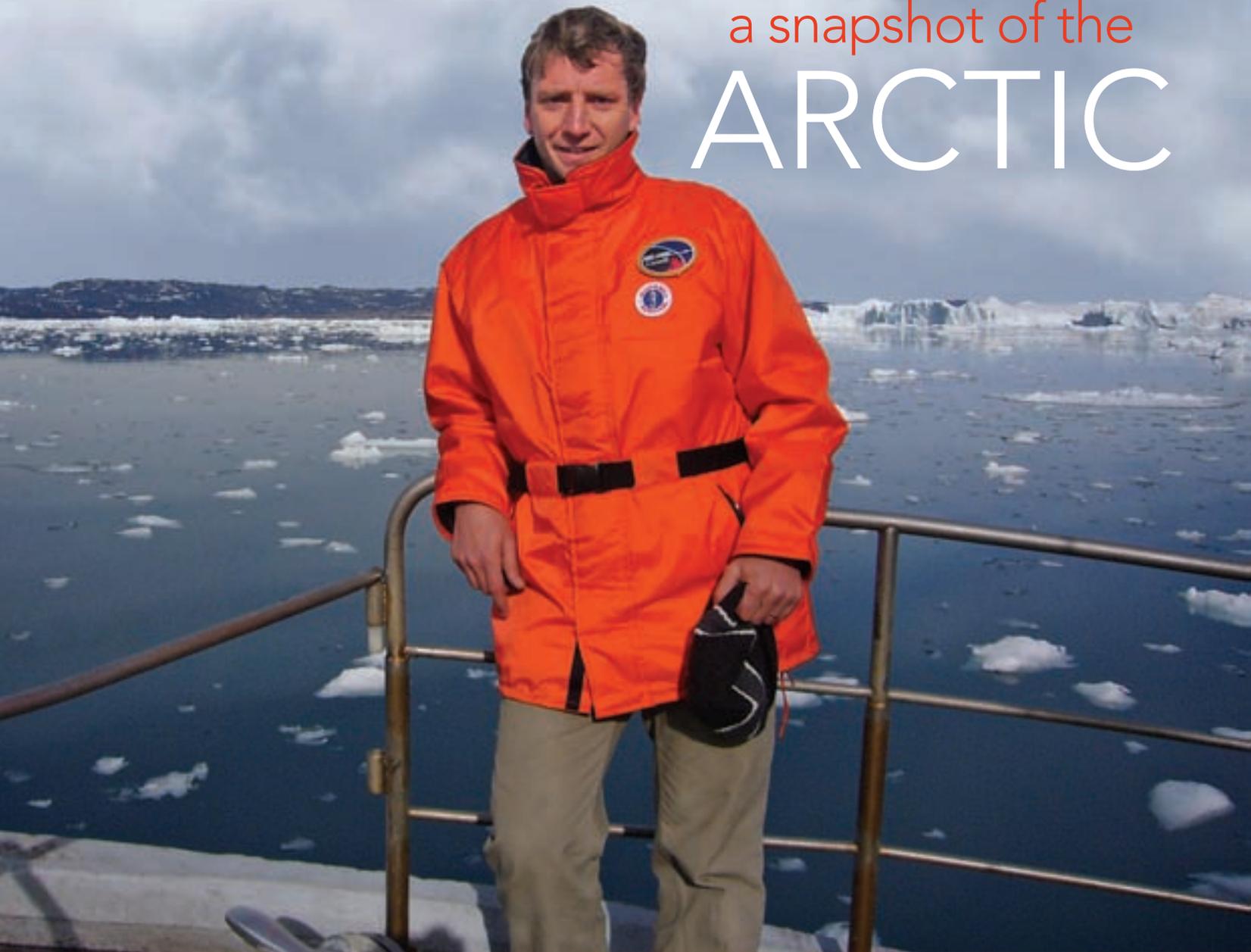




# Benchmarks

SPRING 2009

a snapshot of the  
**ARCTIC**





# The Dean's message

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**Welcome to another edition of *Benchmarks*.** The Faculty of Engineering and Applied Science has had another year of growth and development and, inevitably, with that has come some changes. As you may be aware, Dr. Ray Gosine has taken on the position of vice president of research and I have taken on the responsibilities of dean for the faculty, for the time being, in his absence.

Leadership in ocean engineering research and education is one of our areas of great strength. About 40 years ago, we established Canada's first research and educational field in ocean engineering. Today, Memorial University of Newfoundland is the only university in Canada that offers an accredited co-operative undergraduate engineering program leading to a B.Eng. degree in ocean and naval architectural engineering, as well as M.Eng. and PhD research degrees in ocean engineering. As one of our major research focuses, we continue to advance ocean engineering research and technology development in Canada. We are also continuing to expand our research horizon in the area to include activities in the Arctic and other harsh environments. This issue of *Benchmarks* includes a selection of articles that highlight some of our Arctic initiatives.



Dr. Quaicoe

Throughout the pages to follow, you will also read all about the exciting initiatives and accomplishments over the past year. You will read about outstanding faculty members who have secured major funding to further their research and how faculty members and students have won major awards and recognition for their research; what some of our students are doing; what other alumni are doing; and what we are doing to engage the community. I am very proud of the progress we have made and excited about where we are going, and I hope you get a sense of that pride as you turn the pages.

I hope that you enjoy this latest issue of *Benchmarks*. I welcome your comments on anything that you read in this edition, and please feel free to contact me if you would like further information on any of our activities.

Sincerely,  
Dr. John Quaicoe, P.Eng.  
[jquaicoe@mun.ca](mailto:jquaicoe@mun.ca)



## Student LIFE Program

**Engineering students can now apply** to the Angus Bruneau Student Leadership and Innovation Fund in Engineering Program.

Recently, engineering students at Memorial were given another reason to showcase their creative and innovative talents. Applications are now being accepted for the Angus Bruneau Student Leadership and Innovation Fund in Engineering Program.

The program encourages and supports student leadership and innovation in engineering education, research and community service, and will provide funding for student-led initiatives that significantly enhance a student's experience in the Faculty of Engineering and Applied Science — initiatives that would not normally be funded through the faculty's operating budget.

Emilie Martin, a fifth-year mechanical engineering student, is excited about the possibilities this new program brings to engineering students.

"Engineering students here at MUN are lucky to have a unique program that offers great academic and professional experience. The Student LIFE Fund now provides the opportunity for equally important experience in our community. It is wonderful that Dr. Angus and Dr. Jean Bruneau are helping students to pursue their creative ideas, and assisting them in learning and researching topics that they are very passionate about," she said.

The Angus Bruneau Student Leadership and Innovation Fund in Engineering was established through the kindness of Drs. Angus and Jean Bruneau through a very generous gift of one million dollars to endow the Student Life Program. In 1968 Dr. Bruneau established the Faculty of Engineering and Applied Science as its first dean. Dr. Bruneau led the development of co-operative engineering programs – an innovation offered at only one other Canadian university. He is also credited with creating the Centre for Cold Ocean Resources Engineering (C-CORE) which he



## New leadership for the Faculty of Engineering and Applied Science

**With any growing institution**, change is inevitable and the Faculty of Engineering and Applied Science is no exception. When Dr. Ray Gosine accepted the position of associate vice-president (research), and later as vice-president (research), pro tempore, at Memorial University, the Faculty of Engineering and Applied Science was in need of new leadership. In addition, based on demonstrated and potential growth in both graduate studies and research in the faculty, it was decided to try a one-year pilot project to split the responsibilities of graduate studies and research. As a result of the above, the following have assumed new responsibilities within the faculty:

**Dr. John Quaicoe** has been appointed to the position of dean (pro tempore).

**Dr. Ramachandran (Venky) Venkatesan** was the acting associate dean of undergraduate studies until April 30, 2009.

**Dr. Steve Butt** is the acting associate dean of graduate studies.

**Dr. Brian Veitch** was the acting associate dean of research until February 28, 2009.

**Dr. Kelly Hawboldt** is the acting associate dean of research as of March 1, 2009.

chaired for 10 years. Dr. Jean Bruneau has served on numerous non-profit and community organizations such as the YM/YWCA and the Newfoundland Law Society, among others, and in 1998 Memorial bestowed an honorary Doctor of Laws on her in recognition of her long-time commitment in public arenas for the good of society. Their gift to the faculty for the Student Life Program has created an endowment that will significantly enhance the experience of students at Memorial.

Students can apply for funds up to \$10,000. The fund will provide financial awards on a matching basis such that students will be required to raise some portion of the funds needed for the project.

In addition to financial awards, the program will sponsor an annual leadership and innovation forum, which will take place in the fall of 2009.



## Faculty of Engineering and Applied Science offers a new environmentally-friendly undergraduate program

**The Faculty of Engineering** and Applied Science is now offering a new process engineering program to satisfy the needs of various processing industries, including oil and gas and mineral processing.

Process engineering is a diversified program which encompasses new development, design, safety and environment, optimization and operation of sustainable processes for human needs. A process engineer uses biological, chemical, and physical processing of petrochemical, oil, gas, minerals, food and other materials to modify their nature, their properties, and/or the composition of mixtures to produce useful products, such as petrochemicals, gasoline, diesel, metals and alloys. This requires a thorough knowledge of materials, chemical and physical sciences, and mathematics, as well as an ability to apply this knowledge in an economical and sustainable way to engineering development.

Dr. Faisal Khan is the chair for this new discipline and said the new program means long-term benefits for the faculty, Memorial and the province as a whole.

"It is the program of the 21st century based on sustainability engineering development. It focuses on green and safe processing. Process engineering will provide highly-qualified personnel and research and development to support the economic and technological development of our province including new initiatives such as the Hebron development, petroleum refinery and metal processing. This program will



"IT IS THE PROGRAM of the 21st century based on sustainability engineering development."

also attract national and international students. Furthermore, researchers in process engineering will help to solve some of the unique challenges faced by these industries, such as operating in harsh climatic conditions, asset integrity, safety and environment management, as well as day-to-day operational issues such as process scheduling and maintenance," explained Dr. Khan.

The bachelor of engineering major will be taught by a multidisciplinary team of faculty members with expertise in metallurgical processes, geological engineering, electro-mechanical engineering, environmental engineering, safety and risk engineering, and oil and gas engineering. It is designed to provide students with a specialization in the areas of minerals and metals processing and downstream oil and gas processing. Throughout the program, and within each area of specialization, emphasis will be placed on green and clean processes that are environmentally-benign and inherently safe. Graduates of the program will be safety- and environmentally-conscious engineers who will be able to contribute to large-scale industrial development in a sustainable manner — a priority for the process and allied industries.

Memorial's Faculty of Engineering and Applied Science is the first school in Canada to offer this unique program, which will be offered for the first time in academic term 3 in September 2009, to the class of 2013.



## The business of engineering: new options for entrepreneurial engineers

**For years** there has been talk of the faculties of business and engineering collaborating to create an entrepreneurship stream for engineering students, but it was a chance meeting in Houston, Texas, that finally got the ball rolling.

Brian Veitch, acting associate dean for research in the Faculty of Engineering and Applied Science; and Peggy Coady, director of graduate programs in the Faculty of Business Administration, started working at Memorial within months of each other. They both won President's Awards at the same ceremony in 2004 and have worked in adjacent buildings for more than 10 years but it wasn't until a Memorial alumni event in Houston that the pair met.

That meeting coincided with changes in the ocean and naval architectural engineering program that make it easier for students to take a focused stream of electives, the ideal time to introduce an entrepreneurship stream for engineering students.

"Our meeting was a great example of being in the right place at the right time. Brian is the chair of the ocean and naval architectural engineering discipline and I had recently finished a term as the acting associate dean of academic programs, so we both had the background and understanding necessary to make this finally happen," said Prof. Coady.

Their determination to create an entrepreneurship offering for engineering students has paid off and ocean and naval architectural engineering students can begin their business education in spring 2010, subject to approval by the Faculty of Engineering's Committee on Undergraduate Studies.

Dr. Veitch said the Faculty of Engineering believes that the entrepreneurship stream will appeal to students.

"Many engineering students have taken business electives over the years, but we wanted to offer a more coherent set of courses. The recent changes in the naval architectural engineering program have added flexibility to the program and it was the ideal time to capitalize on that and offer the entrepreneurship stream with the Faculty of Business," he explained.

The courses, which range from accounting to marketing to new venture creation, are meant to foster an understanding of how business and engineering complement each other.

"There are many examples of engineering students who have a business idea but lack the business skills to turn that idea into a commercial reality. These courses will give them that base to complement their technical engineering courses," said Prof. Coady.

The new entrepreneurship stream for ocean and naval architectural engineering students is the first such offering for undergraduate engineering students.

## Programmed for the future: Faculty of Engineering and Applied Science introduces new graduate programs

**The Faculty of Engineering** and Applied Science has recently introduced two new course-based graduate programs for both full- and part-time students in oil and gas engineering and engineering management. Both have been approved for implementation starting in September 2009.

"The initiatives the faculty has undertaken are timely, given the growing activities in the oil and gas industries in the province. The new programs will produce graduates who are well qualified to contribute to the economic development of the province," explained Dr. John Quaicoe, the faculty's dean.

### MASTER OF APPLIED SCIENCE IN OIL AND GAS ENGINEERING

The oil and gas industry is a complex one and requires expertise in various areas and technical disciplines. To meet this demand, the faculty has developed multidisciplinary graduate programs in oil and gas engineering (OGE). The program provides the latest technical knowledge on upstream, production, and downstream aspects of oil and gas engineering such as drilling engineering, reservoir simulation, environmental protection, risk management and safety. Many of the courses taught in the program will be supported by field study and laboratory demonstrations. To apply the concepts learned in the classroom and laboratory environment, students will work in teams on an engineering project for two terms.

### MASTER OF ENGINEERING MANAGEMENT

The primary goal of the program is to enable engineering graduates to gain advanced knowledge in their field of engineering along with formal training in business allowing them to play a major role in their firm's development as part of the developing knowledge economy. This course-based master's program, developed in collaboration with the Faculty of Business Administration, will combine business education with advanced technical education in the students' field of

interest. The program will draw on graduate courses in the Faculty of Engineering and Applied Science and the Faculty of Business Administration.

The program can be completed on a full- or part-time basis. The core courses address important engineering management topics such as statistical principles, organizational behaviour, marketing and accounting applied to decision-making in the

engineering sector. Apart from core and elective courses in business and engineering, the program consists of an engineering management project. Issues discussed in courses and projects are geared to be of interest for engineering graduates associated with large companies, small and medium enterprises and start-up organizations.

## Ocean and naval architectural engineering 101

**Memorial's Faculty** of Engineering and Applied Science believes in educating "prospective" engineering students at a young age and yes, even pre-schoolers. Dr. David Murrin, an assistant professor with the faculty's ocean and naval architectural engineering program until December 2008, believes it's never too early to start.

"We really wanted to get kids excited about science and engineering in general. That was the first step. In addition, ocean and naval architectural engineering is an extremely challenging yet satisfying discipline and we wanted to expose children to it so that they would consider it as a possible career option," he said.

Last summer, Dr. Murrin designed a two-day course for kids who were registered in their school's Junior High Enrichment Program. The program taught them about ocean and naval architectural engineering, and consisted of tours of the faculty's laboratories, virtual marine simulator and interaction with a small remotely operated vehicle (ROV) built by Dr. Murrin himself.

"The course, which is essentially about the behaviour of objects in water, was designed to educate students who weren't sufficiently challenged under their regular program and introduce them to a career path in ocean and naval architectural engineering," said Dr. Murrin.

The first day students attended a laboratory where they were given some empty bottles and they observed how the bottles floated in water. Then they were given sand and water to put in the bottles, and they observed the behaviour again. After the demonstration, they went back into a classroom to look at why things happened the way they did.

On the second day, they were divided into two teams and each team designed a boat as part of a boat-building competition.

"The competition consisted of two components — a race to see which team had the fastest vessel, and a test to determine which boat could carry the most weight without capsizing," said Dr. Murrin.

At the end of the second day, the students were also able to control a ROV in a small test tank and observe how it responded to changes in propulsive and buoyant forces. Finally, students toured the faculty's laboratories which involved a ride in a towing carriage which took them from one end of the towing



Dr. Murrin chats with students

tank to the other as they observed a model dory being towed through water to learn about resistance (friction).

"The model has sensors that send information back to a main computer so that you can monitor the ship's behaviour through various speeds," said Dr. Murrin.

"We had talked to each group about propulsion, which is moving through the water, and we talked about buoyancy, which is making things float, but until they really got to see it they didn't really get it. So that was encouraging from the very first tour," added Dr. Murrin.

And even though the course was designed for junior high students, it turns out that, with a little tweaking, it's effective on a much younger audience as well.

"Part of the course was taught to younger kids between the ages of 2 and 5 at the Newfoundland Science Centre. We simply talked to them about why things float, and when we let them control the little ROV they really started to understand," he said.

The faculty hopes to expand on this course in the future.

"These tours were designed to gauge excitement and interest from the students. I've been overwhelmed. Kids, for various reasons, they really really get into it. For one thing they can see it, and it moves. It responds right away. I think they like the fact that they can push a button and the ROV controls are very similar to joysticks, which doesn't hurt either," quipped Dr. Murrin.



## WISE SSEP celebrates its 20th year of helping students and researchers

**Women in Science and Engineering (WISE)** has a good reason to celebrate. The non-profit organization's flagship program, the Student Summer Employment Program (SSEP) is now in its 20th year and remains as vibrant as ever.

The program offers an eight-week summer internship for Grade 11 female students from across the province, and matches these eager high school students with meaningful research being carried out at the university.

It is this partnership that makes WISE SSEP such a rewarding experience – students gain first-hand work experience in fields of interest, while researchers avail of assistants to help further their research. For most participants, SSEP is an eye-opening experience in terms of career possibilities.

"I am so grateful that I have been given insight to another career option that I previously assumed was not for me! I have learned and experienced so much beyond my placement position. I have made so many new friends who are ambitious go-getters who are going to make an incredible difference in this world," said one student.

To celebrate the continued success of the program, WISE SSEP is planning its 20-year reunion and conference and the theme is "Women Engineering Their Future". The conference will take place from Oct. 14-16, 2009 at the Holiday Inn in St. John's. The conference will provide former program participants, staff and supervisors the opportunity to reminisce and share memories from their respective SSEP summers, as well as provide networking and professional development opportunities.



Dr. Rahman

**On November 6, 2008** at Carleton University, Dr. Azizur Rahman received the 2008 A.D. Dunton Alumni Award of Distinction, Carleton's most prestigious alumni honour.

Dr. Rahman, a university research professor at Memorial University has made substantial contributions to the engineering field for over 46 years as a leader, a teacher, a researcher and a consultant.

He is recognized as one of the founding innovators of modern power engineering and a pioneer in the development and application of interior permanent magnet motors and associated drive technology — used in the world's first mass-produced hybrid vehicle, the Toyota Prius.

He is a life Fellow of the Institute of Electrical and Electronics Engineers, a Fellow of the Engineering Institute of Canada, a Fellow of the Institution of Engineering and Technology (U.K.) and a life Fellow of the Institution of Engineers of Bangladesh.

The A.D. Dunton Alumni Award of Distinction is given annually, when merited, by the Carleton University Alumni Association to a graduate in recognition of outstanding achievement or contribution in any field of endeavour.

The award is named in memory of Carleton's fourth president, who served the university from 1958-1972. Arnold Davidson Dunton was a distinguished Canadian journalist, educator and public servant.

Dr. Rahman was also awarded the IEEE (Institute of Electrical and Electronics Engineers Inc.) Power and Energy Society Distinguished Services Award for 2008 in recognition of outstanding service to the IEEE PES Electric Machinery Committee and revitalizing the motors subcommittee. IEEE is a non-profit organization and the world's leading professional association for the advancement of technology.



## Speaking of ENGINEERING...



Gloria Montano

**From why students** choose engineering to how rapid prototyping impacts daily life, Speaking of Engineering lectures continue to draw people from throughout the university, including faculty, staff and students; as well as people from outside the university community.

On Nov. 20, 2008, people gathered to hear Ms. Gloria Montano talk about why students choose engineering and how it relates to community engagement.

Ms. Montano's lecture was based on her master's research, which looked at why first-year engineering students chose engineering and their interest in civic engagement. Her survey of engineering students starting the program in 2007 was the first such research project on students in the Faculty of Engineering and Applied Science.

Ms. Montano highlighted the top three reasons first-year students at Memorial gave for choosing engineering — they felt they were good at math and science; they wanted a well-paying job after graduation; and they liked to solve problems. However, Ms. Montano went on to say that the traditional reasons for choosing engineering might not be enough to satisfy future needs. She noted that over the last 20 years, the number of students entering engineering in North America has been flat and that trend is expected to continue if not drop. She stated that doing the same things means getting the same results, and that the cost of doing the same things to get the same results is expensive.

To uncover any links between Memorial engineering students and a desire to bring benefits home to local communities, Ms. Montano's research also looked at student interest in civic engagement. Her research showed that not only did engineering students consider helping others who are in difficulty important, they also valued improving their understanding of other countries and cultures and becoming involved in environmental cleanup programs. A significant number of students, especially female students and students from non-urban areas, also considered direct involvement through community action programs and community leadership important.

More recently, on Feb. 19, 2009, amidst a week of winter storms, people came to hear Prof. Andy Fisher talk about how rapid prototyping impacts daily life.

Prof. Fisher threw out terms such as rapid prototyping, free-form fabrication and desktop manufacturing and explained that they describe the processes which represent a technology trend that is already changing the product development process and may eventually move into our homes.

Prof. Fisher's lecture discussed how traditional manufacturing processes are subtractive processes such as machining parts from metal. For mass production it is the tooling that is machined and then the parts are created through a molding process. These subtractive processes can be very time-



Andy Fisher

consuming and expensive for complex part shapes — imagine a telephone handset or computer mouse — which brings us to the million dollar question of how to produce these parts without the delays and costs of traditional processes. In other words, how can we quickly go from on the screen to on the desk in front of us.

Prof. Fisher explained that the breakthrough "trick" to all of the many rapid prototyping technologies is to slice the computer model into a stack of thin planar cross sections. Individually, these cross sections are much easier to fabricate since they are two-dimensional. The second step is to bond each layer to the previous layer to create an additive fabrication technique.

There are many different commercial rapid prototyping machines available which use different building materials, such as paper, plastic, metal and wax, and the technology is already introducing the potential for far more customization of parts, faster design evolution and minimal inventories. As these technologies mature, it is possible to imagine having an affordable machine which can access CAD files through the Internet, use different building materials and produce parts right in our own homes. Prof. Fisher compares it to the old Star Trek "replicator", which, he said, wasn't so far-fetched after all.

The Faculty of Engineering has used this technology to support teaching and research as well as local companies. Several industrial outreach projects have proved the benefits of using rapid prototyping to not only enhance, but to also speed up, the design process.

# The 2008 Angel Lecture from a Northern perspective

**This past October**, the faculty hosted the 2008 F.W. Angel Memorial Lecture. Canadian Oceanographer Dr. Eddy Carmack was the guest



Dr. Carmack

and first view the big picture. He talked about how the three oceans surrounding Canada are fully connected and could, in fact, be considered one ocean — the Northern Ocean. He also pointed out that the pan-Arctic region is tightly connected with the sub-Arctic through significant supplies of Pacific and

Carmack was the guest lecturer and his topic was One Changing Ocean: A Northern Perspective — a timely topic since last year was International Polar Year, a large scientific program focused on the Arctic and the Antarctic from March 2007 to March 2009.

In his lecture, Dr. Carmack talked about how the Arctic is changing fast, so much so that experts are saying we must step back

Atlantic water through the Bering Strait and the European Arctic Corridor.

Dr. Carmack also discussed how this one “Northern Ocean” and its sea ice cover play a critical role in the global climate system and the high latitude hydrological cycle. He then went on to say that both model results and observations show that the high latitudes will respond fastest and greatest in the high latitudes.

Lastly, he talked about how humans are inextricably linked to the changes being observed today, both as drivers of change through greenhouse gas emissions and as populations needing to prepare for what lies ahead.

The lecture reviewed such changes in ocean currents and ice cover, and what this may mean in terms of marine life and ecosystems, contaminant dispersal, invasive species, sea level rise and ocean acidification, and the impact on Canada’s northern residents. Several International Polar Year projects — such as the Canada Three Oceans (C3O) effort — have resulted in detailed information about the sub-Arctic/pan-Arctic connection and its implication for ecosystems and biodiversity.

## Faculty holds Dean’s Table Breakfast Series

**In the spring of 2008**, the Faculty of Engineering and Applied Science began a new outreach initiative called the Dean’s Table Breakfast Speaker Series.

The event is an initiative of the faculty’s Alumni Relations Committee – a subcommittee of the Engineering and Applied Science Advisory Council – whose mandate is to build relationships with alumni and friends of the university through professional development and networking opportunities.

The first in this series was held in May 2008. It was a huge success as approximately 25 invited guests listened to Mr. Ed Martin, CEO and president of Nalcor Energy, Newfoundland Hydro, talk about the company’s role in the province’s energy plan, and about how well-positioned our province is from a renewal perspective – a very important and interesting topic for the people of Newfoundland and Labrador.

The second was held this past November and was equally as enlightening as guest speaker Mr. Bob Cooper of Vale Inco Newfoundland & Labrador provided an overview of Voisey’s Bay Mine and Concentrator Project. Mr. Cooper also highlighted Aboriginal training and employment. The talk was timely since that same day Vale Inco announced \$2-billion plans to refine nickel in Long Harbour.



The faculty’s dean, Dr. John Quaicoe, said the breakfast discussions have surpassed expectations and he is excited about the opportunity it brings to discuss important current issues.

“I thought the event was well planned and the topic timely. Breakfast is a good time as we can plan this into our diary and still have a full day,” said one participant.

The faculty plans to hold breakfast discussions on other topical issues on a regular basis.



## Leaders in Lifeboat hook technology



“PEOPLE WERE PLEASED that someone was finally looking at marine evacuation from a scientific point of view.”

## Engineering and entrepreneurship — a winning combination

When you talk to Dean Pelley about his success as an entrepreneur, it quickly becomes evident that engineering and entrepreneurship is a winning combination.

Mr. Pelley is the CEO and president of Mad Rock Marine Solutions Inc., a company he started in 2002, along with his colleague Jason Dawe, to provide a modern approach to finding solutions to marine evacuation systems. The Deer Lake native is also a graduate of the ocean and naval architectural engineering program at Memorial's Faculty of Engineering and Applied Science and has a M.Eng. degree in naval architecture.

Mad Rock is now being recognized worldwide for its RocLoc lifeboat release hook system, a hook designed to help with the safe evacuation of seafarers. Mr. Pelley says he owes the success of his company to not only hard work and perseverance but to the opportunities he had as an engineering graduate student at Memorial's Faculty of Engineering as part of the faculty's Offshore Safety Research Team.

“We couldn't have done this independently. When I was a part of the Research Group, I saw they were doing some really good work on escape, evacuation and rescue of seafarers at sea.

My research was on the performance of lifeboats in extreme seas. I had many opportunities to meet with industry and present the work where I received a lot of really positive feedback. People were pleased that someone was finally looking at marine evacuation from a scientific point of view,” he said.

A year shy of graduating, Mr. Pelley saw an opportunity from what he was doing on the Research Team and started Mad Rock.

“So, essentially, we started with the Research Offshore Safety Team, we've spun out and actually started to impart change on the industry,” he said.

Mad Rock employs 14 people; was named by the *Marine Technology Reporter's Yearbook* edition as a top 100 company for its marine industry achievements; is an associate member of the International Association of Independent Tanker Owners; and most recently won the Board of Trade Business Excellence Award.



## a snapshot of the ARCTIC



"MY VISION IS TO ENABLE SUSTAINABLE AUV OPERATIONS in the Arctic for ocean monitoring and sampling of the ocean floor without human interference for weeks or even months at a time."

**Dr. Ralf Bachmayer** wants to give scientists better tools to understand what's under the Arctic ice. The effects of melting icecaps on the world's climate and dwindling natural resources are leading researchers to further explore what's happening in the Arctic. However, because of ice cover, most areas are only accessible for a very limited time each year and only with considerable cost and effort. Ships and ship-based observational tools, which can be challenging to deploy in these extreme conditions, are subject to weather delays and even cancellations.

Dr. Bachmayer, who has just been appointed Memorial's Canada Research Chair in Ocean Technology, believes that autonomous underwater vehicles (AUVs) offer an opportunity for unattended operations in these harsh conditions. "My vision is to enable sustainable AUV operations in the Arctic for ocean monitoring and sampling of the ocean floor without human interference for weeks or even months at a time," said Dr. Bachmayer. "This will give us invaluable access and new insights into this otherwise inaccessible environment."

However, the current AUVs are not capable of such a vision. They have to be able to reliably navigate, hover, hold their position and make contact with the ocean floor. Dr. Bachmayer believes that miniaturization of sensors and improved sampling technologies together with advances in energy storage and underwater navigation will help to solve the major constraints of AUVs.

Over the next five to 10 years, Dr. Bachmayer, who is working with the Faculty of Engineering and Applied Science as well as the Marine Institute's School of Ocean Technology, will develop the capabilities to operate autonomous underwater vehicles for extended periods of time over large distances. This will involve the AUVs sampling the environment and making real-time decisions without surfacing or the need for human operator input.

Dr. Bachmayer wants to help Canadian researchers, institutions, and industry explore areas that are of growing interest because of their economic potential, their relevance to Canada's security and their impact on our climate. The results will be a snapshot of the state of the Arctic with global significance.

The Government of Canada recently announced an investment of \$120.4 million to fund 134 new or renewed Canada Research Chairs in 37 Canadian universities. Memorial is home to 25 Canada Research Chairs. They are studying nutrition, archaeology, boreal and cold ocean systems, healthy aging, environmental science and traditional music, among other areas. The Canada Research Chairs Program offers Memorial an opportunity to strengthen its research culture, infrastructure and reputation by retaining outstanding researchers and recruiting new faculty members with exceptional research expertise. For more information on Memorial's Canada Research Chairs, visit [www.mun.ca/research](http://www.mun.ca/research).

# RESEARCH at its best

The Faculty of Engineering and Applied Science acknowledges the intimate connection between research and education of highly-qualified people. While research aims to generate new knowledge and new understanding, its application generates economic and social wealth.

The innovative application of research to the creation of new products and techniques is usually done in a milieu that combines the efforts of researchers, graduate students and entrepreneurs. This same milieu creates the next generation of innovators and leaders in our society.

As a result of the above, our researchers have been busy throughout the past year.

## Natural Sciences and Engineering Research Council of Canada (NSERC):

### DISCOVERY GRANTS (NEW):

DR. WEI QIU received \$25,000/year for five years for "Coupled LNG Ship Motion with Violent Sloshing Flow."

DR. HEATHER PENG received \$21,000/year for five years for "Hydrodynamic Response of Multiple-Body Interaction in Shallow Water Waves."

DR. MOHAMED AHMED received \$20,000/year for five years for "Design and Analysis of Co-operative-Diversity Wireless Networks."

DR. BING CHEN received \$19,000/year for five years for "An Integrated Simulation-Optimization Coupling Approach for Supporting Pesticide Pollution Control."

### STRATEGIC NETWORK PROJECT:

DR. TARIQ IQBAL received \$158,000, through a University of New Brunswick-led initiative for "Hybrid Wind Energy Systems for Remote Communities."

DR. DAG FRIIS, along with DRS. DON BASS and WEI QIU, received \$397,394 for "An Operational Efficiency and Energy Audit in the Newfoundland and Labrador Inshore Fishery."

### COLLABORATIVE RESEARCH AND DEVELOPMENT:

DRS. KELLY HAWBOLDT and FAISAL KHAN received \$170,400 from NSERC/Vale Inco. for "Thiolsalts in Mining and Metals Processing."

## INDUSTRIAL RESEARCH AND INNOVATION FUND (IRIF) NEW FACULTY START-UP GRANTS:

DR. AMY HSIAO received \$50,000 for "Materials, Innovation and Engineering Management."

DR. MARTIN ORDONEZ received \$80,000 for "Renewable Power Conversion and Energy Storage."

DR. BING CHEN received \$50,000 for "Simulation and Technology for Development of Enhanced Bioremediation for Soil and Groundwater Impacted by POPs."

DR. DAN WALKER received \$50,000 for "Autonomous Underwater Vehicles (AUVs): Hydrodynamics."

DR. BIPUL HAWLADER received \$50,000 for "Numerical and Physical Modelling of Buried Pipelines Subjected to Ground Movement," with an additional \$25,000 from C-CORE.

## INDUSTRIAL RESEARCH AND INNOVATION FUND (IRIF) GRANTS:

DR. SIU O'YOUNG received \$310,965 for "Raven II."

DR. STEVE BUTT received \$650,000 for "Advanced Exploration Drilling."

DR. BRIAN VEITCH received \$500,000 for "Small Craft Simulation Backbone Technology Development."

DR. BING CHEN received \$234,600 for "Northern Region Persistent Organic Pollution Control Laboratory."

DR. RAMACHANDRAN VENKATESAN, along with Drs. Mohamed Ahmed; Octavia Dobre; Howard Heys; Cheng Li; P. Gillard (Computer Science), Y. Chen (Computer Science), and J. Wyse (Business), received \$250,000 as well as \$120,000 from Atlantic Canada Opportunities Agency and \$120,000 from Bell Aliant for "Wireless Communications and Mobile Computing Research Centre."

RESEARCH continued on page 12

RESEARCH continued from page 11

### **MATHEMATICS OF INFORMATION TECHNOLOGY AND COMPLEX SYSTEMS (MITACS):**

#### **ACCELERATE NL:**

DR. KEN SNELGROVE received \$15,000 from MITACS/NALCOR for "Groundwork for Modelling the Effects of Climate Change on the Lower Churchill Hydroelectric Development."

DR. STEVE BRUNEAU received \$15,000 from MITACS/Ballicater Consulting for "Iceberg Deterioration Modelling."

DR. BING CHEN received \$15,000 from MITACS/InCoreTec Incorporated for "Risk Management of Groundwater Resources and Water Supply Systems."

DR. WEI QIU received \$45,000 for "Computational Fluid Dynamics (CFD) Programs for Marine Application".

DR. WEI QIU received \$30,000 for "Mathematical Modelling of Planing Hull Motion in Waves."

#### **Networking Grant:**

DR. WEI QIU received \$10,000 for "Workshop on Shallow Water Hydrodynamics."

#### **NALCOR:**

DRS. KEN SNELGROVE and LEONARD LYE received \$32,000 for "Climate Change Impacts on Energy Production for the Lower Churchill."

DR. KEN SNELGROVE received \$24,000 from the University of Manitoba for "Hydrologic Monitoring, Characterization and Modelling of Goose Creek and Deer River Watersheds"; and \$17,000 from NL Hydro (now Nalcor Energy) for "Climate Change Impacts on Energy Production for the Lower Churchill Hydroelectric Project".

### **PETROLEUM RESEARCH ATLANTIC CANADA (PRAC):**

DR. FAISAL KHAN received \$94,000 for the next two years for "Development of a Tool for Risk-Based Integrity Assessment of Process Components."

DR. HESHAM MARZOUK received \$150,000 for "Structural Health Monitoring and Damage Detection for Offshore Structures".

DR. WEI QIU received \$50,000 for "Development of a Time-Domain Vortex Induced Vibration (VIV) Prediction and Analysis Tool".

### **ATLANTIC INNOVATION FUND (AIF):**

DR. CLAUDE DALEY and his team, which includes faculty members, DRS. KEN SNELGROVE and STEVE BRUNEAU, received \$3 million for Memorial University's Sustainable Technology for Polar Ships and Structures (STePS2). This is the single biggest award made to a NL-based project.

DR. STEVE BUTT and his team, which includes faculty members DRS. RADU POPESCU, KATNA MUNASWAMY and GEOFF RIDEOUT, received \$1,762,500, along with \$650,000 from the Industrial Research and Innovation Fund (IRIF); and \$350,000 from industry for "Advanced Exploration Drilling Technology".

DR. THORMOD JOHANSEN received \$1,800,000, along with \$900,000 from ExxonMobil, Chevron, Husky, PetroCanada, SaudiAramco, ZADCO for "Advanced Well Completion Modelling and Optimization".

### **CANADA FOUNDATION FOR INNOVATION (CFI) LEADERS OPPORTUNITY FUND:**

LIHONG ZHANG received \$91,756 for "Computer-aided Design Laboratory for Analog and Mixed-signal VLSI Systems".

DRS. OCTAVIA DOBRE and MOHAMED AHMED received \$200,000 for "Advanced Wireless Communications Research Laboratory (AWCRL)".

### **PRIVACY COMMISSIONER:**

DR. MOHAMED AHMED received \$49,000 for "Threats to Mobile Phone Users' Privacy... Who, How, and How to Face?"

### **AUTO21 NETWORK OF CENTRES OF EXCELLENCE:**

DR. GEOFF RIDEOUT received \$19,000/year for two years for "Hybrid Active Safety Systems and Intelligent Grid Interfacing."

### **RESEARCH TOOLS AND INSTRUMENTS:**

DR. YURI MUZYCHKA is part of a team with Drs. Erika Merschrod and Christina Bottaro of the Department of Chemistry, that received a combined NSERC RTI/IRIF grant for a Maskless Patterning System, acquired from Intelligent Micropatterning (IMP), Inc. The RTI is \$150,000 and IRIF support is \$30,000.

## Oceans research continues to grow



**Two of the five** projects announced on Jan. 22, 2009 under Round VI of the Atlantic Canada Opportunities Agency's (ACOA's) flagship Atlantic Innovation Fund (AIF) were awarded to Memorial researchers.

The biggest winner in the announcement was the Faculty of Engineering and Applied Science for a project titled, Sustainable Technology for Polar Ships and Structures (STePS2). Several researchers in the faculty will work with local and international partners to address the shortage of tools and expertise in the engineering of polar ships and structures. The project, which will cost \$6 million, will receive approximately \$3 million from the AIF over a five-year period. Dr. Claude Daley is the principal researcher for this project.

"The STePS2 project brings together of whole set of issues, interests and challenges concerning Arctic shipping and offshore structures. ACOA's AIF program was just the right incentive to pull together a set of existing capabilities and new ideas into a large and ambitious project that will define the state-of-the-art in this field. We have a group of researchers and industry partners with global reach and reputation, with strong links to Memorial and to Newfoundland and Labrador. As significant as this project is, I see it as just one 'step' along the way. The opportunities for this community in polar ocean engineering are immense. We are already seen as 'a' world centre of activity in this field and I think we can be 'the' centre," said Dr. Daley.

Dr. Dan Walker is also a faculty member in the Faculty of Engineering and Applied Science and he's the president of Oceanic Consulting Corporation. Oceanic will receive \$2.5 million over three years from the AIF to improve and develop tools and methods to provide comprehensive performance evaluations under a project titled Numerical Simulation of Hydrodynamic Loads in Harsh Marine Environments. This research will be used for a variety of oil and gas exploration and production vessels, and platforms operating in harsh ocean environments.

"The university is at the centre of Newfoundland and Labrador's research capacity," commented Dr. Eddy Campbell, acting president and vice-chancellor of Memorial University. "Without research, innovation is difficult. Without innovation, the economy cannot grow vigorously. It is therefore crucial that financial support is obtained from various sources, such as the Atlantic Innovation Fund, and the provincial government's Industrial Research and Innovation Fund. It's funding that enables Memorial not only to maintain but grow its level of research for the benefit of the institution, province and country."

## New Chair in Arctic and Cold Region Engineering



**A strong relationship** with industry is important for an academic institution, especially an engineering school. Recently, the Faculty of Engineering and Applied Science received a professorship chair in Arctic and cold region engineering, and Dr. Eddy Campbell, Memorial's acting president and vice-chancellor, is extremely pleased with the partnership.

"It's very important for an engineering school to have strong links with industry. This benefits students due to the exposure the industry can provide to the world outside the university. It's also important for faculty to have similar exposure. This is very important especially when we're working in frontier regions. I mean frontiers both in terms of geography and knowledge. Ideally, the boundaries between the university and the industry are porous so people and ideas can move back and forth to the benefit of all," he explained.

The new chair is important for another reason. Since its inception, the Faculty of Engineering has had a long term interest in, and focus on, harsh ocean and ice-covered environments, which is natural given its geographic location. Dr. Brian Veitch, past associate dean of research for the faculty feels the chair will provide the ideal opportunity for the faculty to further extend its experience to the Arctic environment.

"We might have latitude similar to Paris, but our climate is dominated by the Labrador Current – icebergs and sea ice are local phenomena with which we have always had to consider in our engineering. Applying this experience to the Arctic environment was a logical step for us," said Dr. Veitch.

The professorial chair is sponsored by the international energy services company John Wood Group PLC (Wood Group), and will be associated with the Ocean Engineering Research Centre in the Faculty of Engineering.



## Arctic alliance

**With so much emphasis** on the North these days, when Dr. Brian Veitch, associate dean of research with the Faculty of Engineering and Applied Science, received an invitation in August from the Harris Centre to go to Iqaluit for a sovereignty exercise, he jumped at the opportunity.



Applied Science is sharpening its focus on this strategically important area," said Dr. Veitch.

Dr. Veitch said the visit also provided him with an opportunity to establish closer links with the Canadian Forces. In addition to his role as associate dean of research, he is the chair of the faculty's Ocean and Naval Architectural Engineering Program.

"The invitation was to observe the 2008 Operation Nanook Arctic Sovereignty exercise. My immediate interest in attending this exercise was to communicate to our military and government officials that Memorial is very interested in Arctic issues, and that the Faculty of Engineering and

"We are the only university in the country that teaches ocean and naval architectural engineering and we want to ensure that the Canadian Navy has an opportunity to take an active role in our program, whether that's through sending their naval officers here to take engineering degrees, or joining some of our collaborative research projects," he explained.

Operation Nanook, a \$3-million, 10-day sovereignty and security exercise, focused on exercising emergency responses to scenarios that included an oil spill, a mass evacuation of a cruise ship due to a fire on board, and a public health threat. It was also an opportunity for the Canadian Forces and other government departments and agencies to collaborate on key issues. As one of the largest northern operations, it included participants from the army, navy, air force, as well as Canadian Rangers, and members of the RCMP; Canadian Coast Guard; CSIS and Canada Border Services Agency.

Dr. Veitch believes that opportunities such as this one are valuable to the Faculty of Engineering and Applied Science and to Memorial as a whole.

"The Arctic will be transformed in the next few decades as mining and energy projects are developed and transportation expands. Our research program anticipates some of the associated challenges with a view to reducing the engineered footprint on this tough, but fragile region."

## Engineering professor participated in expert panel



**Dr. Kelly Hawboldt** from the Faculty of Engineering and Applied Science recently participated on an expert panel established by the Network Centres of Excellence (NCE) Secretariat.

Dr. Hawboldt, whose research focuses on sustainable or green processing of natural resources, travelled to Ottawa as part of the panel of national and international experts who evaluated funding proposals for centres of excellence. The proposed centres were based on green chemistry and reduction of greenhouse gases in petroleum. She said she found the experience valuable and interesting.

"I really found the review panel work valuable. The two centres reviewed were interesting from both a research and administrative perspective. These centres have to be very well structured in terms of accessing research, incubating and fostering new ideas, and matching researchers with industry

issues. The two reviewed were in 'green chemistry' and sustainable fossil fuel extraction. As centres have to reach across the country I saw the diversity and breadth of research across Canada. The centre structure fosters interdisciplinary work, which is key in sustainable engineering and science," she explained.

Dr. Hawboldt believes she was chosen for a couple of reasons. Her research is on sustainable natural resource extraction and processing, greenhouse gases mitigation, and renewables, and she has served on the review committee for sustainable energy strategic grants for NSERC for the past six years, which gives her experience in big dollar grant reviews.

The NCE, a joint program of the Natural Sciences and Engineering Research Council of Canada and the Social Sciences and Humanities Research Council of Canada, brings together partners from the academic, industry, public and non-profit sectors to conduct leading-edge research and knowledge-transfer activities in areas of strategic growth and opportunity for Canada.

# Faculty and staff **NOTES & SERVICE AWARDS**

## Faculty's academic program administrator received the President's Award for Exemplary Service

**On November 25,** 2008, Ms. Moya Crocker received a well-deserved award, the President's Award for Exemplary Service.

Ms. Crocker is the faculty's academic program administrator for Graduate Studies and Research, and has been with the faculty for the past 24 years. Prior to this, she worked in the Cashier's Office.



Ms. Crocker receives her award from Memorial's president, Dr. Eddy Campbell.

Since joining the university, Ms. Crocker has worked closely with eight associate deans and many faculty members. In addition, she also works with local, national and international engineering graduate students from the start of their programs to convocation, which she thoroughly enjoys and describes as rewarding. In fact, she has been instrumental in the growth of the faculty's graduate program — from its 50 students in 1984 to its current enrolment of almost 300.

"I am honoured to receive the President's Award for my contribution to the Faculty of Engineering and Applied Science. I enjoy working with the graduate students and find my job very rewarding. There is a great sense of accomplishment being involved with graduate students from the start of their programs up to their graduation," said Ms. Crocker.

Ms. Crocker's professional development includes certificates in supervisory skills, and workplace communication. In 2004, she was awarded the Dean's Award for Exemplary Service from the Faculty of Engineering and Applied Science. She also sits on the Board of Studies for graduate cohort programs and on the Awards and Medals sub-committee.

The President's Award for Exemplary Service at Memorial University of Newfoundland is presented each year to recognize employees who have demonstrated outstanding service and/or who have made significant contributions to the university community beyond that normally expected for their positions.

## NEW FACULTY

**DR. RALF BACHMAYER**, associate professor, March 2008

**DR. AMY HSIAO**, associate professor, January 2009

**DR. MARTIN ORDONEZ**, assistant professor, January 2009

**DR. DAN WALKER**, associate professor, January 2009

**DR. BIPUL HAWLADER**, associate professor, March 2009

## NEW STAFF

**GREG O'LEARY**, engineering technologist, March 2008

**JACKEY LOCKE**, communications co-ordinator, April 2008

**TREVOR CLARK**, engineering technologist, June 2008

**CAROLINE KOENIG**, engineering technologist, July 2008

**JODY ROTCHFORD**, recruitment officer, August 2008

**BETTY CORBETT**, intermediate clerk stenographer, December 2008

**GLORIA MONTANO**, academic program manager, January 2009

**DON TAYLOR**, engineering technologist, January 2009

## RETIREMENTS

**RON WISEMAN**, audio visual technician, May 2008

**DR. HESHAM MARZOUK**, professor, August 2008

**DR. PHILLIP BORDING**, professor, January 2009

## MILESTONES

### 10 YEARS OF SERVICE:

**DR. DENNIS PETERS**, associate professor, May 2008

### 15 YEARS OF SERVICE:

**DR. RANGASWAMY SESHADRI**, professor, October 2008

### 20 YEARS OF SERVICE:

**DR. GLYN GEORGE**, associate professor, October 2008

**DR. LEONARD LYE**, professor, October 2008

**ANIL RAHEJA**, associate director of Co-operative Education, October 2008

### 25 YEARS OF SERVICE:

**YVONNE MURPHY**, administrative staff specialist, October 2008



## Faculty of Engineering and Applied Science co-sponsors female rowing team



The team, from left to right, after their 5:57 race: Melissa Bailote (spare); Gillian Langor; Amy Sturge; Surrey Lane; Delia Warren; Amanda Baker; Julie Hedderson; and Steve Reddin (coxswain).

**This past summer**, the Faculty of Engineering and Applied Science, along with the Chair for Women in Science and Engineering, co-sponsored Memorial's first-ever female rowing team.

The team was composed of eight, term 7, engineering students, who trained vigorously from mid-May to August for the Royal St. John's Regatta, which took place on Aug. 6 at Quidi Vidi Lake in St. John's.

Julie Hedderson is a term 7 mechanical engineering student and one of the rowers on the team. She said the partnership was a great one and felt it was mutually-beneficial for everyone involved.

"We were so honoured to represent such reputable sponsors, who recognized the importance that extra-curricular involvement plays in university life. We are confident our rowing team will encourage engineering students to take initiative and get involved in community events such as this," she said.

## Eastern Edge Robotics team takes top spot at International ROV competition

**The Eastern Edge Robotics team** proved once again that they are the team to beat. The team, comprised of students from the Marine Institute, Memorial University's Faculty of Engineering and College of the North Atlantic, captured top honours, beating out 25 teams in the Explorer (advanced level) class competition at the 2008 MATE International ROV Competition, held at the Scripps Institution of Oceanography — University of California San Diego from June 26-28.

In addition to taking top spot in overall performance, the team placed first for their engineering evaluation, technical report and mission performance.

Dwight Howse, head of the Marine Institute's School of Ocean Technology and team mentor, is extremely proud of the team's accomplishments.

"Over the last several months, the students worked very hard to develop their ROV and get ready for the competition. The team demonstrated an amazing amount of technical talent, not to mention teamwork and a sense of co-operation, camaraderie, and professionalism that radiated throughout the event," he said.



The competition challenges high school and post-secondary teams to design, build and operate an ROV to perform a series of tasks like those performed by an ROV in an industrial setting.

More than 300 students, instructors, mentors, technical assistants and industry professionals participated in the event, which focused on hydrothermal vents, which are like hot springs in the sea floor, discharging continuous streams of hot fluids from deep beneath the earth's crust into the surrounding cold ocean water.

Dr. Ramachandran Venkatesan is the acting associate dean of undergraduate studies for the Faculty of Engineering. He feels that the level of participation by the Faculty of Engineering has been steadily increasing over the past few years with

# Engineering students win Rothermere Fellowship two years in a row

**For the past** two years, Memorial's most prestigious award, the Rothermere Fellow, has been awarded to engineering students. In 2008, the award went to Jonathan Anderson and this year's award went to Michael Furlong.

The Rothermere Fellowship was established by Lord Rothermere, Memorial's first chancellor. The Fellowship allows candidates who have completed a bachelor's degree at Memorial and must have completed, or be about to complete, a master's degree either at Memorial or at another North American university, the opportunity to continue their education in the United Kingdom.

## Jonathan Anderson



Jonathan Anderson

In a world of online banking and cellular phones, the security of personal information is a hot topic of conversation. Jonathan Anderson, who received the Rothermere Fellowship in June 2008, is helping to put our security worries to rest.

The Rothermere Fellowship enabled Mr. Anderson to do his doctoral program at the University of

Cambridge where he is studying network security.

"It's about managing confidentiality, authentication 'knowing who's who', and other security concerns in networked environments," said Mr. Anderson.

A resident of St. John's since the age of six, he became involved in cryptography when he was selected for a Natural Sciences and Engineering Research Council (NSERC) Undergrad Student Research Assistantship – an experience that convinced him he wanted to pursue graduate studies in cryptography.

Mr. Anderson has a bachelor of engineering degree from Memorial and recently submitted his master's thesis titled, Side Channel Analysis of Stream Cipher Hardware.

Mr. Anderson said he plans to pursue an academic career where he can continue both his teaching and his research.

the winning team including 11 engineering undergraduate students.

"I believe that one of the real strengths of the team is the diversity of backgrounds and skills that the team members bring. The Faculty of Engineering is indeed proud to be associated with the Eastern Edge Robotics team. The team has been performing at the highest level on a consistent basis since the commencement of this competition. This is a testament to the excellent post-secondary education available in engineering technology in Newfoundland and Labrador. I

## Michael Furlong

As a native Newfoundlander, Michael Furlong knows all about the province's harsh marine environment, and as this year's recipient of the Rothermere Fellowship, Mr. Furlong is helping to make a difference — by making robots.



Michael Furlong

"I am interested in putting robots out to work in real-world environments, particularly harsh environments and if there is one thing we are not lacking in Newfoundland and Labrador is a harsh environment. Search and rescue is a big problem we have that automated vehicles could help solve. By searching the ocean and reporting back, we could reduce the number of people on the ocean in bad weather and multiply the number of eyes searching, hopefully reducing loss of life in naval accidents," he explained.

"The same technology for searching and exploration could be used to monitor environmental accidents like oil spills or to track populations of various marine animals for the purposes of more effective fishing, reducing by-catch, or more ecologically-friendly fishing, knowing species populations in order to set fishing quotas," he added.

Mr. Furlong was extremely happy when he heard he had won the Fellowship.

"It's a great honour to be selected from the candidates for the Fellowship. Winning this award is also an opportunity to experience British-style education, which is different from the Canadian and American systems," he said.

An electrical and computer engineering graduate from Memorial's Faculty of Engineering, Mr. Furlong is currently in-between finishing his master's in robotics at Carnegie Mellon University (CMU) and starting his PhD, and is spending the summer working on connecting models of human behaviour into some search and rescue robots at the Robotics Institute at CMU.

am confident that this success will resonate in the hearts of the school children in the province and inspire more students sufficiently to consider a career in engineering," he said.

The following engineering students were on the winning team: Jake Bragg, Leanne Brockerville, Mark Flynn, Scott Follett, Justin Higdon, Nancy Hillier, Jonathan Howse, Adam Lewis, Matthew Minay-Goldring, Chris Neville and Erin Waterman.

# Master of engineering student receives best student paper award

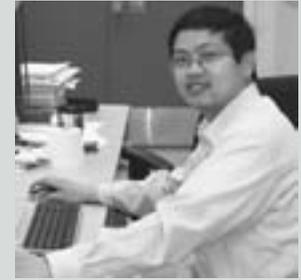
**Shi Chen**, a master of engineering student at Memorial's Faculty of Engineering and Applied Science, received a Best Student Paper Award in Computer Systems and Applications Symposium for his paper entitled, "Implementation of vector floating-point processing unit on Field Programmable Gate Arrays (FPGAs) for high performance computing", at the Institute of Electrical and Electronics Engineers (IEEE) Canadian Conference, held in Niagara Falls, May 4 to 7, 2008.

Mr. Chen's paper presents a design that follows vector thread (VT) architectures, which unify the vector and multithreaded execution models. In this way, a large amount of structured parallelism can be implemented on VT architectures. The simple control and data path structures of vector processing enable the embedded computing system to attain high performance at low power.

This research applies mainly to scientific and engineering applications. Scientists can build a mathematical model to simulate the earthquake, which includes a lot of data-intensive computation. Shi's research will speed up the calculation process and keep a high-accuracy for the computer results.

Mr. Chen said winning this award encourages him to continue with his research.

"I greatly appreciate that the CCECE recognizes and encourages my research work. In fact, I also hope this award can help me to get a job opportunity and start a successful career life in Canada. I want to dedicate this minor success to victims of the devastating earthquake in Sichuan province. I am proud of our country for the courage and fortitude."



Shi Chen

The Computer Systems and Applications Symposium, in which Shi's paper was featured, included 60 technical papers authored by researchers in France, India, Italy, Jordan, United States, United Kingdom, China, Saudi Arabia, Austria, Iran, Pakistan, Cuba, Israel, Egypt, and Canada. Acceptance of papers for this conference involves a full paper refereeing process.

Mr. Chen graduated from Memorial in May 2008 and is now working as a software engineer in Toronto.

## Searching for opportunity

**When asked** why he chose to study engineering, Abdesh Khan, a PhD student at Memorial's Faculty of Engineering and Applied Science, said it was because the opportunities and impacts of engineering in real life are endless. But for Abdesh, the opportunities and impacts in his personal life have been equally as incessant.



Abdesh Khan

Before coming to Memorial to complete graduate studies with university fellowship, Abdesh completed his bachelor's degree in electrical and electronic engineering from the Bangladesh University of Engineering and Technology in 2004. And according to Mr. Khan, life in St. John's is very different than life in Bangladesh.

"Life in St. John's is easier and faster than life in Bangladesh. I did not notice frequent power blackouts and traffic jams in St. John's. These are very common in Bangladesh. I also like the rules and regulations for public safety and security. In Bangladesh, there is corruption," he said.

But even though life in Canada, and at Memorial, has been a very positive and rewarding experience for Abdesh, the one thing missing is his family.

"I miss my mom and dad very much. My mom is a great cook. They have been encouraging me all through my life, and I miss their encouragements. I see them once every two years. I have a sister in Bangladesh, who is also a well-wisher for me. I got married in 2006. My wife joined with me in May 2007. She is a wonderful lady who is compensating my family member's affections and encouragements," he said.

But, despite the sacrifices, Mr. Khan is happy he came to study engineering at Memorial, where he says the focus is on practical learning and the interaction between students and faculty is better than it was at the University in Bangladesh.

"The power research group in the Faculty of Engineering and Applied Science at Memorial University is one of the best research groups in the area of power engineering with a lot of opportunities, and I wanted to pursue my graduate studies in power engineering. I was selected in this group with fellowship and assistantship," he said.

Mr. Khan finished his master's in electrical and computer engineering in June 2006 where he completed five courses and a research-based thesis on designing and implementing a diagnostic and protection technique for permanent magnet synchronous motors. And, as a PhD student, he continues to do fascinating research on the design and implementation of an intelligent wavelet controller-based permanent magnet synchronous motor drive for electric and hybrid electric vehicles.

"High-reliability, high-efficiency and power-density are key factors for electric propulsion of electric and hybrid electric vehicles. I have developed a wavelet-based intelligent controller for permanent magnet motor drives in electric and hybrid electric vehicles. This controller can provide high-efficiency, optimum power density and reliability in fuel-efficient and environmentally-friendly electric and hybrid electric cars," he explained.

And even though the most rewarding thing when it comes to his research is getting published in scholarly peer-reviewed journals and conference proceedings, Mr. Khan says life at

Memorial has given him many exciting and challenging opportunities. From working as a teaching assistant to research assistant to publishing 21 papers to becoming involved with many technical and social communities, this budding engineer is just getting started.

And what has been his favorite part? Receiving his master's degree, of course.

"It was an excellent memorable personal experience in stimulating my interest for PhD research."



## Engineering student recognized for outstanding achievement

**Zhipeng Duan** is standing out amongst the crowd. This past summer, the Faculty of Engineering and Applied Science graduate student was awarded the Governor General's Gold Medal in Graduate Studies and the David Dunsiger Award for Excellence.

Zhipeng Duan

The Governor General's Gold Medal in Graduate Studies is an annual award that recognizes excellence in a doctoral program. It is awarded normally to a PhD student who achieves the highest academic standing in his/her graduate degree program. Zhipeng, who received his PhD degree in engineering at Memorial's spring convocation, was chosen among all those receiving a PhD at Memorial this year.

The David Dunsiger Award is for excellence in graduate studies in the Faculty of Engineering and Applied Science, and commemorates the contribution of Dr. A. David Dunsiger, a member of the faculty from 1974 to 1979. It is awarded to a student who produces outstanding quality work. The recipient is selected by the Faculty of Engineering Scholarship Advisory Committee, on the advice of the dean of Engineering and Applied Science and the dean of Graduate Studies.

Mr. Duan is honoured to receive these awards and very grateful for this recognition from the faculty.

"Winning these awards is very important to my future academic career and these awards will motivate me in my future research. I would like to express my appreciation to my supervisor, Dr. Yuri Muzychka, for his enthusiastic guidance and support of this work," he said.

The awards are awarded during convocation, and to be eligible for nomination by a Faculty or School, candidates must:

- have completed all the requirements for the degree;
- have been approved by Senate for the conferring of the degree; and
- be eligible to graduate at the spring convocation or have graduated at the previous fall convocation.

## Ocean and naval architectural engineering students compete in "junk boat" race



**This past September**, new students to the ocean and naval architectural engineering program competed in the annual "junk boat" race.

Teams were given the same set of supplies including plywood, Styrofoam, duct tape, nails, pool noodles, a plastic container, and other random materials to build a "junk boat" within a certain timeframe. Once the boat was built, each team chose a captain to sail the vessel in Long Pond, behind the engineering building. As fellow students and faculty cheered them on, captains paddled their way to the finish line. In the end, Team 3, led by Gracie Watts, won the race; however, all participants had a great time and had an opportunity to meet their fellow classmates.

Next year's "junk boat" race is much anticipated.

## The Faculty's Student Society 'B' holds Winter Charity Ball in support of Daffodil Place

**On Saturday**, Feb. 7, 2009, hard work and teamwork sure paid off as engineers gave back to the community by hosting the third annual Winter Charity Ball.

Hosted by the Faculty of Engineering's Student Society 'B', the event raised more than \$8,000 in aid of Daffodil Place. Jill Henderson is the Society's vice president external and she couldn't be happier with how things went.

"I am extremely pleased with how everything turned out. The whole society executive put in countless hours to make this event happen. I feel that this event is finally starting to grow within the community and will undoubtedly continue to grow in years to come," she said.

David Sharpe, president of Engineering Student Society 'B'; Dr. John Quaicoe, dean for the Faculty of Engineering and Applied Science; and Michelle Cannizzaro, Daffodil Place, all gave speeches throughout the night talking about the importance of the event and the engineering community coming together.

The fundraiser consisted of a three course meal, speeches, a silent auction and the chance to socialize with people from the engineering community as a string quartet from Memorial's music school played throughout the evening.



The annual Winter Charity Ball has always centred around engineers giving back to the community and began as a way for the engineering community to come together to support a local charity.

"Every year the event has seen an increase in attendance and money raised. This year we had 160 people in attendance and were able to raise over \$8,000. The charity ball is finally starting to become a more well-known and annual event, which is sure to draw in more people in the years to come," said Ms. Henderson.

Sponsors included the Professional Engineers and Geoscientists of Newfoundland and Labrador (PEG-NL); the Faculty of Engineering and Applied Science; Technip; Peter Kiewit Sons Co.; 99.1 Hits FM; Royal Bank of Canada; Production Services Network; Newfoundland Transshipment Limited; Cre8iv Design Studio Inc.; AE Consultants Ltd.; and Genesis Centre.

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## Fifth annual Pi-Day in support of the Janeway Children's Foundation a huge success

**They say that** many hands make light work. This was certainly the case on Friday, March 20, 2009 when volunteers from the Faculty of Engineering's Student Society 'B' came together for the fifth-annual Pi-Day in support of the Janeway Children's Hospital Foundation. The fundraiser was a huge success with more than \$1,900 raised. Mr. David Sharpe is the society president and he was extremely pleased with how the event came together, especially since it's for such a worthwhile cause.

"The society executive was extremely pleased with the number of student volunteers from the engineering student body. We had more than enough and appreciated their willingness to help out. Events like these are so important and we look forward together in the future on similar events," he said.

The event is run by student volunteers, who deliver the pies and collect the donations. For \$10 you can have a cream pie

delivered to anyone in St. John's or Mount Pearl. If a person receives a pie, he or she can choose to take the pie in the face or pay \$10 to have the pie directed towards someone else. There is also the option to not participate.

"Although it's a controversial fundraiser since no one wants to be faced with receiving a pie to the face, it is effective. Most people pay the \$10 to redirect the pie to someone else, which leads to more funds being raised for the chosen charity, which has been the Janeway," added Mr. Sharpe.

The society recognizes the continuing support of sponsors, which for this fundraiser included the Faculty of Engineering and Applied Science; Professional Engineers and Geoscientists of Newfoundland and Labrador (PEG-NL); Best Dispensers; The Telegram; Sobey's; Imprint; GJ Cahill & Company, and Genesis Centre.





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Photo provided by Dr. Ralf Bachmayer

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