



# KITCHENER-WATERLOO SECTION

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The Kitchener-Waterloo Section of the Institute of Electrical and Electronics Engineers serves members whose mailing address is in Bruce, Grey, Perth, Waterloo or Wellington counties. It collects news relevant to local engineers and is published bi-monthly.

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## Upcoming Events

Check <http://kw.ieee.ca/activities.html> for updated information.

### **Near-quantum-limited radio frequency amplifier based on a SQUID**

May 31

Dr Michael Muck of the Institute of Applied Physics in Germany will discuss a working design of low-temperature quantum amplifiers.

### **Green Energy Conference**

KW Record

UW will host the first International Green Energy Conference June 12 to 16. Leading topics include hydrogen energy, fuel cells, environmental protection, emission reduction and abatement, global warming and green buildings.

For more information see <http://www.igec.uwaterloo.ca>

### **International Engineering Management Conference**

September 2005

You are invited to St. John's, Newfoundland, Canada, for the 2005 International Engineering Management Conference (IEMC 2005). IEMC brings together engineering and management professionals, and academics from around the world. We encourage attendance from engineers, managers, business and management consultants, academics and researchers. IEMC is a forum for the exchange of ideas, experience, theories, and knowledge between all persons involved in engineering management. For more information on the conference, please visit the website: <http://www.iemc2005.org>.

### **UW Midnight Sun heading for Kansas**

UW Daily Bulletin

UW's sun-worshipping road racers are looking forward to the North American Solar Challenge in July, as the solar car Midnight Sun VIII is being readied to compete.

Participants in this year's North American Solar Challenge will make history as the first solar-car racers to cross an international border. The race also sets a new standard for length -- 2,500 miles (4,000 kilometres) -- beating the 2001 and 2003 challenges by more than 100 miles (160 km). It remains the longest solar-car race in the world. There will also be the most teams from outside the United States, with 10 from Canada.

## **The IEEE Canada Telus Innovation Award**

This competition, with a top prize of \$10,000 is open to IEEE student members who are completing or have recently completed their final year project. IEEE Canada student members are invited to enter a significant Information Computing and Telecommunication (ICT) Technologies project for which they are receiving education credits.

Please see [http://www.ieee.ca/students/telus\\_award/index.htm](http://www.ieee.ca/students/telus_award/index.htm) for further information and for the registration form.

## **Recent Events**

### **Senior Member Upgrades**

The following local member has earned the professional recognition of peers for technical and professional excellence.

M. Tamer Ozsu

Marek Wartak

See <http://www.ieee.org/ra/md/smprogram.html> for more information on this program.

### **Aerospace and Electronic Systems Society Chapter**

The KW Section is pleased to add another chapter. More news on this chapter will be included in the next newsletter.

### **IEEE Xplore Version 2.0**

IEEE

This release marks a milestone in the evolution of the IEEE's web delivery platform because it adds not only an updated graphic design, but also adds many new functions to improve the user's experience and facilitate web-first publishing.

Key improvements in Xplore 2.0 include:

- A new home page that makes it easy to immediately access information including:

- Free Basic Search for guests (guests only get to see basic abstracts for free as a result of their search)

- Top 100 articles: the most frequently downloaded articles in the past month

- Improved search

- Expanded journal and magazine "homepages" better identify each periodical and provide easy access to everything about it

- Easier navigation that in general means fewer clicks to get to requested information

- Improved abstracts records

- Consolidated title listings for many IEEE conferences, including conference nicknames

- An improved single-article purchase process

- Improved support

### **Conestoga Students Win 11 Ontario Skills Medals**

Conestoga Web Site

At the 16th annual Ontario Technological Skills Competition (OTSC), which showcases the province's best technical students, Conestoga College continued its record of success as 11 students earned post-secondary level medals for their knowledge and applied skills in a variety of competition categories.

The gold medal winners include:

John Poidevin of Milton -- A student in the Electronics Engineering Technology - Telecommunications Systems program, he won the electronics competition.

## **Engineering Students to Unveil Revamped Race Car**

U of Guelph Web Site

An all-wheel-drive race car designed and built by University of Guelph engineering students for an international competition was entered in the Formula Society of Automotive Engineers (FSAE) competition. The largest prototype race in the world, the event was held at the Pontiac Silverdome and is expected to attract entries from more than 100 universities. This is the third year U of G has participated.

Last year, U of G was the only school to enter an all-wheel-drive car and placed second among Canadian universities and 17th overall. "This year's team is promising a faster, more refined racing machine aimed at finishing in the top 10 teams," said Jason Griffith, an engineering student and co-manager of Gryphon Racing.

"The car is once again all-wheel-drive, but it has been refined to allow for better performance. There has been extensive testing on many of the components, many parts have been redesigned and the overall manufacturing of the car has been improved. The car can go from zero to 60 miles per hour in 3.4 seconds."

Some of the new innovative features include an LCD display screen for driver feedback, a newly designed controller that allows for faster, smoother and more reliable shifting, and a telemetry system that receives data from the car and transmits the information to team members on the sidelines. The new components were designed by two fourth-year engineering design groups. This year's team also includes two physics students and one student who is studying marketing.

## **The Quest for Supersymmetry**

PI lecture in April

Edward Witten is one of the world's preeminent string theorists. Among his many accomplishments, he is widely known for showing how five different variations of string theory all belong within a single framework. His awards range from a MacArthur "genius grant" to the Fields Medal - the highest honour in the world of mathematics. Witten is currently a Professor in the School of Natural Sciences at the Institute for Advanced Study in Princeton. Many physicists consider him to be Einstein's true successor.

Professor Witten will examine key discoveries made by physicists in the 20th century such as the detection of antimatter. He will then describe how many of today's leading

scientists are working at the high energy frontier of elementary particle accelerators in their quest to uncover the quantum structures of space and time.

### **Quantum leap in Lazaridis gift**

UW Daily Bulletin

UW officials announced receipt of another "magnificent" gift from Ophelia and Mike Lazaridis, who have given the university another \$17.2 million on top of last year's \$33.3 million gift for the Institute for Quantum Computing.

The press release notes that quantum computing is one of the most important new areas of technological research in the world. It involves harnessing the power of atoms and building quantum computers with transistors of atomic size. "Scientists believe this technology will aid many discoveries, including unbreakable cryptography, unparalleled high precision measurement devices, computers with mind boggling power and a better understanding of the microscopic world.

"Nanotechnology engineers and scientists assemble, manipulate and control materials at the atomic and molecular scale to fabricate structures, devices and systems that have novel properties and functionality. Applications include ultra-fast and high memory capacity computers, new materials of incredible strength and cell size probes for biomedical investigations.

### **Hagey Lecturer addressed technology**

March

Ursula Franklin's lecture was titled "Thinking about Technology: Defining Technology as Practice." Acclaimed internationally for her pioneering work in the field of metallurgy -- the science of extracting metals from their ores and modifying the metals for use -- Franklin has also worked tirelessly to bring a humanitarian and feminist voice to the world of science and technology.

### **Cognitive Radio: Brain Empowered Wireless Communications**

April IEEE cosponsored seminar by Simon Haykin

Cognitive radio is a new and exciting approach to wireless communications, the objective of which is to improve spectral efficiency of existing bands. It exploits several disciplines: Communication theory, Mesh networks, Signal processing, Control theory, Game Theory, Machine learning.

This lecture explained how these disciplines come together to open up some new and important potential applications for wireless.

### **Optical Design Course**

The University of Waterloo Education Program for Photonics Professionals (EP3) is running a new course: Optical Design (<http://ep3.uwaterloo.ca/Content/design.html>). The recent session started in May.

The course consists of eight weeks of classes, one week of labs and a final exam. The course will cover thick lens systems, spherical mirrors, aberration theory, lens design and optical image quality and earns credit towards a University of Waterloo Diploma in Photonics.

## **RobotRacing Launched at UW**

UW Daily Bulletin

"This is a new competition that we've created this year to raise the visibility of UW in the mobile robotics field, and to motivate undergraduate students to consider continuing with graduate research in the area," says Mike Peasgood, a PhD student in Mechanical Engineering, who organized the event with help from colleagues in the Lab for Autonomous Intelligent Robotics.

Ten undergraduate student teams built small (30 centimetres long max), fully autonomous vehicles that can race against each other on three different tracks -- a drag race, an oval circuit, and a figure-8 circuit. Points will be awarded for quality of design and innovation as well as a speedy finish.

<http://www.RobotRacing.org/> , <http://lair.uwaterloo.ca/>

## **CIBC Student Entrepreneur of the Year**

UW Daily Bulletin

Joseph Fung, a third-year UW computer engineering student, has been named "CIBC Student Entrepreneur of the Year" across Canada. Says a news release from the sponsoring bank: "Joseph was awarded \$2,000 for the development and operation of the most innovative and entrepreneurial business by a Canadian post-secondary student. Joseph received the distinction for founding and operating Lewis Media, a Waterloo-based web development company. Their flagship product, WebAdmin, allows website owners to easily update their websites without the ongoing cost of a webmaster. Joseph was selected from among three finalists who competed in the ninth annual CIBC Student Entrepreneur of the Year Award presented by CIBC and ACE (Advancing Canadian Entrepreneurship). The award celebrates and showcases the accomplishments of Canadian student entrepreneurs, and is open to full-time university and college students running their own business. . . . The competitors' businesses were judged by a notable panel of Canadian business leaders."

<http://www.lewismedia.com>

## **Anton Zeilinger Visited**

March

A prominent scientist visited Waterloo's quantum physicists. Anton Zeilinger, formerly of such institutions as MIT, Innsbruck, Oxford, and now professor of physics at the University of Vienna gave a talk titled: "Experimental Interlude 1: Interpretation of Macromolecules". A memo from the Institute for Quantum Computing advises: "His work has received worldwide attention, most notably his first realization of quantum teleportation. In 1997, Zeilinger and his colleagues confirmed aspects of quantum teleportation by actually teleporting light particles -- earning him the nickname 'Mr. Beam'."

## **Security Flaws in Tunnel Mode IPsec**

April, Professor Kenny Paterson, Royal Holloway, University of London

We presented a variety of attacks that efficiently extract all plain text data from IP datagrams that are protected using the IP secprotocol ESP in tunnel mode. In contrast to earlier work of Bellovin, the attacks require only small amounts of time and network bandwidth to be successful. The attacks apply in situations where the IP packets are not integrity protected, or where integrity protection is supplied only by a higher layer protocol. They also apply in some cases where integrity protection is provided by IPsec, but where the integrity is checked by an end host rather than a security gateway.

While strongly discouraged, these configurations of IPsec are still allowed by the relevant IPsec RFCs. In addition, we believe that these configuration may be widely used in practice. We report on successful implementation of the attacks against an IPsec VPN built using the native implementation of IPsec in Linux.

## **UW students are Disney competition finalists again**

UW Daily Bulletin

For four systems design engineering students, the creation of an interactive virtual motion theatre ride is their ticket to the world of Disney.

As one of three teams of undergraduate students selected as finalists in the Walt Disney Imagi-Nations Design Competition, Bonny Lau, Eric Lee, Jenny Yeung and Erin Yu will travel to Disney headquarters in Glendale, California, in June to present their design to a panel of judges.

Their entry in the contest, entitled DIVA (Disney Interactive Virtual Adventure) was part of an eight-month final-year design workshop project supervised by management sciences professor Tom Carey and electrical and computer engineering professor Rob Gorbet.

The project "employs various motion tracking and image processing technologies to allow visitors to navigate through a virtual space using body motions," explains Yu. "It is designed to encourage social interactions among the visitors as they must cooperate with each other to steer the vehicle and fight the villains.

<http://disney.go.com/disneycareers/imaginations/home.html>

## **Ottawa funds new chair probing nuclear plants**

April UW media relations

A new industrial research chair investigating the modernization of nuclear power plants was formally launched at the University of Waterloo with a total of \$2 million in federal and research partner funding. The chair will be called the NSERC/UNENE Industrial Research Chair in Risk-Based Life Cycle Management of Engineering Systems.

## **Application of Asset Management to the Airport Environment**

Computer Society Chapter Presentation by Dr. Susan L. Tighe, PEng

This presentation discussed the principles and practices of asset management in terms of first defining the issues and scope of the process and then providing a general framework for asset management plus an associated component system framework. Analysis tools related to implementation were discussed. In addition an example of a working maintenance management system was presented.

## **Application-Specific Networks-on-Chip for Embedded Systems**

April, Mr. Jiang Xu, Princeton University

Two challenges gradually move on-chip communication architectures from bus and ad-hoc interconnection to more sophisticated Networks-on-Chip (NoC). On one hand, smaller transistors allow more and better functions on a single chip. This results more on-chip computations as well as more on-chip communications. On the other hand, reduced feature sizes make on-chip communication more difficult. The delay of global interconnection increases exponentially, as the feature sizes reduce. On-chip communication will need not one but multiple clock cycles. Crosstalk noise and lower power supply voltage worsen the case. Facing these two challenges, state-of-art communication network theories and technologies are used to systemically study and design more sophisticated and efficient on-chip communication architectures.

This talk introduced an on-chip communication architecture, Application-Specific Networks-on-Chip (ASNoC), and its design methodology. While other NoC studies use regular-topology architectures, such as mesh, ASNoC uses irregular-topology architectures. We use a systematic methodology to generate ASNoC for each embedded application. Compared to regular-topology NoC architectures, ASNoC offers significant improvements in performance, power, and area. In a H.264 HDTV decoder application, the ASNoC uses 39% less power, 59% less silicon area, and 74% less metal area to achieve 2X performance compared to the MITs RAW network.

## **Handshake Ranked in Top 25**

KW Record

Handshake VR of Waterloo ranked in the top 25 “up-and-comers” by the Branham Group. Handshake makes software that simulates the sense of touch.

## **iAnywhere now runs on BlackBerry**

KW Record

Sybase’s iAnywhere web-content software AvantGo now runs on a number of BlackBerry models. The software connects handheld devices to specially formatted websites such as AccuWeather and Reuters.

## **Brock Solutions in Best 50 Managed List**

KW Record

Brock Solutions builds systems that combine many aspects of Electrical and Computer Engineering such as baggage handling and screening systems, and control systems for

mills and water treatment plants. Its flat management structure, project orientation and business focus has earned the company its 8<sup>th</sup> placement in the top 50.

### **Company Thrives on High-Tech Machining**

KW Record

RJB Machining has developed the niche market of quality custom machining for the local high-tech companies. Their investment in equipment and location has made them a good choice for companies needing components to hold the electronics of their devices.

### **Electric Vehicle Control Company Rises Again**

KW Record

Navitas Technology Inc. is the new name for SRE Controls after being bought from bankruptcy by a British bank. Navitas develops the motor control systems for electrically powered vehicles ranging from forklifts to scooters.

<http://www.srecontrols.com/>

### **FibreTech offers WiFi at WPL**

KW Record

The Waterloo Public Library will soon be a free WiFi hotspot thanks to FibreTech. WPL hopes the added network will decrease the demand on its desktop computers in the library.

## **Engineers and the World**

### **Beckett's Catastrophe staged in cyberspace**

UW Daily Bulletin

The possibility of creating collaborative theatre using videoconferencing technology to link remote sets and actors was explored in a workshop production of Samuel Beckett's one-act play, *Catastrophe*.

The performance will be co-directed by Gerd Hauck, of the drama and speech communication department at Waterloo and by George Brown of the department of theatre arts at Bradley University in Peoria, Illinois. Gerd Hauck

"This is all pretty new stuff," Hauck admits. "There have been a couple of similar projects, but what makes this project innovative is that we have live audiences as well as actors in two locations interacting and experiencing the same play in a space that is both real and virtual.

The challenges of such a performance "are inherent to the medium," he explains. Most significant is the delay in sound transmission due to the compression/decompression process when the sound and images are relayed on the World Wide Web. "We can teach actors to anticipate the lag, or we can just accept it as a given of the medium.

"We can `willingly suspend our disbelief' to overcome some of these technological shortcomings," he adds, including the presence/absence of the actors themselves.

<http://www.samuel-beckett.net/speople.html>

## **Students explore technology in art**

April, UW Daily Bulletin

Fine arts and engineering students are combining their skills to explore the possibilities of technology in art. A recent exhibition featured sculptural work from the Technology Art studio course, Fine Arts 392, that was launched last year and that involves engineering students working side-by-side with art students.

[http://tarsas.uwaterloo.ca/tart/online\\_catalog/](http://tarsas.uwaterloo.ca/tart/online_catalog/)

## **MBET available at a distance**

UW Daily Bulletin

UW's innovative Master of Business, Entrepreneurship and Technology degree is to be offered part-time for students who can't get to the campus, and may begin as early as this fall, says its director.

The program, dubbed MBET@Distance, combines online distance education with face-to-face, personal interaction. Students will periodically meet for a day "to develop doing skills, practice capabilities, and further relationships". It's the equivalent of what goes on -- sometimes twelve hours a day -- in the Needles Hall seminar room where the on-campus MBET students make their headquarters.

Similar to the on-campus MBET program, MBET@Distance aims to provide aspiring business leaders with the practical experience, tailored business capabilities and network of stakeholders required to successfully commercialize new ventures within technology-based organizations -- or run their own companies. "While differing in delivery," says Armitage's publicity, "the two MBET programs share one goal: MBET will help you create Canada's next generation of successful businesses."

<http://cbet.uwaterloo.ca/>

## **Sweating the video-game life?**

Globe and Mail

A Nova Scotia mom has started the Bulldog Interactive Fitness centres geared at youths. The kids can exercise in a variety of ways including combining video games and biking using a GameBike. The kids enjoy the activities and real improvements in fitness, health and self-esteem have been seen.

<http://www.bulldoginteractivefitness.com/>

## **Engineering Humour**

### **Paying the Price**

By Tom East

In the 1950s, I was working at McGill, when a professor told me how he had dealt with a case of copying. Two identical essays showed up, but he gave one 80% and the other 40%. The brighter of the two students came to him to complain that he had received 40% when a friend had got 80% for similar work: he finally admitted that he had let his friend copy his work. The professor, tongue in cheek, said he did not know who copied whose. They agreed that the bright student "would never let anyone copy his work again".