IEEE Canada

Kitchener-Waterloo Section Newsletter for November 2004

Section Officers 3
Committee Chairs 3
Society Chapter & Affinity Group Chairs 3
Student Activities Chairs and Programs 3
Upcoming Events 4
How Money Works 4
Educating Engineering Educators 4
Annual General Meeting and Elections 5
Executive 5
Committee Chairs 5
Society Chapter & Affinity Group Chairs 5
International robotics competition comes to UW 6
5th Annual - E&CE Design Projects Symposium 6
Recent Events 7
Senior Member Upgrades 7
Tony Ponsford Described Integrated Marine Surveillance 7
Horizons of Embedded Graphics 7
The Internet: Problems and Future Directions 8
MIMO-OFDM From Theory to Practice 8
Broadband Wireless Access at Frequencies below 11 GHz 8
Aerosol Can Recognition in X-Ray Imagery 9
UW Prof. Receives Innovation Challenge Award 9
Partnership to promote entrepreneurship 9
UW Students Initiate new IEEE Activities 9
UW Robotics Club 10
Students Sharpen Their Edge at University of Waterloo 10
Nuvation opens Waterloo design centre 11
Communications technologies institute launched at UW 11
Student calls for space-age aircraft 11
Donation to fund Mechatronics Lab 12
Programmers ready for the worlds' 12
Grand Opening of the Perimeter Institute Building 12
Richard Epp on Quirky Quanta 13
James Brown on Proof and Pictures 13
Perimeter Library Named for Guelph Math Prof 14
Sybase Officially Opens Building on North Campus 14
Maplesoft and UW Group Receive Synergy Award 14
Re-engineering the Piano 14
Nanotechnology: The Coming Revolution in Manufacturing 15
New Manufacturing and Automation Training Centre 15

Campana Systems Earns Silver and Gold 15
Tracking Tennis Trajectories 15
Com Dev Works on New Space Telescope 15
Engineers and the World 16
IEEE and Boy Scouts Develop EMerit Badges 16
Memorable RIM Usage 16
And Canadians too. 16
Sonofusion 16
Smart Cars make Canadian Debut 17
EWB will list two spring co-op jobs 17
Library Lends Hand-Tools 18
Integrating Technology into the Household 18
Engineering Humour 18
Live Sims 18
A Mathematical Puzzle 18

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

Editor: Mike Hulls
Contributors: Tom East, Carol Hulls and others
Address: http://kw.ieee.ca
IEEE K-W Section, c\o Elect.& Comp.Eng.(EIT 3028), University of Waterloo
Waterloo. Ont. N2L 3G1

Section Officers

Position	Name	Phone	Email
Chair	Mauro Rossi	747-3969 x110	mrossi@handshakeinteractive.com
Vice Chair	Tony Kormos	725 4706 x226	a.kormos@ieee.org
Secretary	Shahab Ardalan	888-4567 x2033	ardalan@ieee.org
Treasurer	Joseph Shu	747-3969 x103	jshu@handshakeinteractive.com
Committee Chairs			
Awards	Tom East		tieast@sympatico.ca
Educational Activities	Magdy Salama	888 4567 x3757	msalama@hivolt1.uwaterloo.ca
Membership Development	Tony Kormos	725 4706 x226	a.kormos@ieee.org
Nominations	John Mowbray	884 1710	john.mowbray@ieee.org
Newsletter Editor Newsletter Content	Mike Hulls	747-5222 x208	mike.hulls@ieee.org Kw.newsletter@ieee.org
Professional Activities	Gilbert Lai	581-8332	gmylai@Kingcong.uwaterloo.ca
Society Chapter & Affinity Group Chairs			
Antennas & Microwave Theory	Raafat Mansour	888 4567 x5780	Raafat.mansour@ece.uwaterloo.ca
Circuits & Systems	Faycal Saffih	888 4567 x5167	fsaffih@vlsi.uwaterloo.ca
Communications / Vehicular Technology	Raouf Boutaba	888 4820	rboutaba@bbcr.uwaterloo.ca
	Youssef Iraqi	888 4567 x4716	iraqi@bbcr.uwaterloo.ca
Computer	Ladan Tahvildari	888-4567 x6093	ltahvild@swen.uwaterloo.ca
Control Systems	Fakari Karray	888-4567 x5584	mailto:karray@watfor.uwaterloo.ca
Electron Devices	Arokia Nathan	888 4803	anathan@venus.uwaterloo.ca
Information Theory	Amir K. Khandani	888-4567 x 5324	a.khandani@ece.uwaterloo.ca
Signal Processing (SP)/ Computational Intelligence Society (CIS)	Mohamed Kamel	888 4567 x5761	mkamel@pami.uwaterloo.ca
GOLD (Young Professionals Network)	Kevin Yang Ma	(519) 241-8652	Kevin.ma@ieee.org
Life Members	open		
Student Activities Chairs and Programs			
Conestoga College	open		

University of Guelph	Radu Muresan	824-4120 x56730	rmuresan@uoguelph.ca
University of Waterloo	Siva Sivoththaman	888 4567 x5319	sivoth@ece.uwaterloo.ca
UW Branch A	Robert Woolley	(416) 516-0044	rcwoolle@engmail.uwaterloo.ca
UW Branch B	Boyang Qin		bqin@engmail.uwaterloo.ca
Computer Society Tutorial Program	Zohreh Azimifar	(519) 747-4214	azimifar@rousseau.uwaterloo.ca
Computer Society Distinguished Visitors Program	Ladan Tahvildari	(519) 888-4567 x6093	ltahvild@swen.uwaterloo.ca
Information Theory Distinguished Visitors Program	Ali Abedi	(519) 888-4567 x5007	abedi@ieee.org

Upcoming Events

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

How Money Works

IEEE GOLD seminar, Dec 8, 7:00 UW DC 1204

Bernard Wong, a graduate of UW Engineering will offer very practical and useful insights into how to handle your own money, particularly in how to save it, grow it, and keep it. Integrating time-testing truisms with the introduction of powerful concepts and strategies, the seminar will benefit those who are looking to take control of their financial future. Topics include: RRSP, Mortgage, Investment, Insurance, Tax and more. This seminar has been arranged to benefit new graduates as part of the mandate of the Young Professionals Network/Graduates of the Last Decade affinity group.

Educating Engineering Educators

IEEE event

The local section will host a seminar that will focus on reaching pre-university students and ensuring they consider engineering a valid career option. The intended speaker is Doug Gorham who has designed and implemented a number of pre-university IEEE promotional/educational programs. The proposed venue is UW's DC 1304 on December 10 (check the website for possible changes). Some additional information is below; more information will be posted on the website as it is available.

The intended audience is primarily IEEE volunteers. If local pre-university educators are available and interested in attending that would be welcomed and would likely assist the local Section in establishing or strengthening collaboration with the local school district.

The approach is to provide a range of strategies and programs. It is difficult for me to predict what types of strategies or programs a Section may choose to participate. It could be as simple as volunteers sharing on-line resources, e.g., the IEEE Virtual Museum, with educators to as complex as becoming involved in an on-going program of professional development with the local school district through the teacher in-service program. The overall goal is to generate interest in developing or enhancing partnerships with the pre-university community that will have the effect of promoting technological literacy and an interest in engineering and other technical professions.

Annual General Meeting and Elections

The Annual General Meeting of the IEEE KW Section will be held January 12, 6:00 PM at University of Waterloo's DC 1304. There have been some interesting ideas to make the AGM entertaining but the details are not available yet.

This AGM also ends the 2 year term of the current executive team. The proposed team for the next term is listed below. The IEEE is a volunteer-run organization and there remain many ways that people can get involved in making the KW section more active and beneficial to all members.

Executive

Chair: Tony Kormos
Vice Chair: Shahab Ardalan
Secretary: Amir Khatib
Treasurer: Kevin Ma

Committee Chairs

Membership Development:	Tony Kormos
Professional Activities (& Publicity):	Gilbert Lai
Educational Activities:	Dr. Magdy Salama
Newsletter Editor:	Mike Hulls
Student Activities (Conestoga College):	Dr. Monzur Kabir
Student Activities (University of Guelph):	Dr. Radu Muresan
Student Activities (University of Waterloo):	Dr. Siva Sivoththaman
Awards:	Tom East
Nominations:	Mauro Rossi

Society Chapter & Affinity Group Chairs

Antennas/Microwave Theory:	Dr. Raafat Mansour
Circuits and Systems (CAS):	Faycal Saffih
Communications (COM)/Vehicular Technology (CVT):	Dr. Raouf Boutaba
(CVT) Vice-Chair:	Currently Vacant
Control Systems:	Dr. Fakari Karray

Electron Devices/Solid State Circuits:	Dr. Siva Sivoththaman
Information Theory:	Dr. Amir Khandani
Signal Processing (SP)/Computational Intelligence Society (CIS):	Dr. Mohamed Kamel
Computer (CS)	Dr. Ladan Tahvildari
GOLD (Young Professionals Network):	Kevin Yang Ma
Life Members:	Currently Vacant
Computer Society Tutorial Program (CTP):	Zohreh Azimifar
Distinguished Visitor Program (DVP):	Amin Mobasher

International robotics competition comes to UW

UW Alumni E-Newsletter

The University of Waterloo will be Canada's second site for the FIRST Robotics Competition, an annual event that involves more than 20,000 high-school students internationally.

The inaugural FIRST -- For Inspiration and Recognition of Science and Technology -- Robotics Waterloo Regional will take place March 24 to 26 next year.

It involves short games played by remote-controlled robots that are designed and built in six weeks out of a common set of basic parts by a team of 15 to 25 students and a handful of engineers-mentors. The students pilot the robots on the field.
http://alumni.uwaterloo.ca/alumni/e-newsletter/2004/november/robotics_competition.html
In related news, RIM has donated $50,000 to support the competition.

5th Annual - E&CE Design Projects Symposium

UW ECE faculty

The E&CE Design Projects match teams of Waterloo Engineering students with design problems from industry and research. The teams work under the guidance of senior engineers to develop solutions to a wide range of engineering problems. For further information ahead of time, feel free to check out our website at http://eceprojects.uwaterloo.ca .
9:00 a.m. - 4:30 p.m. Wednesday, January 19th, 2005 at the University of Waterloo

Also available is the Open House running from 4:30 to 8:00pm. An exciting evening for students and parents to come and see the various projects the Electrical and Computer Engineering students have designed.
<editor: last year's event presented a wide range of uses of new technology and initiated ideas and discussions applicable to industry>

Recent Events

Senior Member Upgrades

The following local member has earned the professional recognition of peers for technical and professional excellence.
Mohamed O. Damen
See http://www.ieee.org/ra/md/smprogram.html for more information on this program.

Tony Ponsford Described Integrated Marine Surveillance

Tom East, IEEE seminar
On 26 October, Dr. A.M. Ponsford, a Raytheon Engineering Fellow, described a system being developed at Raytheon Canada for "Network Centric Integrated Marine Surveillance and Reconnaissance." The problem of detecting small ships in a large ocean is not only to get a fix at one moment in time, but to get several fixes over a period of time, to establish a track. A Low Earth Orbit satellite returns to the same area every eight hours. Reconnaissance aircraft see a swath of ocean, but to have a fleet of aircraft such that each area is covered frequently would be very expensive.

The solution is to use a High Frequency (3 – 30 MHz) shore based radar, with vertical polarization, which hugs the surface of the ocean. The Raytheon Canada HFSWR has a range of 250 km on a small ship, and covers ten million square km. The main technical problems are sea clutter, ionospheric clutter, meteor trails (which are short lived), galactic noise and interference from other users of the spectrum (there is no band exclusively allocated to HF radar). Because of the relatively low frequency, the antenna is very large, but even so, the azimuth resolution is only fair: the range resolution is also only fair (5 nmi) but velocity resolution is good (0.5 m/s or 1 knot radial). The average transmitter power is 1.6 kW: there is no point increasing it because that would only increases the clutter power.

The radar detects ships and icebergs, and also measures ocean currents. The data is correlated with other information and presented on displays. It is used to detect illegal fishing, smuggling and piracy. Canada has two sites, and the government plans to order five more. Other countries have shown interest. It is another feather in Waterloo's cap.

Horizons of Embedded Graphics

IEEE Seminar (GOLD)
Current and future trends from both hardware and software perspective.
Jointly presented by Dan Joncas, ALT's Vice President of Sales, and Robert Applebaum, President of Silicon Turnkey Express, the dynamic duo offered a provocative overview in the world of embedded graphics from both hardware and software perspective. This interesting presentation not only discussed the existing technologies and offerings of the embedded graphics industry including the existing standards (i.e. OpenGL), PC104 / COTS embedded boards plus a wide range of applications (i.e. Graphic mobile terminals, PDAs, cockpit display in aircrafts) but also looked into the future of the industry with the forthcoming standardization (i.e. Khronos group, embedded OpenGL API), and other technology trends.

<editor> This presentation introduced the technology side of a rapidly expanding market but also gave a perspective on current business environments and how to play the high-tech game. Notes on early designs/estimates, distributors and manufacturing representatives felt familiar even though the acronyms were different. Designs that specialized on specific purposes (certified graphic libraries for navigation systems) showed the underlying complexity of a wide-ranging technology.

The Internet: Problems and Future Directions

IEEE seminar by Prof. D. Cheriton of Stanford University

The Internet has been amazingly successful, changed the world in significant ways and continues to grow and impact the way we work, learn and interact. However, the Internet was designed according to certain principles that seek to provide important properties yet it has departed from some of its original principles, lost some supposedly important properties and is confronting some significant challenges. Various groups have been busy coming up with "next generation" solutions, such as IPv6, yet it is not clear these solutions solve the real problems.

In this talk, I claim that the Internet architecture is too important to be ignored or wrong, and yet it is both right now. I further explore what I think are some key problems as well as some promising directions for the future.

MIMO-OFDM From Theory to Practice

IEEE sponsored seminar by Wen Tong of Nortel Networks

A New Landscape for Very Broadband Wireless Networks using MIMO-OFDM as the key enabling technology. We give a system architecture overview of MIMO-OFDM and its potential impacts. The key research areas and direction MIMO-OFDM are discussed. We also introduce the design for the industry 1st MIMO-OFDM standard: IEEE802.16d/e for the wireless metropolitan access and the emerging IEEE802.11n standard for the wireless local areas access.

Broadband Wireless Access at Frequencies below 11 GHz

IEEE sponsored seminar by Hikmet Sari, Professor and Chair of the Telecommunications Department at the Ecole Supérieure d'Electricité (SUPELEC)

Broadband wireless access (BWA) at frequencies below 11 GHz is an interesting technology, particularly for new operators without an existing wired infrastructure. The frequencies available for this type of networks include the 2.5 GHz microwave multipoint distribution service (MMDS) band in the US, the 3.5 GHz band all across Europe, and the 10 GHz which is available in a number of countries. There are also license-exempt frequency bands at 2.5 GHz and 5 GHz. First-generation BWA systems are today in the field, but their deployment is still very modest compared to DSL and cable modem technologies. To foster the mass deployment of BWA systems, the IEEE 802.16 and ETSI BRAN groups have recently developed technical specifications for interoperable systems. A general presentation of BWA at frequencies below 11 GHz, describes the technical challenges, highlight the current trends, and discuss the potential technologies. In particular, we highlight the fact that the main issue in these systems is frequency-domain processing vs. time-domain processing rather than OFDM vs. single-carrier transmission, which is the traditionally debated issue.

Aerosol Can Recognition in X-Ray Imagery

IEEE seminar by R.B. Paranjape of University of Regina

This seminar presented progress in the development of computer vision systems for the automatic recognition of aerosol cans in X-ray images of passenger carry-on baggage. Computer vision systems can typically be divided into three stages: object segmentation, feature extraction and feature analysis. In this problem, the primary challenge appears to be the first stage as the objects to be identified are difficult for a computer vision system to be able to correctly recognize the objects of interest. The presentation showed a number of approaches to address this problem and demonstrated their effects on the final results of the computer vision system.

UW Prof. Receives Innovation Challenge Award

Waterloo Chronicle

John Yeow's award is for his research into micro-machined scanners that aim to be small enough to insert into human bodies without damaging tissue but provide clear, three-dimensional images of areas of interest.

Partnership to promote entrepreneurship

UW Daily Bulletin

UW, in partnership with Wilfrid Laurier University, has created a competition that not only promotes entrepreneurial activity but also helps to launch new businesses. The LaunchPad $50K Venture Creation Competition will provide an environment where many of the challenges facing potential entrepreneurs are addressed.

For anyone looking for a great idea to turn into a business, having a great idea but not knowing where to start, or just wanting to be involved in an exciting new venture, more details can be found at the project's web site.

Organized by UW and WLU, the competition is modelled on the Massachusetts Institute of Technology $50K competition and provides a network of resources for teambuilding, mentorship and networking. Cash prizes and in-kind services totaling $50,000 in value will be divided among the three winning teams. Geoff Malleck, associate director for student development for the Centre for Business, Entrepreneurship and Technology, said that "although the prizes are significant, the true reward comes from the actual launch of a business, both to the entrants as well to the community as a whole."

The LaunchPad site offers an electronic tool called Team Builder that enables individuals to connect with each other electronically. By reading and posting messages, users can recruit team members or find a team to join based on interests, skills and experience.
http://www.launchpad50k.ca/

UW Students Initiate new IEEE Activities

M.Hulls

The students are developing a group to support research in Nuclear Plasma. They hope to form a student chapter with both theoretical and applied research being pursued. They are trying to provide learning opportunities that the university doesn't currently include in the regular courses.

The students are also working with other groups on campus on joint projects such as interview skills and business knowledge.

UW Robotics Club

V. Silagadze

The University of Waterloo Robotics Club was founded in the Winter school term of 2004 by EE student Vecheslav Silagadze. The goal was to put together a robot for entry into the Trinity Fire Fighting Robot Competition in Hartford Connecticut, and in general learn how to design and put together robot control systems. The team didn't complete the project in time, and instead opted to enter the mini-sumo contest in the Western Canada Robotic Games held about a month later.

The following term, in the spring of 2004, the UW Tactical Robotics Team was founded by CE student Murat Ozkan, who was unaware of the existence of the UW Robotics Team. The team began constructing two sumo robots for the OCAD contest, and in the process found out about UW Robotics. Realizing their common goals, the two teams decided to merge to form a team that would be active on both streams.

During the current term, the robotics team decided to take on a rather ambitious set of projects: Two full size sumo bots, and a 4 legged (10 servo) walker robot. The team decided to make an attempt to complete at least one of the robots for the Eastern Canada Robotic Games, to be held less than two months into the term. Despite various setbacks, the team managed to finish one sumo bot and nearly complete both other robots.

The goals for the remainder of the term are to complete the other sumo bot, and work on the circuitry of the more advanced walker robot.

Currently there are officially 25 members in the UW Robotics Club, with 4 core members. The team will focus more towards the control area of robotics in the coming terms, once numerous robotic platforms have been constructed, with a tendency towards soft computing control systems.

The team is seeking sponsorship from WEEF, Cypress, IEEE, and Microchip Technologies. You can contact the team leader at primemover@gmail.com and check out their website at http://www.roborific.com

Students Sharpen Their Edge at University of Waterloo

Lee Brooks

The University of Waterloo IEEE Student Branch "A", in conjunction with the Waterloo Professional Association of Students (WATPAS) ran a joint event entitled "Career Edge" on November 23, 2004. The goal of the event was to give first and second year students the opportunity to learn about the importance of soft skills while also hearing strategies and techniques to expand their technical skills.

What set this event apart from other similar workshops is the fact that all of the workshop facilitators were current UW students with work and interview experiences relevant to the attendees. WATPAS is an organization that helps students hone their soft skills, such as

communication, as well as proper interview etiquette. Combined with the IEEE Student Branch, whose members could relate their own experiences in co-op, the two organizations complemented each other brilliantly to provide a practical, informative, and engaging workshop.

Student demand for the workshop was far beyond original expectations. In fact, a second workshop session had to be created in order to accommodate everyone who was interested. The response for the evening was positive, and many students stayed afterwards to talk further with the presenters. Those who attended enjoyed hearing "about actual experiences from students." Presenters were able to relate their own personal experiences and share what it is really like in the competitive co-op job market. Many in attendance commented that it would be useful if similar sessions were run more often throughout the term. Judging from the success of this initial offering, it seems likely that this event will be held again in the future.

From the response alone, it can be seen that University of Waterloo students are interested in making a strong and lasting impact in the workplace, and recognize that it takes more than technical aptitude to reach career objectives. Members in the industry should take note that these leaders of tomorrow are truly interested in finding out more about what it is truly like in the real world. The UW IEEE Student Branch, as well as WATPAS, is more than happy to better prepare these students for a lifetime career in technology.

Nuvation opens Waterloo design centre

Waterloo Tech Digest and others

San Jose's Nuvation has opened an engineering office in Waterloo. The co-founder and CEO of Nuvation is UW grad Mike Worry and there have been other UW graduates in executive positions with the company over the years.

Nuvation was formed in 1997 and provides FPGA and ASIC design, PCB development, and embedded software design services. The Waterloo center could grow to 20-30 staff over time.
http://www.nuvation.com

Communications technologies institute launched at UW

UW Alumni E-Newsletter and others

The University of Waterloo recently celebrated the establishment of the Centre for Integrated Radio-Frequency Engineering (CIRFE) to conduct leading research on emerging communications technologies.

The CIRFE houses a new advanced laboratory and clean (dust-free) room for the fabrication, characterization and testing of RF MEMS (Micro-Electro-Mechanical Systems) devices. The advanced lab is the only one of its kind in Canada.
http://alumni.uwaterloo.ca/alumni/e-wsletter/2004/november/communications_institute.html

Student calls for space-age aircraft

UW Daily Bulletin

International aerospace leaders met in Vancouver October 4-8 at the International Astronautical Congress, where leading researchers from around the world unveiled their views on the future of flight and space exploration.
Benjamin Sanders, a second-year electrical engineering student at UW, who presented a paper October 7 in a session on "Hypersonic and Combined Cycle Propulsion". He is the only Canadian and the only student presenting in this field. Title of Sanders's paper is "The Need for a Versatile and Reusable Hypersonic Vehicle" -- in effect an aircraft that can travel at "hypersonic" speeds, several times as fast as sound, which travels at 761 miles (1,224 km) per hour.
Sanders is currently the president of the Waterloo Space Society. In addition to his technical paper, he'll be presenting a poster on student outreach at the congress along with several Waterloo Space Society past presidents.
http://www.spacesoc.uwaterloo.ca/

Donation to fund Mechatronics Lab

UW Daily Bulletin
An engineering alumnus has made a $500,000 donation that will be used to create a graduate scholarship fund and develop a mechatronics laboratory at UW. Arthur Church, president and CEO of Mancor Industries, Inc., announced his gift on Oct 18.

Programmers ready for the worlds'

UW Daily Bulletin
Waterloo's "Black" and "Gold" teams took first and second place in the ACM East Central North American Region Programming Contest on Nov 8 in Oakville -- which means a UW team will be in the ACM worldwide championships when they're held in Shanghai in April. Says coach Gordon Cormack: "Black started quickly, solving the first problem in ten minutes. Black swapped the early lead briefly with Gold, but retook the lead by solving its third problem at the 25-minute mark, and went on to solve all 8 problems in 3 hours, 24 minutes. No other team solved all the problems. Gold was the only team to solve 7 problems. Third and fourth places went to the University of Michigan; fifth and sixth to Carnegie Mellon; seventh and eighth to Toronto."

Grand Opening of the Perimeter Institute Building

Tom East

The Perimeter Institute for Theoretical Physics was proposed by Mike Laziridis, founder of Research In Motion (RIM), and founded in 2000 with most of the funding ($100 million) coming out of his own pocket. It has been operating in an old post office building on King Street in Waterloo. Construction of the new building has been going on for a couple of years.

On Friday 1st October 2004, the new building of the Perimeter Institute was given its official opening, with Prime Minister Paul Martin and other dignitaries making speeches.

Saturday 2nd October was the public opening. In spite of rain in the morning, and a cold strong wind all day, several thousand people turned out. There was a carnival atmosphere in the large parking lot, with a five piece band, face painting for kids, physics experiments for young persons and a hot dog stand. Then there was the long line up for the tour of the

building. The celebrations went on from 10 am to 4 pm, and included 14 lectures in three parallel sessions. I took the tour, and attended one of the lectures, by Richard Epp.

The four story building (floor area 65,000 sq. ft) is located near the Waterloo railway station, between Father David Bauer Drive and Silver Lake, on the former site of the Memorial Arena. It is made of concrete, with some aluminium and glass. Unlike most large buildings, the windows are placed quite irregularly. The south facing wall is entirely black, perhaps to represent a blackboard, which is the theoretical physicist's main tool. In the centre is a large atrium, which forms the Mike Lazaridis Lecture Theatre: several of the lectures were given there. There are many "research offices": in each, one side consists entirely of a window looking out on to the lake, and another side consists entirely of a blackboard. Graduate students have to work in a room with several "carrels" as in a UW library. There are no laboratories, since this is a theoretical place. There are about 34 researchers (including post-docs), plus administration, custodial and security people.

There are comfortable lounges with wood fires, a snack bar and a small cafeteria. At almost every turn, there are windows (some near the floor, some near the ceiling, or extending from floor to ceiling) looking out on the lake, the park or the city.

The City of Waterloo can be proud of this latest addition to the skyline, and so can the Province of Ontario, and Canada, each of which have contributed to its creation.

Richard Epp on Quirky Quanta

Tom East

The lecture on Quantum Mechanics was one of 14 given during the public opening of the new Perimeter Institute building on 2nd October, and was given in one of the seminar rooms. The room had no windows, but had blackboards on two sides, and a computer controlled projector mounted on the ceiling, projecting on to a drop down screen. The lecture was titled "Quirky Quanta", given by Richard Epp, and attended by about 50 people. He described some implications of Quantum Mechanics, which include the possibility that two fundamental particles can be in states which are unknown, but entangled: by observing the state of one, this sets its state, and automatically sets the other to the opposite state. He then went on to discuss teleportation – the displacement of a body from one place to another without actual physical movement along the path. This displacement cannot occur faster than the speed of light, and involves the transmission of enough information to completely describe the body. By creating the body at the new location, the body at the old location must be destroyed - "no cloning". So far, only a photon has been teleported.

My only criticisms of the room would be that the bottom half of the screen was hidden by the people in front of me, since the floor was not raked, also the air conditioning was not very quiet.

James Brown on Proof and Pictures

Tom East

The PI public lecture on 3rd November was given at the Waterloo Collegiate Institute as usual, not at the new Perimeter Institute building, presumably because there would not have been room for the 500 or so people who turned up.

Prof. Brown acknowledged that the conventional view is that a mathematical theorem can only be proved by logical statements or equations, not by diagrams. However, using some finite theorems as examples, he showed pictures which demonstrate the results very simply, compared with the usual method of proof by induction. His examples were $1 + 2 + 3 + \ldots + n$
and ½ + ¼ +1/8 +…+1/n
However, 1/1 + 1/2 + 1/3 + … +1/n does not converge to a finite value, but a diagram would not tell you whether it does or not.

Prof. Brown went on to describe the work of Galileo, Barwic and Godel in this area. He pointed out that Newton proved vital theorems by calculus, but converted them to geometrical proofs for publication.

Perimeter Library Named for Guelph Math Prof

U of Guelph website

A longtime U of G mathematician was honoured during this fall's gala opening of the Perimeter Institute for Theoretical Physics with the dedication of the George Leibbrandt Library.

The library is named for the late professor George Leibbrandt, a faculty member in the Department of Mathematics and Statistics from 1966 until his death in 2001. He was the only academic scientist on the board that created the Perimeter Institute.

Sybase Officially Opens Building on North Campus

UW Daily Bulletin
Sybase Inc., the UW spinoff company that has become the first tenant in UW's north campus Research and Technology Park opened their building with a "wire-cutting" (not a ribbon-cutting, but something to symbolize Sybase's contributions to wireless technology).

Maplesoft and UW Group Receive Synergy Award

KW Record
NSERC Synergy Awards recognize outstanding partnerships between industry and academia. One of seven awards went to UW's Symbolic Computation Group for their ongoing relationship with Maplesoft, a provider of mathematical software.

Re-engineering the Piano

Globe and Mail
Stephen Birkett of UW's Systems Design Department is researching how to create a low-cost piano that sounds as rich as current high-end ones. The base technology of the piano dates back to the 1700's. Recent competitive pressure from electronic instruments has narrowed the field for low-end pianos so that few manufacturers are left in Canada.

Nanotechnology: The Coming Revolution in Manufacturing

ICR Seminar Nov 18 by Dr. Ralph Merkle, Co-Inventor of Public-Key Cryptography

A new manufacturing technology looms on the horizon: molecular nanotechnology (http://www.zyvex.com/nano). Its roots date back to a 1959 talk by Richard Feynman (http://www.zyvex.com/nanotech/feynman.html) who said"...ultimately...we can arrange the atoms the way we want; the very atoms." In recent years, the idea that we should be able to economically arrange atoms in most of the ways permitted by physical law has gained greater acceptance -- yet how and when we might achieve this mastery over matter is still uncertain. One practical use for nanotechnology is likely to be in the exponential improvement of computer hardware and in the development of novel computing systems. As switches are scaled to ever smaller sizes and as we demand ever greater performance and reliability the tolerance for error shrinks. Once we can "...arrange the atoms the way we want..." what are the limits to computation?
What novel devices will become possible?

New Manufacturing and Automation Training Centre

Conestoga College

Conestoga College Institute of Technology and Advanced Learning officially opened the new $11 million, 20,000 square foot Manufacturing and Automation Training Centre on September 16. The new facility is a major expansion of the existing ATS Engineering Complex at Conestoga's Doon campus in Kitchener.

Campana Systems Earns Silver and Gold

M.Hulls

On November 3, the British Columbia Interior Health Authority (IHA) was awarded the Canadian Information Productivity Awards (CIPA) Silver and Gold award of excellence for Mobile Solutions and the implementation of Campana's GoldCare Care Anywhere system. IHA has over 150 case managers in the field using Laptop computers to complete assessments and determine care and risk levels for home based clients.
Campana is a local software company that develops solutions for Auto Clubs and the Healthcare industries.
http://www.campana.com , http://www.cipa.com

Tracking Tennis Trajectories

KW Record

Auto-Ref Inc. is commercializing a system that uses multiple cameras and a central computer to calculate the location of tennis balls on the court. This can be used to reduce disputes of calls and may reduce the need for line judges in the future. The cameras take 120 frames per second and the system has an estimated accuracy of 4mm,

Com Dev Works on New Space Telescope

KW Record

Com Dev is working with other international companies and NASA to create a fine-guidance sensor for the James Webb Space Telescope which NASA intends to launch in 2011.

Engineers and the World

IEEE and Boy Scouts Develop EMerit Badges

IEEE

The IEEE emeritbadges.org program has developed hands-on electricity and electronics instructional material based on the Boy Scouts merit badge requirements. Instructional material for computer education is being developed. Any student, boy or girl can use the program to enhance technical literacy and learn more about viable engineering and other technical career options.

http://www.emeritbadges.org/

Memorable RIM Usage

ComputerWorld Canada

A historical look at Mike Lazaridis included some interesting examples of the use of Blackberrys.

Shortly after 9/11, Jeb Bush was flying to a major city center when the plane lost communications. The pilots where concerned that F-16's had been sent to shoot them down. Jeb used his Blackberry to contact his assistant who contacted the airport.

Sean O'Keefe, Chief Administrator of NASA was emailing while being driven home. He eventually realized he was having a real-time conversation with an astronaut from an orbiting space station while in the backseat of a taxi.

Gives the rest of us something to aim for ;-)

And Canadians too.

Waterloo Tech Digest

In the Ontario legislature in October, NDP member Gilles Bisson was being razzed after his BlackBerry started ringing in the middle of his speech (Bisson in Hansard :<editor: the transcript http://www.ontla.on.ca/hansard/about_hansard/index.htm> "That's not mine. I don't know who the heck that is. Somebody's cellphone was ringing but it wasn't mine. Oh, hell, it is mine."). But he got the last laugh when one of the MPPs responding to his comments, Liberal member Maria Van Bommel, had her BlackBerry start to buzz on her desk as she was speaking (Bisson's interjection in Hansard: "This time it's hers. Never throw stones. You never know when it's going to come back to you." Van Bommel in response: "I have handed my BlackBerry over, and I apologize to the assembly for that. That is quite a sound when it comes across the [microphone], no question about it."). A few days later, PC MPP John Yakabuski had the same thing happen to him, so using a BlackBerry -- and being absentminded -- transcends party boundaries.

Sonofusion

Selected by R. Golds from Physical Review E [Apr 16, 2004]

Lasers and magnetic fields won't do it ... acoustics did. Moral: don't turn up your speakers too loud.

Four other institutions confirm and extend sonofusion findings

TROY, N.Y. - Physical Review E has announced the publication of an article by a team of researchers from Rensselaer Polytechnic Institute (RPI), Purdue University, Oak Ridge National Laboratory (ORNL), and the Russian Academy of Science (RAS) stating that they have replicated and extended previous experimental results that indicated the occurrence of nuclear fusion using a novel approach for plasma confinement.

This approach, called bubble fusion, and the new experimental results are being published in an extensively peer-reviewed article titled "Additional Evidence of Nuclear Emissions During Acoustic Cavitation," which is posted on Physical Review E's Web site as http://news.uns.purdue.edu/html4ever/2004/0400302.Taleyarkhan.fusion.html .

The research team used a standing ultrasonic wave to help form and then implode the cavitation bubbles of deuterated acetone vapor. The oscillating sound waves caused the bubbles to expand and then violently collapse, creating strong compression shock waves around and inside the bubbles. Moving at about the speed of sound, the internal shock waves impacted at the center of the bubbles causing very high compression and accompanying temperatures of about 100 million Kelvin.

Smart Cars make Canadian Debut

Canoe.ca

A new environmentally geared car hit Canadian roads in October. The European Smart car is smaller (730 kg) and cheaper (see below). Company management says “We were convinced that smart would be very well accepted here in Canada. Our intensive research confirmed unequivocally that the Canadian market was ready for smart and judging by the overwhelmingly positive consumer reaction since our February announcement, I am extremely confident that the smart brand and its product offerings will have a tremendous future in this country."

Over 1,000 units will be produced and delivered prior to the end of 2004. The smart fortwo coupe cdi starts at $16,500 while the smart fortwo cabriolet cdi will retail from $19,500. Both models will be available for sale as of October 4th in three design lines: pure, pulse and passion. More detailed information about smart in Canada is available at http://www.thesmart.ca .

EWB will list two spring co-op jobs

UW Daily Bulletin

Engineers Without Borders will send two UW co-op students overseas next summer.

Sonya Konzak, of fourth-year computer engineering, is one of two students who had EWB internships during the spring term this year. She was in Ghana, while economics student Sarah Lewis worked in Cameroon. The two are now working with the UW chapter of EWB to organize next summer's postings, says Konzak, who's now president of the chapter. EWB is a national organization that was founded at UW by George Roter, then an engineering student and now co-CEO of the national group. The role of EWB is to promote human development through access to technology. Its activities include development

presentations, public outreach workshops, weekly development discussion sessions, research projects and overseas internships.

She stresses that "Technology is only one small component of development, and as such EWB needs people with a variety of backgrounds. In fact, more students from diverse departments are participating in EWB development projects. The only criterion is that people understand that there will always be a technical component to their projects. People with backgrounds in humanities, business, sciences, engineering and others are all welcome to get involved."
EWB discussion group sessions will be taking place every Wednesday this fall.
http://www.uwaterloo.ewb.ca/

Library Lends Hand-Tools

Globe and Mail
A number of libraries (Berkeley, Oakland, Portland) have tool lending sections. People can borrow tools (wheelbarrows, staple guns etc) to complete Do It Yourself projects. The system is popular with thousands using the system at Berkeley.

Integrating Technology into the Household

Waterloo Chronicle
Still using 5 different remotes to control your entertainment center? Unifi can simplify your environment by integrating the components into a coherent home. Their store is designed to look like a house so customers can view the technology in action, touch and feel the demos and see the advantages of integration. http://www.unifi.ca

Engineering Humour

Live Sims

A recent release of a new version of the Sims games was promoted by having a Dutch family acting on the commands given to them through the computer. <editor: my link to this article has expired and a brief web search only found Dutch pages referring to the event>.

A Mathematical Puzzle

By Tom East

In a biography* of Paul Erdos (pronounced air-dish, more or less), a colourful Hungarian mathematician, it is stated that he published 1500 papers, some in obscure journals. One of his colleagues composed this limerick:

A conjecture both deep and profound
Is whether the circle is round.

In a paper by Erdos
Written in Kurdish
A counterexample is found.

I approach this puzzle as follows:

A square is not round, because at each corner, the curvature is infinite.
I define a closed contour as being round, if the curvature is finite everywhere.
Consider a circle of zero radius: it is not round since the curvature is infinite everywhere.

Could this be the counterexample in Erdos' mythical paper?

*See "A mathematical messiah" by Howard Swann, a review of two books in IEEE Spectrum December 1998 page 10, which surfaced on my desk recently.