The Dean's message

Our faculty, staff and students are turning many successful funding proposals into exciting research and development projects in the upcoming months

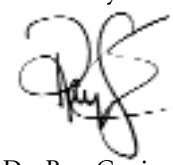
As an alumnus of our Faculty of Engineering and Applied Science, it is a great honour to welcome you to this edition of *Benchmarks*, our faculty newsletter. During 2003 our faculty, staff and students have been very busy with a range of successful teaching and research initiatives, entrepreneurial ventures, outreach and community-oriented activities. I would like to take this opportunity to congratulate our students, alumni, staff and faculty who have been recognized with various awards for excellence in their professional lives. This issue of *Benchmarks* includes a selection of articles that highlight some of these professional achievements, as well as articles that highlight personal interests of some of our students and staff.

The upcoming spring convocation marks the 30th anniversary of graduates from our co-operative engineering degree programs and we continue to offer one of the few mandatory co-operative engineering programs in Canada despite increased competition from other engineering programs and uncertainties in segments of the technological job market. Our ability to continue to offer excellent academic and work experiences to our students is a result of the tremendous dedication of our staff and faculty, as well as the exceptional support of our co-op employers and supporters. It is a great pleasure to work with such dedicated individuals.

As you read this newsletter, we will be busy preparing for an accreditation submission later in 2004, undertaking a major review of the structure and content of our undergraduate programs in order to provide engineering education that will best serve our future students and the engineering profession, and developing a number of new professionally-oriented graduate programs. We will be taking the new initiatives described in this newsletter from successful funding proposals to active research programs that involve faculty, staff and undergraduate and graduate students in exciting R&D in collaboration with local, national and international industry.

I hope that you enjoy this issue of *Benchmarks* and please feel free to contact me to arrange a visit to the faculty or to get further information about any of our activities.

With very best wishes,

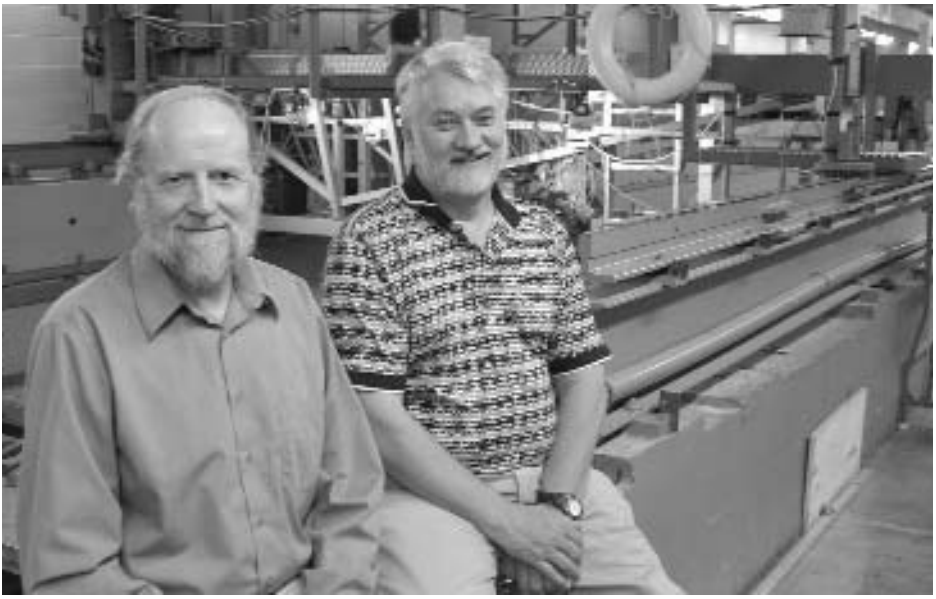


Dr. Ray Gosine, P. Eng.
Class of '86

Stormrunners

For fishermen making a living in the unforgiving North Atlantic, running away remains a valid means of self-protection. But now, with the help of two Memorial engineering professors, the ability of fish harvesters to stay one step ahead of bad weather could improve significantly.

Professor Dag Friis and Dr. Don Bass have been performing vessel motion and resistance testing for a 65' catamaran design. The project is partly funded through the National Research Council's Industrial Research Assistance Program (IRAP) and the Canadian Centre for Fisheries Innovation, with the majority of funding coming from Bon Pelley Enterprises of Springdale for whom the work is being carried out.



Dr. Don Bass and professor Dag Friis

Pelley, who has been a fisherman for more than 30 years, conceived the idea of using a high-speed, multi-hull vessel for the offshore fishery while working the stormy North East Coast – Funk Island Bank area. Pelley believes the catamaran has tremendous potential as a faster vessel – a ship capable of getting to and from lucrative fishing grounds twice as fast, while at the same time offering a much more stable and safe working platform. Construction of the prototype is currently underway and it is expected to be in service for the 2004 season.

"The inshore fishery fleet is now being forced further afield," Dag Friis said. "When bad weather comes up, they need to be able to get to sheltered waters more quickly." Fish harvesters risk their lives to stay financially viable, the professor explained, because of the federal fisheries regulations limiting the length of inshore vessels. "The 65' limit on vessel length is driving the fishing industry to extremes. They're pushing their boats – fishing with all sorts of different gear, coming to port and changing gear, trying to do processing on board, trying to cram everything into that space. The result is that you're going out in beam, down in depth and up in height, which is not necessarily a good thing."

"The rule might not have been too bad when they were close to shore but now that they're going further afield because of their quotas – it's a fishery that's much riskier. So this catamaran design is one possible way of trying to address the problem."

Operating at a speed of at least twice that of most 65-footers (up to 20 knots), the catamaran can halve the usual two to three days of travel time out to the grounds – a difference, as Dr. Bass pointed out, that also means an improvement in product quality. "You can get the product back to port very quickly," he explained, "and that's very important for some species, like crab, where quality is so important."

The engineering professors are performing vessel motion and resistance testing on computer-generated models of the design and assessing its performance capability. They need to give the boat enough capacity for storage and the proper-shaped hull to move it through the water quickly and efficiently. Also collaborating on the project was Lee Hedd of Oceanic Consulting Corporation who was involved in the modifications to the hull form to improve vessel performance and also constructed the original model. "Because they have two hulls, catamarans tend to be more stable," Dr. Bass said. "However, there is a trade-off between stability, speed and carrying capacity in any vessel design; a catamaran has the stability, but speed is gained at the expense of carrying capacity."

Pelley is very optimistic about this new design and believes it will have a very positive impact on the local fishing industry. "This is what we as engineers should be doing," Friis said. "Being an engineer, you want to see that link between the theory that you're working with and the practical application."

CFI grants announced: Big news for faculty

Two professors from the Faculty of Engineering and Applied Science were recently awarded New Opportunities grants to support their research efforts. The Canada Foundation for Innovation (CFI) has awarded Dr. Faisal Khan $122,452 for a laboratory facility to investigate process safety and risk management and Dr. George Mann was awarded $96,356 to further develop the Intelligent Systems Lab for research into co-ordinated robotics.

Dr. Faisal Khan

Dr. George Mann

"Receiving such an award gives researchers renewed confidence in the work that they're doing and it provides the infrastructure to carry out further research," exclaimed Dr. Khan. "I am also very excited about the opportunities this funding presents for both graduate and undergraduate students here in the faculty." Dr. Khan plans to use the funding to purchase specialized equipment for studying the characteristics of oil and gas products and by-products under different operating conditions. He will be able to examine chemical behaviour under pressurized conditions to see how the physical state changes under high pressure, when chemicals become unstable and what the consequences of this instability are. "Ultimately we want to be able to say with confidence what the best operating conditions are," adds Dr. Khan. "This will lead us towards safer designs and operational activities which can only serve to benefit the oil and gas industry in the long term."

Dr. George Mann will also be able to build upon his research infrastructure and purchase equipment, enabling him to do further work on co-ordinated robots, sensors and process control. "I have always believed in applied research and have chosen to focus on the resource sector, particularly the mining industry. We have a lot to learn about how to apply technology in a non-structured environment so the answers we find will be very beneficial

CFI *continued on page 9*

New funding for research

Unmanned aerial vehicles come to Atlantic Canada

Funding has been awarded to the Faculty of Engineering's Instrumentation, Control and Automation (INCA) laboratory for innovative technology of unmanned aerial vehicles (UAVs). The Remote Aerial Vehicles for Environment Monitoring (RAVEN) is a model airplane that will be used autonomously (i.e. you can control it without seeing it or you punch in a flight path) for offshore applications. The project will be the first application of commercial UAV surveillance in Atlantic Canada and will aid greatly in the areas of environmental monitoring, search and rescue, and national security. Engineering professor Siu O'Young says, "The novelty is not in the hardware but in the combination of innovative ideas to accomplish a variety of unique missions for lower costs than those of manned aircraft."

RAVEN is a collaborative research project between the Faculty of Engineering, Provincial Airlines Ltd., the Atlantic Canada Opportunities Agency and the two National Research Council laboratories: Institute for Aerospace Research and Institute for Marine Dynamics. It will allow researchers to pursue research and development on autonomous vehicles over four different industrial sectors: aerospace, mining, marine and subsea, based on a common technology.

New Memorial partnership means better food inspections

The Faculty of Engineering and Applied Science is partnering with a St. John's company to research and develop innovative technology for inspecting food. The Atlantic Innovation Fund has announced $2.9 million to Baadar-Canpolar Inc., which specializes in advanced food inspection systems, to research and develop a multi-spectral system, integrating x-ray technology with machine vision.

Funding *continued on page 5*

Funding *continued from page 4*

Although the initial focus will be on the fishing industry, the technology will be designed so that it can be used in other food sectors, as well.

Industry trends are demanding higher detection levels because of worldwide competitive pressures for cost efficiencies and demands from the fast food industry. This will require food inspection systems to function faster and beyond the capability of the human eye. An Industrial Research Chair will be established at Memorial as part of the project, which will cost a total of $5.8 million over a four-year period.

Paul Hearn, managing director and COO of Baader-Canpolar Inc. says the establishment of an Industrial Research Chair to look at some of the technological needs of the fish processing industry is long overdue for the Faculty of Engineering and Applied Science. "I went through the engineering program at MUN in the early 1980's and I remember very little research being carried out in fish processing technology. I believe that the same is true today. We are hopeful that the establishment of this research chair will change that." Dr. Ray Gosine, dean of the faculty says the project solidifies a much valued relationship with Baader-Canpolar. "Memorial will contribute to both the fundamental and applied research and we will also work with Baader-Canpolar to apply the results of this research to real products and services in the local technical community." Dr. Gosine adds that the partnership means more research capability; more highly qualified personnel available in the Atlantic region; and another link between university-based research and the long-term technological needs of innovative Atlantic Canada industry.

The world's first

AIF has provided funding to EnerSea Canada Inc. to establish a Compressed Natural Gas (CNG) Centre of Excellence at Memorial University. The CNG Centre of Excellence is the world's first research and development centre for large-scale marine transport of compressed natural gas. The centre, a partnership between Memorial and EnerSea Canada Inc., will conduct innovative research and development in CNG marine transportation and related issues with the goal of advancing technologies capable of delivering natural gas from offshore locations where pipelines do not exist or are impractical. It will address the technical challenges associated with developing a complete transportation system (gas processing, loading/off-loading, storage and safety practices) for global applications. EnerSea and Memorial, including several members of the engineering faculty, have worked diligently over the past 18 months to develop the centre and to obtain funding for this federally incorporated not-for-profit entity.

Modeling and simulation of harsh environments

Despite enormous strides in marine engineering and construction, human error accounts for 80 to 90 per cent of all accidents of maritime shipping and marine resource industries. Nowhere are the environmental and ecological stakes so high as in the exploration, production and transshipment of hydrocarbons in harsh marine environments. AIF has recently announced funding to our Centre for Marine Simulation to help reduce these risks. The funding will focus on research to improve the safety and efficiency of oil and gas operations in harsh maritime environments through the development of innovative modeling and simulation capabilities.

This project will incorporate three highly interdependent activities: simulation infrastructure, model development and human factors studies. Among the key economic benefits of the project are development of the world's first comprehensive ice management and human factor modelling and simulation capability with a corresponding increase in the sale of new products and services. In addition, the enhanced reliability of human factor modelling and simulation will benefit the oil and gas industry through access to more qualified offshore personnel, and reduce significantly the likelihood of accidents stemming from human error. The work will be conducted principally within Atlantic Canada at collaborator facilities, and at sea with Husky Energy and Petro-Canada support, with some activities assigned to the project's international collaborators in the U.K. and the Netherlands.

Faculty of Engineering & Applied Science

Spot light

Engineered for greatness - The Footworker™ -S

If you play squash and want to improve your performance you may have a unique opportunity thanks to the research and creativity of Dr. Leonard Lye, Faculty of Engineering and Applied Science, and engineering graduate Chris Butt. The Footworker™ -S is a device designed for both novice and advanced squash players to improve movement around the squash court. Be prepared to work up a sweat because this device will challenge even the best of players.

The Footworker™ -S is designed to help players perform ghosting routines more effectively. The purpose of ghosting routines is to encourage good movement with correct footwork in any corner of the court. The Footworker™ -S is placed at the front of the court, 10 lights are positioned on the device to reflect the typical positions from where a squash ball is hit and when a particular light is illuminated, the player moves to that position on the court and hits an imaginary ball. What follows is a properly timed, according to your chosen level, pseudo-random pattern of flashing lights designed to simulate a rally. Dr. Lye says the idea for a similar device for badminton came to him about 20 years ago. When he started playing squash five years ago, the idea came back and he proposed it as a term 8 project for the electrical engineering students in 1999. "Chris accepted the project and went to work right away programming and putting the hardware together. When we had something ready to present, we took it over to Dr. David Behm in the School of Human Kinetics and Recreation and asked him to take a look at it. He tried it out, made a few suggestions, and we have been refining it ever since."

Since the beginning, the Footworker™ -S has changed from roughly constructed plywood to a real prototype, thanks to the help of Steve Foster of Memorial University's Technical Services. The device has been streamlined, the electronics component has been made a lot smaller and it's been given a more compact design. "We are still making some minor modifications and are always finding something that could be slightly tweaked. Having people try it helps us to make it even better," adds Mr. Butt.

According to Dr. Lye, there is no other device similar to this available. Consequently, the endorsements have been rolling in from those who have tried it. "The Footworker™ is a great new tool for coaches and a fun way for players to improve their game," says Kathy Lundmark, level IV coach and former Canadian and World Masters Champion.

Engineering graduate Chris Butt and Dr. Leonard Lye, Faculty of Engineering and Applied Science, inventors of The Footworker™ -S

Dr. Lye and Mr. Butt have since formed their own company, Com-Adv Devices Inc., and are now working on marketing their product. They have been in contact with players and coaches worldwide and they plan to start advertising in magazines and other publications devoted to the game. They are also working on a similar product for badminton and are very optimistic given the interest they have received from the local community. "This device makes you work very hard. It challenges your footwork technique and improves your overall fitness level," points out Dr. Lye. "We know we have a winning product. Now we just need to show everyone what it can do for them!"

For more information, please visit their Web site at *www.footworker.ca*.

From childhood toys to robots – Adventures in learning

Lego is no longer just another children's toy. With the advent of the Lego Mindstorm™ robotics kit, children of all ages are being exposed to science and engineering principles by learning how to build and program a robot to do simple tasks. The potential for these kits to excite young people about engineering and science careers has not gone unnoticed. Teachers from the Avalon East School District, working in collaboration with the Faculty of Engineering and Applied Science, are making sure that full advantage is taken of this educational opportunity.

For the past two years, junior high schools in the St. John's area have been involved in an enrichment program in robotics. Operating out of the Instrumentation, Control and Automation (INCA) Centre and taught by both engineering faculty and graduate students, the enrichment program gives young students the chance to do hands-on robotic design, be creative, and really work together as part of a team.

"The students who have been involved in the enrichment program love it! It is really amazing how much they learn in such a short time," says Clarence Button, one of the co-ordinators for the program and a teacher at O'Donell High School. "They get to see the applications of science first-hand and this often renews their interest in the subject when they return to classes."

Dr. Ray Gosine, dean of the faculty, could not agree more. "Last year we had over 500 students show an interest in the robotics enrichment course. Courses like this leave a marked impression upon students. They are at a stage where they are forming impressions about what it means to be a doctor or an engineer. Having a hands-on learning opportunity really helps to shape those impressions and gives them a more solid understanding."

This year, mechanical engineering student Nick Janes and engineering graduate student Rose Wilson got to help out and teach the four-day robotics course. They say it was not only enjoyable, but also a chance to meet future engineers. "The course is a great introduction to software for kids. But best of all it is a lot of fun! They get to build their own robots using the Lego Mindstorm™ kit, program them to perform specified tasks and then compete in a wrestling match," says Rose. Their enthusiasm for the subject was contagious, adds Nick. "Each student wanted to be there and it showed. They all said they wanted to come back and they wanted the course to be longer. If we have helped increase their interest in science, then that's something we should be very happy about."

Junior high students participating in enrichment program in robotics

The Avalon East School District and the Faculty of Engineering and Applied Science plan to partner to offer this and other courses. Making this connection with young students is a part of the faculty's plan to stimulate interest in engineering and its applications within the wider community. And it does not have to stop there," says Dr. Gosine. "There are many other areas where we can collaborate with the local schools and give younger students the opportunity to come to Memorial and see what we do here. Opportunities like this are just the beginning."

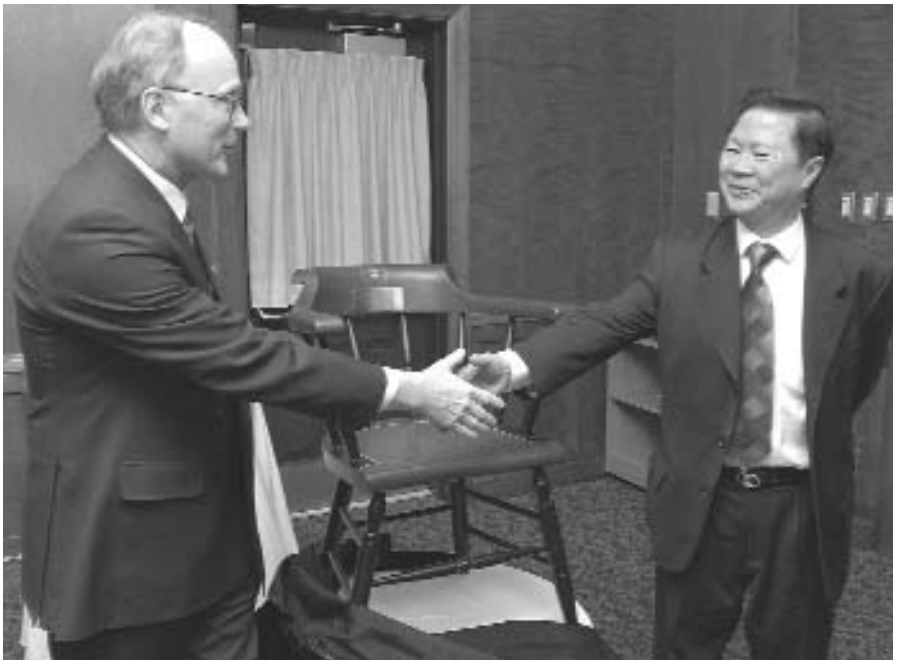
Did you know that junior high school students can now compete at an international level with the First Lego League? For more information please visit *www.firstlegoleague.org.*

An historic partnership: Husky Energy and Memorial University

Memorial University is taking a great stride forward in becoming a centre for world-class research thanks to an endowed gift from Husky Energy. There is a newly-established Husky Energy Chair in Oil and Gas Research and it is the first time an endowed research chair has been bestowed upon Memorial. Many people are excited about the opportunities this presents for the university.

"It is this kind of support that will help transform Newfoundland and Labrador into an internationally-recognized leader in education, training, research and development in all facets of offshore oil and gas," remarks Dr. Axel Meisen, Memorial's president and vice-chancellor. "By permanently endowing this dedicated senior research and teaching position at Memorial, Husky Energy has shown true leadership and also support for this university's contribution to the oil and gas industry."

The establishment of an endowed research chair will, according to those involved, strengthen Memorial's research in the area of oil and gas and build upon the expertise of faculty members like Dr. Thormod Johansen, Canada Research Chair in Petroleum Reservoir Engineering and Characterization. The Husky Energy Chair will focus initially on reservoir engineering and the utilization of seismic imaging to enhance the interpretation of reservoirs. "This is the start of a cluster of expertise in reservoir simulation and characterization that will enable us to conduct world-class research with a global impact," says Dr. Chris Loomis, vice-president (research). "What is truly remarkable about this chair is that it will exist virtually in-perpetuity meaning that we will have a permanent research chair in this area at Memorial for as long as the return on the endowment is present. It also sets a new standard by which we can hope to secure other research chairs."



Dr. Axel Meisen (L) president, Memorial University and John C. S. Lau, president, Husky Energy, shake hands in front of the university's gift to Husky, a hand-crafted chair marking the donation.

Is this the start of a new trend for Memorial? Dr. Loomis hopes it is. "Collaboration between industry and the university is something we would very much like to encourage. It is normal for research chairs to have an expiration date, but this will not to be case with the Husky Energy Chair and that is a significant advantage when conducting research. We are very grateful for Husky Energy's support."

This chair will also play an integral role in further developing the Oil and Gas Development Partnership (OGDP) launched in September 2000, by providing additional research expertise and teaching resources. "The Husky Energy Chair will bring us one step closer to realizing our goal of specializing in research that has an immediate impact upon both the local and global industry. We hope this announcement will act as a catalyst for other companies to see the benefits of collaborating and supporting research here at Memorial," says OGDP executive director, Gerrit Maureau. "We are also optimistic that the chair will act as a magnet for prospective students in our flagship program – the master in oil and gas studies."

Model plane makes history

Dennis Johnson is an electronic technologist with the Faculty of Engineering and Applied Science, and has always had an interest in building models and in aviation history. Now, a model plane he worked on for more than two years is the star in a documentary on The History Channel entitled *The Great Atlantic Air Race*.

A model of the Vicars Vimy during filming of The Great Atlantic Air Race

Dennis built the replica of the Vicars Vimy in 1994 to commemorate the 75th anniversary of the first non-stop transatlantic flight, made in 1919 by Captain John Alcock and Lieutenant Arthur Whitten Brown. The original Vickers Vimy was built as a bomber for the First World War but production was not completed in time. It was built mainly of wood with fabric covering and was powered by two Rolls Royce Eagle engines that could fly for 100 hours before they needed to be serviced. After some alterations were made it was put in crates and transported to an airfield in Newfoundland on May 26, 1919. Alcock and Brown took off for their famous flight just weeks later on the afternoon of June 14, from Lester's Field. The crew faced many problems. Besides delays, their radio broke down shortly after take off and fog enveloped the plane, preventing the fliers from seeing anything for much of the journey. The next morning, however, Alcock and Brown reached Ireland.

Dennis also faced a number of problems when building the model of the famous plane. There were no plans, so he started with 3-view drawings he got out of a book. "It was a challenge just finding all of the information I needed because it wasn't just a scale model, but a flying model. I did quite a bit of research." Dennis says he got a lot of help from friends and colleagues in piecing together information.

Eighteen hundred hours and $1,000 later, he had duplicated the aircraft's control systems, materials and construction techniques. "I felt it was important to recreate the history accurately so every knob, dial and gage is like it appears in the original and it all works the same way." And it must have impressed the experts because in 1996 there was a province-wide model contest held at the Arts and Culture Centre. Dennis didn't show up for the awards ceremony but when he came to take his model home, he had three trophies waiting for him: Best in Show, Technical Achievement and Best in Category.

In 2002, the model plane was on display in Labrador when some Americans from Vimy Restorations Incorporated saw it. They called The History Channel, who in turn, called Dennis. He says he was very flattered by the request because he has a lot of respect for the flight that "took air flight from infancy to young adult-hood in a single stroke and pioneered the transatlantic route that aircrafts still fly today." Filming took quite some time but when he saw the finished product, about 80 per cent of the shots used in the film were of his model.

In June 2004 the Vimy Atlantic team of Vimy Restorations Incorporated will recreate the first direct crossing of the Atlantic by John Alcock and Arthur Whitten-Brown in 1919. *The Great Atlantic Air Race* appeared on The History Channel on Dec. 17, 2003.

CFI *continued from page 4*

to the industry." He and various graduate students are working on automating the underground vehicles by developing models or mobile robots which can simulate an underground mine. They are also working on a control system which can co-ordinate robots from the surface. "The research that we are doing is not limited to the mining industry. It can also be applied to underwater vehicles. We want to try out advanced theories in intelligent control and now we have the means to do so."

Both facilities will be open to various faculty members for collaborative research in each respective area. Students at the undergraduate and graduate level will also have the opportunity to use these resources to build upon their own research interests. The grants were officially awarded at CFI's 25th board of directors' reception and dinner, held in St. John's and hosted by Dr. Axel Meisen, on Oct. 9, 2003.

Connecting navigation to toilet paper

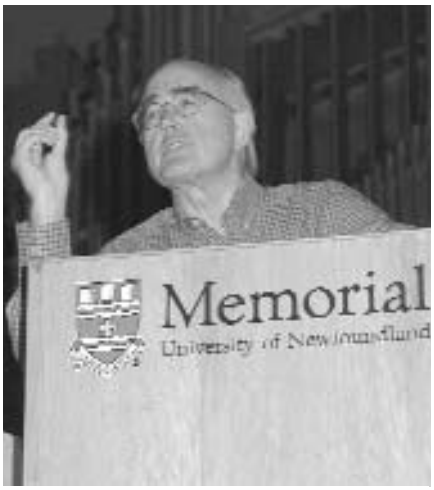
Science historian, author and television writer/producer James Burke spoke to an enthusiastic crowd of about 175 people who attended the 2003 F.W. Angel Memorial Lecture on Oct. 2. The topic of the lecture, which was held by the Faculty of Engineering and Applied Science, was Innovation and Change and Mr. Burke managed to deliver his theories on the complicated and chaotic patterns of history while frequently making the audience laugh with his eclectic approach. He spoke on several different topics (each one seemingly connected to the next) from how we came to hunt animals for food and how this led to our current democratic society, to how we must use technology to help solve the world's environmental crisis. He even connected the need for better navigational tools, which lead to improved steel springs for machinery, the patent for which was bought by the same company which, on the same day (just because it was available), bought the patent for a continuous process machine for making wallpaper which led to the invention of toilet tissue.

Mr. Burke's infectious passion for hyper-connections was obvious as he brought audience members on journeys through knowledge, explaining how technology has shaped our culture. "The brain appears to be naturally configured for innovation to work, to have new ideas because its job is to use information about the world and innovate by modeling new ways in which the state of the world out there might be put together," remarked Mr. Burke. "Much of innovation, however, is unpredictable and uncontrollable until it emerges and as a result, in an increasingly interconnected world, by the time the innovation emerges and given the reductionism lag in getting information to the general public, it's too late to rethink. We cannot un-invent goodies like plutonium or nerve gas… There may be a real danger if we continue to leave innovation to the accidental and serendipitous nature of reductionism."

Mr. Burke also spoke about the role of institutions in innovation. In his opinion, most institutions were set up to solve problems of the past, not to innovate new solutions for the future saying they act like sign posts telling us we're going in the right direction by obliging us to look backwards all the time. But, he says that's the nature of innovation. "The problem with how institutions such as democracy, political establishment, education, the legal process, international relations, diplomatic guidelines or board meetings keep up with innovation is made harder by the fact that even back in history when things were simple, innovations often ended up with an entirely unexpected secondary effect."

Mr. Burke also gave the audience a preview of an Interactive Knowledge Web he's creating, which is due online next year. With this tool, students can trace just about any innovation to everyone in history to which the inventor was connected. As an example, he used the software to connect Mozart to the invention of helicopters in about a minute.

Educated at Oxford and holding honorary doctorates for his work in communicating science and technology, Mr. Burke attributes his success to being in the right place at the right time. For over 30 years Mr. Burke has produced, directed, written and presented award-winning television series on the BBC, PBS and The Learning Channel. These include *Connections*, which achieved the highest-ever documentary audience, *The Day the Universe Changed,*



James Burke speaking at the F.W. Angel Memorial Lecture

Connections2, *The Burke Special*, a one-man science series, *The Neuron Suite*, a mini-series on the brain, *After the Warming,* a series on the greenhouse effect, *Masters of Illusion*, a special for the National Art Gallery on Renaissance painting, and *Connections3*. Mr. Burke was also the BBC's chief reporter on the Apollo moon missions and has written several books. His publications include: *Tomorrow's World*, *Tomorrow's World II*, *Connections*, *The Day the Universe Changed*, *Chances*, *The Axemaker's Gift* (with Robert Ornstein), *The Pinball Effect*, *The Knowledge Web* and *Circles*. His latest book, *Twin Tracks: The Unexpected Origins of the Modern World*, focuses on the surprising connections among the seemingly unconnected people, events and discoveries that have shaped our world. In addition, he has written a series of introductions for the book *Inventing Modern America: From the Microwave to the Mouse*. Burke has also written and hosted a best-selling CD-ROM titled *Connections: A Mind Game*, and is a current contributor to *Time* magazine.

Faculty of Engineering & Applied Science

Alumni profile

Making it happen: Right here

More often than not, graduates leave Newfoundland and Labrador to find work. Graduates from the Faculty of Engineering and Applied Science find employment all over Canada and sometimes around the world. But Sean Ryan is a graduate who did not go west; he went east, about as far east as you can go. Sean found his niche right here at Hibernia. He graduated with a bachelor of engineering (mechanical) in 1993, but started working for Hibernia in 1991. His first job was assisting in site road building at Bull Arm, and he worked a number of co-op terms there providing field-engineering support during the construction of the Gravity Base System (GBS).

Once the GBS was installed offshore, he worked in a variety of jobs with increasing responsibility. Now, Sean is production supervisor and is responsible for production offshore, accountable for process and utility systems, and is deputy installation manager. For 12 years, Sean was also a member of the Reserves, receiving military engineering officer training and, as an officer in the 56th Field Squadron, involved in constructing many bridges in communities throughout the province. He attributes the military with helping him to learn leadership and teaching skills and to accept responsibility at an early age. At Hibernia, he uses these skills to succeed in extremely responsible management positions on an offshore platform that currently produces an average of 206,000 barrels a day.

Sean says Memorial's program is at a very high standard. “What I learned from engineering is that problems are solved in the same manner regardless of the discipline. I found the program at Memorial challenging and a test of your capacity to learn while at the same time getting an early appreciation for the demands that the work place will place on decision makers. I think the co-operative education and early apprenticeship and mentorship are critical for the development of a young engineer. They allowed me to gain valuable practical experience, helped finance my tuition and allowed me to explore opportunities for my career path.”

Sean recently received the Early Accomplishment Award from the Professional Engineers and Geoscientists of Newfoundland and Labrador in recognition of outstanding work-related achievement and notable leadership early in his career. “I did not make a conscious decision that I had to stay in Newfoundland and Labrador. The opportunity I had to return to Bull Arm was very fortunate. When we finished work at Bull Arm I had offers of employment in Alberta, British Columbia and here and given a choice what better place to live than home. Heather and I look back now that we are married with two children and we are very happy with our choices. This is our home.”

Engineering alumnus Sean Ryan

A multi-tasker par excellence

Keith Pike believes very strongly in making the most out of your university experience and his six years at Memorial are proof of this. Keith began at Memorial University in the fall of 1996 with the intention of studying architecture, but later decided to pursue civil engineering. When he realized he was a chemistry course short of advancing into term one of the program, he took a year to do the course, along with every other arts/humanities course that he was interested in, trying to figure out if engineering was what he wanted to pursue. When that year was up, he came back more determined than ever to pursue civil engineering. And in between starting engineering and graduating, he found time to referee soccer and perform in several music groups including a jazz band. How is that for multi-tasking?

To say that he is organized would probably be an understatement. As Keith points out, "It is a schedule I have gotten used to because I have been doing it for so many years. Ever since I can remember, I have been involved in sports, music and academics. There are definitely times when it gets very hectic, but I love the pace. It works for me." Keith has been playing soccer for a long time and in May he travelled to Toronto to write the national referee exam. Passing that exam has gotten him one step closer to becoming one of the few nationally certified referees in the province. In fact, Keith was fortunate enough to have his biggest appointment yet this past summer when he refereed a professional-level game in Montreal in front of 8,300 spectators. Keith says it went very well. Being a referee is something he takes very seriously, training in the gym or on the track five times a week. He says it has helped him tremendously to become more confident, a skill he has carried over into engineering.

His other pastime gives him a chance to kick back and play the kind of music he enjoys most – jazz. For the past three years he has played in Memorial's concert band. Now as the business manager for Jazz East, he is quite busy playing at special events and performing in various festivals. Since graduating in April, Keith has been working on the Hibernia project with ExxonMobil. But, he says, there will always be time for soccer and jazz.

Engineering alumnus Keith Pike

Engineering alumnus Mark Gillingham

One to watch

Engineering alumnus Mark Gillingham is one of three semifinalists in Atlantic Canada and Quebec for the CIBC student entrepreneur of the year. Mark, a 27 year old from Rodgers Cove, Gander Bay, is one of the owners of Cathexis Innovations Inc., which provides wireless asset management solutions that allow for rapid and efficient deployment of barcode, Radio Frequency Identification (RFID). The founders of Cathexis, Mark Simms, Colin Power, Steve Taylor and Mark, are all graduates of Memorial's undergraduate engineering program in electrical and computer engineering. The idea to start a company grew out of a term six robotics project and the four then formed the company in 2001, a year before graduating. Cathexis now has about 14 people on staff and they have just signed an international contract to grow their business. There is a $2,000 prize for the winner, but Mark says the media recognition for the company and being recognized by his peers as having succeeded in his entrepreneurial goals is worth just as much. Mark is currently working on an MBA at Memorial.

Faculty of Engineering & Applied Science

Faculty news

Profile of a new dean – meet Dr. Ray Gosine, B. Eng., P.Eng.

Memorial Class of 1986

The primary responsibility of a dean is to provide the leadership, management, encouragement, support and rewards necessary for a faculty to reach its full potential in serving the needs of society through its teaching, research and outreach activities. In July 2003 Memorial University announced that Dr. Ray Gosine had been selected as the new dean of engineering and he took up this new role in November 2003.

Dr. Gosine has a strong personal commitment to the Faculty of Engineering and Applied Science and to Newfoundland. He was born in St. John's and attended school and university in St. John's. Following completion of an undergraduate degree in electrical engineering at Memorial in 1986, he attended Cambridge University in England where he completed a PhD in robotics. During 1990/91 he was a research fellow at Selwyn College, Cambridge, and a research associate in the Department of Engineering at Cambridge. His work during 1990/91 was largely involved in the application of his PhD work and gave him the chance to spend time in various parts of Europe. Also, his PhD work on human-robot interaction led to a commercial product through a robotics company called OxIM.

Dr. Gosine returned to Canada in July 1991, after being appointed assistant professor of mechanical engineering and NSERC Junior Chair of Industrial Automation at the University of British Columbia (UBC). At UBC he was the associate director of the Industrial Automation Laboratory and a faculty member at the Centre for Integrated Computer Systems Research (CICSR). Dr. Gosine was primarily involved in applied research into automation techniques to improve the efficiency of the fish processing industry, mainly salmon and herring roe processing. He was also involved in research toward improved methods of motion planning for robot path following operations such as welding, and in biomedical engineering research on new approaches to designing a powered orthosis. The position at UBC was a great combination of the flexibility of academia and the excitement and pace of industry.

In 1994, Dr. Gosine had the opportunity to come home to a position at Memorial University through research collaborations with C-CORE. Like the position at UBC, his research at Memorial involved a balance of academic and industry-oriented research and development.

Dr. Gosine feels that research in engineering should address the longer-term needs of industry with industry interaction helping to determine research priorities and new opportunities for research funding and technology transfer. “The Faculty of Engineering must be aggressive in pursuit of industry for collaboration in teaching, research and outreach that is of mutual interest and benefit,” remarks Dr. Gosine. He says the next five to 10 years will bring considerable change to the faculty and the province. “The resource industries are particularly important to Newfoundland and Labrador and there is an opportunity for the Faculty of Engineering to undertake significant research and development that leads to innovative technologies and services required for these industries to remain competitive. Over the next few years, the faculty will have opportunities and challenges with respect to education and research programs. As the only Faculty of Engineering in Newfoundland and Labrador, it’s very important to remain cognizant of obligations to help both Memorial, and the province, achieve their greatest potential.”

Most of Dr. Gosine’s research is in the areas of telerobotics, machine vision and pattern recognition for applications in the resource industries (i.e. mining, oil and gas, aquaculture and fisheries, and forestry). He won the President's Award for Outstanding Research (1997/98), the Petro-Canada Young Innovator Award (1998), and the PEG-NL Early Achievement Award (1998). Prior to becoming dean of Engineering, Dr. Gosine held the J.I. Clark Chair of Intelligent Systems for Operations in Harsh Environments, which was sponsored by C-CORE, and he was a professor of electrical and computer engineering at Memorial. Dr. Gosine currently serves on the Council of the Professional Engineers and Geoscientists of Newfoundland and serves as a director or adviser to several technology-based companies.

Faculty news

New faculty members

Dr. Mohamed Hossam Ahmed
Assistant professor, electrical and computer engineering

I joined the Faculty of Engineering and Applied Science in April 2003 after obtaining my PhD at Carlton University in Ottawa where I also worked as a senior research associate for two years. Prior to Carlton University, I received my masters in engineering in electronic communications and my bachelor of engineering with a major in electronics and communication from Ain Shams University in Cairo, Egypt. During my time at Carlton, I was fortunate enough to be part of a virtual institute called the National Capital Institute of Telecommunications, which consisted of various universities across Canada and industry partners.

My specialty is wireless communications. I work in the design of wireless networks, increasing their capacity, enhancing the quality of service, planning for new services and increasing client satisfaction. I am also working on designing admission control policies for the wireless communications industry. I was attracted to Memorial University because it meant starting a new area of research here with support from industry partners. Good partnerships between industry and academia are essential to shaping the next generation of wireless communication. I also think Newfoundland and Labrador is unique because there are a lot of remote areas and this makes it necessary to have alternative techniques for wireless coverage.

Dr. Khaled Kandil
Assistant professor, civil engineering

I have a bachelor of science and a master of science in civil engineering from Ain Shams University in Cairo, Egypt and a PhD in civil engineering from Carleton University.

Since graduation I have gained excellent practical and research experience. Immediately after my B.Sc. graduation in 1993, I worked as a highway engineer for almost five years, in different consultant firms, and I participated in several research projects in the field of highway engineering at Ain Shams University, Carleton University and the National Research Council Canada.

During my graduate studies I was awarded a number of scholarships, which included Carleton University Scholarship, Ontario Graduate Scholarship, Fonds pour la formation de Chercheurs et l'Aide à la Recherche, and Transportation Association of Canada graduate scholarship.

After my PhD graduation in 2002, I worked as a research fellow at Carleton University before joining the Institute for Research in Construction, National Research Council Canada, as a postdoctoral fellow.

My research interests include pavement design and construction, pavement rehabilitation, winter maintenance, geometric design and traffic safety. My teaching interests include highway geometric design, pavement analysis, highway materials and traffic engineering.

Faculty notes

Co-operative Engineering program manager Paul Batstone passed away suddenly on February 15, 2003. Paul joined the faculty in 1982 as a co-ordinator in Co-operative Education. Paul played a significant role in building the program to its present reputation as one of the best in the country. A scholarship has been established in memory of Paul. If you would like to contribute or would like more information, please call Wally Jacobs at 737-8817.

Joining our team…

Bill Parsons joined the faculty this year as manager of Industrial Outreach and Engineering Facilities.

Rob Coish is our newest co-ordinator in Co-operative Education.

Craig Mitchell, **Shawn Organ** and **Brian Tucker** have joined the faculty as engineering technologists.

Alex Gardner, **Michael Snow** and **Leon Tracey** were recently hired as project engineers.

Caroline Koenig is now the assistant to the Chair for Women in Science and Engineering (CWSE).

Michelle Osmond is our new communications co-ordinator and editor of *Benchmarks*.

Welcome everyone!

Faculty member honoured by his peers

Dr. Rangaswamy Seshadri has been given an honoured award by his peers. The Professional Engineers and Geoscientists of Newfoundland and Labrador (PEG-NL) have conferred the Teaching Award on Dr. Seshadri in recognition of his significant contribution to engineering education. Originally from India, Dr. Seshadri graduated with bachelor's and master's degrees in mechanical engineering, the latter achieved at the University of Calgary. He subsequently gained his doctorate in mechanical engineering at the same university, before moving to Edmonton in 1974.

In 1983, he joined Syncrude Canada before switching to academia in 1987, as associate professor at the University of Regina. He became dean of engineering at that university in 1989, and moved to Newfoundland in 1993 to take up the position of dean of the Faculty of Engineering and Applied Science. In 2002, he assumed the Research Chair in Asset Integrity Management.

Dr. Rangaswamy Seshadri receiving the Teaching Award from PEG-NL

During his tenure as dean here he introduced a number of new options to the engineering program, including: oil and gas engineering; computer engineering, within the electrical and computer engineering discipline; manufacturing and robotics, within mechanical engineering; and he established a number of chairs, including the Terra Nova Junior Chair in Environmental Risk Management, and the Senior and Junior Research Chairs in Intelligent Systems and Automation.

Engineering professor receives Distinguished Teaching Award

Dr. Leonard Lye, professor of civil engineering, has been given a prestigious honour, the President's Award for Distinguished Teaching, recognizing teaching excellence in the university community. The winner receives a $5,000 grant from the Memorial University Alumni Association. Dr. Lye's research includes statistical and stochastic hydrology, environmental statistics, data analysis, and applications of design of experiments methodology in civil engineering.

"The award is of course a great honour for any university professor. It means a lot to me, it means that my teaching is appreciated and it is a great motivator for me to continue in my search for better and better teaching approaches and techniques," says Dr. Lye. In addition to teaching, Dr. Lye is also one of the creators of The Footworker™ -S, a revolutionary device for footwork and fitness training in squash and the DOE-GolferTM, a fun toy for teaching design of experiment concepts and methodology. Dr. Lye is also the founder of the local chapter of two charities: the Taoist Tai Chi Society, and the Tetra Society of North America, which won a provincial citation award for contributions made to the physically disabled in 2003.

Dr. Leonard Lye accepting the President's Award for Distinguished Teaching from Dr. Axel Meisen, president and vice-chancellor of Memorial University

The recipient of the 2003 Dean's Award for Exemplary Service in the Faculty of Engineering and Applied Science is Yvonne Raymond, administrative staff specialist.

Ms. Yvonne Raymond accepting the Dean's Award for Exemplary Service from Dr. Evan Simpson, vice-president (academic)

Faculty of Engineering & Applied Science

Recommended reading

Physical Modelling in Geotechnics-ICPMG '02

R. Phillips, P. J. Guo and R. Popescu, editors

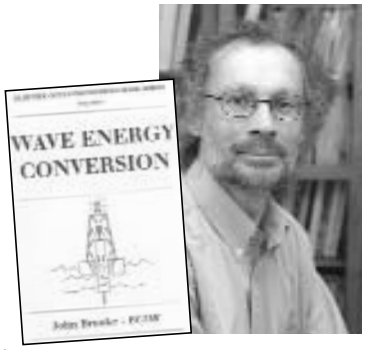
This volume contains a collection of about 160 papers presented at the International Conference ICPMG '02 held in St. John's, NL, in 2002, and organized by the Canadian Geotechnical Society and the Technical Committee TC2 on Geotechnics of Physical Modelling and Centrifuge Testing of the International Society of Soil Mechanics and Geotechnical Engineering. Physical modelling is widely accepted in various geotechnical fields both for research and practical design. The volume provides a useful source of reference for information on recent developments and application of physical modelling.

Dr. Radu Popescu is an associate professor in the Faculty of Engineering and Applied Science. He completed his PhD at Princeton University and, prior to joining Memorial, he held teaching and research positions at the Technical University of Civil Engineering in Bucharest, Princeton University and C-CORE. Here, Dr. Popescu is responsible for teaching and supervising graduate students in the areas of geotechnical and hydro-technical engineering. Currently, his research is mainly related to computational geomechanics. He has also worked in various areas of experimental geotechnical engineering; especially centrifuge modelling, *in situ* and laboratory soil testing and site characterization. While at the faculty, he has developed a research program in numerical modelling of geotechnical systems, which is funded by both industry and government agencies, and includes a laboratory for numerical modelling in geomechanics. Dr. Popescu also contributed a chapter to *Hazards and Disasters*, entitled *Seismic Soil Liquefaction: Effects of Loading Rate*, which is currently in press.

Wave Energy Conversion

John Brooke, editor

Dr. Neil Bose, contributor



Population growth over the years has placed such a demand on the earth's primary available energy resources that there has been a constant search for additional sources to meet the increasing needs. *Wave Energy Conversion* explores the potential of the ocean's energy from waves, an energy source known historically for its immense strength and destructive power. Yet this energy source, as this text shows, can be converted into useful work. Wave energy, together with other renewable energy sources, is expected to provide a small but significant proportion of future energy requirements without adding to pollution and global warming. Dr. Neil Bose was one of 13 members of the International Working Group, Engineering Committee on Oceanic Resources, who published Wave Energy Conversion. Dr. Bose was also involved in editing and providing diagrams for Wave Energy Conversion and was the primary author on some sections, including appendix 4 on Wave Propulsion. He says the book, which is Volume 6 in the Elsevier Ocean Engineering Book Series, is meant to be a snapshot of wave energy conversion up to 2003. The series was created in order to help engineers more knowledgeably and constructively exploit the oceans and to give experts in various areas of ocean technology the opportunity to relate their knowledge and expertise to others.

Dr. Bose is a professor with the Faculty of Engineering and Applied Science, as well as the Canada Research Chair in Offshore and Underwater Vehicle Design, and winner of the President's Award for Outstanding Research, 1992-1993. He graduated in naval architecture and ocean engineering, and obtained a PhD in hydrofoil design from Glasgow University where he taught from 1983 to 1987 when he joined Memorial University. He was director of the Ocean Engineering Research Centre from 1994 to 2000, and chair of Ocean and Naval Architectural Engineering at Memorial from 1998 to 2003. Dr. Bose says he has been fortunate to be involved in outstanding, world-renowned research in the field of ocean engineering, marine propulsion and marine hydrodynamics performance evaluation in Canada.

A lesson in oil and gas safety

Participants in the Safety in the Design, Operation and Maintenance of Oil and Gas Facilities and Oil Refineries course

The Faculty of Engineering, in co-operation with North Atlantic Refining Limited, recently gave those who work in oil and gas facilities and oil refineries a lesson in safety. The five-day course entitled Safety in the Design, Operation and Maintenance of Oil and Gas Facilities and Oil Refineries, which took place at Memorial University, was taught by leaders in the field. Roy Sanders, a chemical engineer and compliance team leader for PPG Industries of Lake Charles, Louisiana, has specialized in process safety for 30 years and is author of *Chemical Process Safety: Learning from Case Histories*; Brian Kelly, a senior risk associate with Syncrude Canada Ltd., Corporate Loss Management in Fort McMurray, Alberta, is responsible for company risk programs and standards and has been involved in engineering design, plant startup and long range process development studies; and Asit Hazra is a professional engineer who has been with Environment Canada since 1972. He is currently the chief of the Emergencies Prevention Division in Ottawa.

Participants in the course reviewed real-life case histories, with images of fires, explosions and damaged equipment and then determined how to approach those situations within their organizations. They also reviewed process safety, process hazards, design practices for addressing process safety and process safety management systems. The course helped identify and assess possible losses in oil and gas industry operations such as collection, refining and downstream processing. Tracy Smith is a process engineer with North Atlantic Refining Limited. She says she found the course very interesting and very informative. "The course made me realize how much I have to consider when I'm at work. We have to step back and analyze something and think about how a certain change will affect the current conditions and the consequences of that change."

For more information on courses being offered, please contact our Continuing Engineering Education office at (709) 737-3056 or *yvonne@engr.mun.ca*.

Engineering students get new support from industry

Memorial University's engineering students are reaping the benefits of years of professional experience through a new program. The Co-operative Engineering Associates Program (CEAP), which is a collaborative effort with the Professional Engineers and Geoscientists of Newfoundland and Labrador (PEG-NL), began last winter as a pilot project. It involves retired professional engineers reviewing work term reports and presentations of current students. The idea is to get feedback, including constructive suggestions, to students early in the academic term so they have time to consider improvements early in their term.

Leo White is the program manager for co-operative education in the faculty. He says they were looking for ways to involve professionals in the program and also looking at the work loads of the co-op co-ordinators. He says the idea caught on right away with six engineers participating in the first term reviewing an average of five reports each. By the summer, 14 engineers were taking part in the program. Leo adds the engineers get orientation and training before reviewing the reports, which are first reviewed by co-op co-ordinators, to ensure consistency and knowledge of the review process. "It's an involvement right in the heart of the program and it's a very positive involvement because the reviewers are not asked to pass or fail the reports, just give suggestions or comments. It also gives us much wider technical expertise than we would normally have because in our department there are only six engineers and the profession has 2,500."

The new program also benefits the engineers involved. Steve McLean is the executive director of PEG-NL. He says it helps the engineering profession keep in close contact with the faculty. "They get the latest information about the research that's happening in the industry and their expertise is invaluable. We want to take advantage of that and give students the best start they can get."

Participants in the NECEC

IEEE 13th Annual Newfoundland Electrical and Computer Engineering Conference

The Institute of Electrical and Electronics Engineers (IEEE) held its 13th annual Newfoundland Electrical and Computer Engineering Conference (NECEC) at the Holiday Inn in St. John's on Nov. 12, 2003. Over 100 professionals took part and listened to guest speakers Steve Rosenberg, systems engineer with Cisco Systems, and Byron Dawe, president of Rutter Technologies.

NECEC 2003 is a forum where professionals in electrical, electronic and computer engineering as well as information technologies present their work to the growing technical community within the province. The conference focused on technical concepts, innovations and implementations. Proceeds from the event were used to sponsor many IEEE initiatives including the IEEE Engineering Scholarship Fund in the Faculty of Engineering.

Industry Night a success

The Society of Petroleum Engineers of Memorial University, Student Chapter, held their second annual Industry Night on Nov. 27. The night included two industry speakers: Freeman Ralph spoke on *Offshore Ice Management* and Dr. Rafiq Islam spoke on *Policy Making in the Information Age*.

The purpose of the evening is to provide a learning opportunity for post-secondary students interested in the oil and gas sector. The event also provides a venue for industry professionals and students to socialize in an informal atmosphere.

The CCPE call for entries

The Canadian Council of Professional Engineers (CCPE) has announced a Call for Entries for the 2004 National Scholarships. Six scholarships totaling $55,000 will reward excellence in the Canadian engineering profession and support advanced studies and research. The scholarships are as follows:

Three CCPE-Manulife Financial Scholarships valued at $10,000 each for engineers returning to university for further study or research in an engineering field.

Two CCPE-Meloche Monnex Scholarships of $7,500 each for engineers returning to university for further study or research in a field other than engineering. The field of study should favour the acquisition of knowledge that enhances performance in the engineering profession.

One CCPE-Encon Scholarship of $10,000 will support an engineer returning to university for further study or research in the field of civil engineering.

The deadline for applications is April 1, 2004. Please contact Elizabeth Santos for more information. She can be reached at (613) 232-2474, Ext. 246; fax (613) 230-5759; or at *elizabeth.santos@ccpe.ca*.

Engineering graduate students clean up

Three graduate students from Memorial's Faculty of Engineering and Applied Science went home with first place honours in the student category from the Offshore Oil and Gas Environmental Effects Monitoring (EEM) workshop held at the Bedford Institute of Oceanography in Dartmouth, Nova Scotia. Haibo Niu, Worakanok Thanyamanta and Vanessa Pennell won best poster presentation for their work, "An Integrated Approach for Environmental Decision-Making for Offshore Oil and Gas Operations." Haibo Niu also won for best oral presentation for his paper titled, "Transport Properties of Discharged Synthetic-Based Drilling Wastes." Both prizes had a value of $500 and were sponsored by EnCana and Petro-Canada, respectively.

All three graduate students are actively involved in an NSERC strategic project spearheaded by Dr. Neil Bose, principal investigator and Canada Research Chair in Offshore and Underwater Vehicle Design, which is examining the potential of autonomous underwater vehicles (AUV) for offshore environmental effects monitoring. Haibo Niu has been investigating the settling characteristics of drilling cuttings from offshore platforms; Worakanok Thanyamanta has been evaluating various drilling waste treatment technologies; and Vanessa Pennell has been working on AUVs equipped with sampling and analysis instrumentation capable of detecting the presence of various chemicals.

Upcoming events

The Oil and Gas Development Partnership of Memorial University is hosting an executive seminar titled *Sustainable Development: Getting it Right the First Time* from March 10-12, 2004, in St. John's. This workshop will assist both corporations and communities in their understanding of the sustainable development concept and how it is defined. Participants will work with several key speakers to explore the options for creating a sustainable development plan. During the workshop sessions, the participants will construct a framework for dialogue and create a set of benchmarks for measuring success of the plan. For more information or to register, please call Louise Green at (709) 737-4519 or *ogdp@mun.ca*.

The MUN Engineering Alumni Advisory Group will be holding a gala dinner Celebrating Memorial Engineering Alumni on Sept. 25, 2004. For more information, please contact Adam Stanley at (709) 737-0640