacecraft for an international communications satellite that will provide high-speed Internet access. "I learned a huge amount at Space Concordia that's useful today. I had to broaden my perspective as a mechanical engineer to work with other subspecialties, like communications, electrical and software engineers. That's real life. We always work in multidisciplinary teams here," he says.

The fast-paced, high-adrenaline culture and performance demands are similar too. "Space Concordia was a lot of pressure and the deadlines were tight," says Potapov. "It helped me because [at MDA] we also have crazy deadlines."

The 29-year-old alumnus is excited about today's challenges and the opportunities that lie ahead. "I feel lucky," he says. "My career is just beginning and I love it. I've got a job I enjoy every day and I do actual engineering design work."

HOMECOMING 2013

October 3-6



Save the date!

A host of exciting activities are planned for alumni of the Faculty of Engineering and Computer Science. This year, we are celebrating the reunions of classes that graduated in the years ending in 3 or 8, i.e. anyone from the Class of 1973 right up to 2008! All other alumni are welcome to join in for the cocktail reception, faculty tours, and other festive events.

For more information, please contact Sarah Kenny at 514-848-2424 ext. 7026 or sarah.kenny@concordia.ca