KITCHENER-WATERLOO SECTION
October 2010

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 bimonthly.

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http://www.ieeekw.com/executive.php

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University of Waterloo Student Branch - Stream A	Mr. Haosen Cai
University of Waterloo Student Branch - Stream B	Ms. Joanna Ma

Upcoming Events

Updated information can be found at http://www.ieeekw.com/activities.php.

Go ENG Girl

University of Guelph, 50 Stone Road E
University of Waterloo, J.R. Coutts Engineering Lecture Hall (RCH)
October 16 2010, 9:00 PM

Go ENG Girl is an exciting opportunity for Grade 7-10 girls across Ontario to visit their local university to learn about the wonderful world of engineering: "A Caring Profession." Join us for fun hands-on activities, informative parents' sessions and engineering student exhibits. Learn from women professionals, academics and students. Admission is free.

Presented by the Ontario Network of Women in Engineering (ONWiE) with the support of the Council of Ontario Deans of Engineering.

http://www.ospe.on.ca/goenggirl/

Tour of Xerox Research Centre

2660 Speakman Drive, Mississauga, ON
October 6th, 1:00 PM

Xerox Research Centre has agreed to provide a tour, free of charge, for 20 undergraduate and graduate students at UW. Staff at different departments will be discussing and displaying the following technologies under research and development:

Speakers:
Dr. Enno Agur (Overview)
Dr. Yiliang Wu (Printed Organic Electronics)
Dr. Michelle Chretien (Solid Ink)
John Abate (Pilot Plant)

Contact the UW IEEE Student Branch for further details.
http://ieee-sb.uwaterloo.ca/

Development of New Surgical Robotics

Cosponsored by Centre for Surgical Invention & Innovation (CSII)
St. Joseph's Healthcare, Hamilton, ON
October 20, 2010, 7:00 PM

Computer-assisted technology will revolutionize medical intervention over the next decade. In particular, the application of advanced robotics in medicine has the potential to extend the capabilities of interventional and diagnostic health care professionals through increased access, precision and dexterity. Technological advancements in this area will enable highly effective patient treatment both at the macroscopic level (organ or systems), and microscopic (cellular) level while the

trauma associated with accessing the treatment site in the body will be greatly diminished.

In the past two decades major breakthroughs in the use of minimally invasive surgical (MIS) and radiological interventions have been made, that reduce the pain, morbidity and recovery period associated with many surgical procedures. MIS techniques now allow patients to undergo many surgeries as outpatients, including surgeries such as bowel or prostate resection for cancer.

The Centre for Surgical Invention and Innovation (CSII) is working on developing the next generation of medical robotic technologies. Building on the significant federal commitment that has led to Canada dominating the field of space robotics, CSII will become a leader in the development, testing, validation and commercialization of novel robotic platforms and tools. Our first platform is the design of an automated robot to assist in the diagnosis and treatment of breast cancer using MRI guidance.

Speakers:
Dr. Mehran Anvari, CEO/Scientific Director CSII, Surgeon
Tim Fielding, MDA Engineer
Dr. Kevin Randall, Senior Project Manager, CSII
Dr Alex Patriciu, Associate Professor, McMaster University

http://ewh.ieee.org/r7/hamilton/y2010/2010events.htm#a20101020T

Sustainability and the Seminar Series
Lambton College, Sarnia, ON
October 28, 2010, 7:00 PM

Keynote:
Power Factor Correction – Potential, Pitfalls and Points to Consider
Andrew Cooper
P. Eng., B. Comm.
Sifto Canada Corporation

Energy is a major, and escalating, cost to industry so energy efficiency improvements are becoming increasingly important. Utility invoices often hide the cost of running at a power factor of less than 0.9, so savings are not initially apparent. Power factor improvement can, however, lead to significant annual savings both with the demand charge and KWh reduction.

The presentation uses the Sifto Goderich Mine power factor correction project as a case study to identify some of the important items, and possible pitfalls, to keep in mind if you are considering a power factor correction project.

Andrew Cooper is the Senior Mine Electrical Engineer at the Goderich mine of Sifto Canada Corporation, a Compass Minerals Company. The mine is one of the largest salt mines in the world and produced 7.5 million tons of rock salt last year. He spearheads Sifto's energy management initiatives, which look at energy reduction and efficiency projects and is also a member of the Ontario Mining Association Energy Committee.

IEEE Symposium on Product Compliance Engineering

October 18-20, 2010
Boston, MA

The IEEE Product Safety Engineering Society is pleased to bring you the 7th Annual Symposium on Product Compliance Engineering. This year, our program builds on our previous successes, expanding our coverage of key areas.

Keynote:
"Check, Double Check, and Don't Forget the Obvious"
Dean Woodard
Director, Defect Investigations,
Office of Compliance
U.S. Consumer Product Safety Commission

Dean W. Woodard is the Director of the Defect Investigations Division of the U.S. Consumer Product Safety Commission. He has led this division for the past two years. His previous governmental experience was leading the Aerospace Industries Division of the U.S. Department of Commerce for five years. Prior to his experience in government Mr. Woodard served as Chief Engineer for Hexcel Corporation's Graham, Texas plant and also later served as a plant manager for Baxter Travenol's cardiovascular division, Vanguard Plastics, and DRG Medical Packaging. Dean was project director and opened Coca-Cola's first bottling plant in Russia. Mr. Woodard holds Bachelor and Master degrees from the University of Oklahoma and is ABD from North Texas. He has traveled Kazakhstan extensively by horseback.

Featured Talk:
"Automobile Sudden Acceleration: Controlling the Safety Risks caused by EMI"
Keith Armstrong
Cherry Clough Consultants

Sudden Unintended Acceleration (SUA) has been a problem for all automakers ever since the early 1980s, but automakers and the US Government's National Highway Transportation Agency (NHTSA) have always blamed it on driver "pedal error". This presentation compares the claims for electronic safety made by both NHTSA and automakers with what we as designers and assessors of safety-related systems would consider necessary whenever electronic malfunctions, software glitches or EMI could increase functional safety risks. It will include the reasons why we cannot rely upon motor vehicle event data recordings (so-called 'black boxes'), why EMC testing cannot prove safe design, and include recent test data showing that EMI can cause a car engine to race, without triggering any fault codes.

IEEE UW Guest Speakers

IEEE UW Student Branch

Keep an eye on the IEEE UW Student Branch website for further details on two very exciting guest speakers that will be visiting in the fall.

Canadian astronaut, Dr. Robert Thirsk will be sharing his experiences with the American and Russian space programs and his recent involvement on the International Space Station.

A representative from Blizzard Entertainment will be returning to Waterloo for the second year to talk about products and career opportunities.

http://ieee-sb.uwaterloo.ca/upcoming_events.aspx

Engineers and the World

Founding Perimeter Member Memorialized
August 23, 2010
UW ECE News

Family and friends of retired Waterloo electrical engineering professor Lynn Watt recently gathered at the Perimeter Institute for Theoretical Physics – of which he was a founding member – to celebrate his life. One of Watt's students was Mike Lazaridis, now the co-chief executive officer of Research in Motion and also the founder of the Perimeter Institute. Years after meeting in the classroom a conversation over dinner between Lazaridis and Watt laid the foundation of the institute. Watt, who died July 7, was also a former dean of graduate studies at Waterloo.

Retired ECE Professor Named to Prestigious Society
July 14th, 2010
UW Bulletin

Savvas Chamberlain, distinguished professor emeritus of electrical and computer engineering and a member of the dean's advisory council, has been elected as a fellow of the Royal Society of Canada. Chamberlain (DEng '07) is the founder and chairman of the board of Dalsa Corporation, a high performance semiconductor and electronics company specializing in digital imaging.

DALSA Founder Donates $3 Million to Waterloo's Faculty of Engineering
September 22nd, 2010
UW News Release

The founder of DALSA Corp., an international leader in high performance digital imaging and semiconductors, has donated $3 million to the faculty of engineering's Vision 2010 Campaign at the University of Waterloo.

In recognition of the gift from the family of Savvas Chamberlain, the electrical and computer engineering wing in the new Engineering 5 building will be named the Savvas Chamberlain Family Floor. The donation will support the faculty of engineering's infrastructure program as well as provide scholarships for undergraduate and graduate students.

Chamberlain, a former University of Waterloo electrical and computer engineering professor, is widely respected as a scientist, academic, inventor and entrepreneur.

"Savvas Chamberlain's early and pioneering work helped put Waterloo on the international map of microelectronics research," said Adel Sedra, dean of engineering. "Savvas has given a lot of his time over the last few years to ensure that the department of electrical and computer engineering continues to thrive and be among the best in the world. Now, Savvas and his family are continuing in this generous vein by making a substantial gift to the department."

Chamberlain founded DALSA, a University of Waterloo spin-off, in 1980, based on extensive research in CCD (charge coupled device) technology and MOSFET (metal-oxide-semiconductor field-effect transistors) image sensors. He is currently chairman of the company's board.

A University of Waterloo distinguished professor emeritus, Chamberlain also received a honorary doctor of engineering degree from Waterloo in 2007. In 2004, he received the life achievement award from the Automated Imaging Association for his world leadership and contributions to the imaging field. As well, he was named a member of the Order of Canada in July 2009. In 2010, he was made a Fellow of the Royal Society of Canada.

http://newsrelease.uwaterloo.ca/news.php?id=5230

Help Pakistan - A Special Message from the IEEE President
August 16, 2010
IEEE Foundation

Dear IEEE Members:
Earlier this year the IEEE Community responded with generosity and compassion to the devastating earthquake in Haiti by donating to an IEEE fund established through the IEEE Foundation. Today, as the world begins to realize the significance of the recent massive flooding in Pakistan, IEEE is responding to the need for international support and has established the IEEE Pakistan Engineering Educational and Professional Development Rebuilding Fund. IEEE volunteers, members, staff and friends are encouraged to contribute to this fund. IEEE will match the first US$50,000 in donations.

http://www.ieee.org/organizations/foundation/2010news.html

Conestoga Partners with Solar Living Institute to Launch Energy Training Program
September 22, 2010
Conestoga College News Release

Conestoga College Institute of Technology & Advanced Learning has recently launched a customized, online program to meet the training needs for solar energy professionals working in the Canadian market.

The Solar PV Design and Installation eCourse was developed in partnership with California's Solar Living Institute (SLI), one of the world's leading providers of education and training programs for green technologies. Accredited by the Institute for Sustainable Power Quality (ISPQ), the course provides a solid foundation for a broad range of careers in the growing Photovoltaic industry.

Topics covered in the course include: PV Market, Applications & Advantages, Fundamentals of Electricity, PV System Design, Grid-tied & Off-grid Installation, Maintenance and Troubleshooting. Delivered in online format through Conestoga's continuing education program, the course has been adapted to meet the needs of solar professionals working in the Canadian market.

http://blogs1.conestogac.on.ca/news/2010/09/conestoga_partners_with_solar.php

$80M Science and Engineering Internship Program Announced in Waterloo

September 25, 2010
Rose Simone, Waterloo Record

As many as 5,000 science and engineering students and graduates in southern Ontario will find it easier to get internships as a result of a new $80 million federal initiative.

The Graduate Enterprise Internship program was announced Friday at Agfa HealthCare in Waterloo by Gary Goodyear, Cambridge MP and Minster of State for the Federal Economic Development Agency for Southern Ontario. Similar announcements were made in Barrie and Windsor.

The FedDev program, which will provide $80 million over four years, aims to encourage small and medium-sized employers to hire grad students and people with recent undergraduate degrees in science, technology, engineering and mathematics. The program will pay up to $15,000 of the costs of a six-month internship for someone who is doing a masters or PhD program and up to $10,000 for someone who has finished an undergraduate program at a post-secondary institution in southern Ontario within the last five years. Employers still have to pay at least 50 per cent of the costs of hiring the person.

The program will operate in tandem with internship programs that are run through colleges and universities and organizations such as MITACS, a national research network that runs industrial research internship programs.

Arvind Gupta, scientific director of MITACS, said he will be speaking with FedDev officials about how to pair the internship programs of his organization with this new program.

"The new federal program will not only boost internship positions, it also will encourage the mentorship of interns", he said. "That combination of business and technical skills is what is required in the modern economy," he said. "I think this program has a lot of potential."

Tech Sector Keeps Multiplying in Tough Times

June 30, 2010
Chuck Howitt, Waterloo Record

Waterloo Region's technology sector just keeps on growing.

The number of high technology companies in the region has jumped to about 700 from 550 in 2008, according to a new report from Communitech, the association representing tech companies in the area.

That represents a growth rate of 21 per cent during one of the worst economic downturns of the past 20 years.

This sector, which includes digital media, information technology and software companies, computer hardware firms and advanced manufacturing businesses, employs roughly 30,000 people with 2,000 job openings waiting to be filled, Communitech said in a news release Wednesday.

Research Park, International Study Award Named After David Johnston

September 16, 2010
UW News Release

The University of Waterloo has bestowed a double honour on its departing president David Johnston, Canada's Governor General Designate, by naming the university's bustling research and technology park and a new international student award after him.

The announcement was made at a special dinner earlier this week to honour Johnston attended by 1,000 people, including members of his family, friends, business, government and the university community. Johnston ranks among the most respected and admired educators and public servants in Canada.

In addition to naming the R+T park after him, the university also announced the creation of the David Johnston International Experience Awards, to be supported by a $5 million endowment fund. In just two months the effort raising money for the award has been enormously successful, with most of the funds in hand.

ECE Graduate Helps Disabled Children

University of Toronto ECE News

ECE graduate, Eric Wan sways his head from side to side and the sound of tinkling ivories radiates throughout the room.

The pace of the melody accelerates in tandem with the rhythm of his movements, as colourful shapes twirl in sync on a monitor. With each bob of the head, the computer engineering graduate is crafting his own little music composition through a specialized software program he played a role in helping to develop.

The Virtual Music Instrument is among several projects he's been involved with aimed at helping children living with disabilities. The work is being done at Holland Bloorview Kids Rehabilitation Hospital, the largest facility of its kind in Canada.

"There are a lot of kids that are not able to play music just because they're not able to hold the musical instrument," said the 32-year-old Wan. "I think that there are a lot of children who would like to play music through some kind of way, so this is one of the reasons that I'm interested in this project."

Unlike many of his peers, he has a true understanding of the importance and need for such technologies to assist youngsters with disabilities. At age 18, Wan was diagnosed with transverse myelitis — a condition resulting from inflammation of the spinal cord — four days after getting a measles vaccination. "The doctors actually didn't know what the prognosis would be," Wan recalled in an interview at his workstation. "The best case would be that I would be able to walk within months, but it didn't happen."

Wan was paralyzed from the shoulders down, forever transforming the life of young man who grew up with a love of computers and playing classical music on his violin.

Wan was initially unable to breathe at all, dependent on life support 24 hours a day. Months afterwards, he was able to breathe on his own, but said otherwise there wasn't much improvement. After about two years, he was breathing on his own during the day, but he still needs to be connected to a ventilator at night.

Wan was brought on board as an undergrad to work with the Paediatric Rehabilitation Intelligent Systems Multidisciplinary lab, or PRISM for short, which focuses its efforts on children and youth with disabilities and special needs, and their families, by drawing on applied science and engineering.

Wan is heading back to the books in September 2010 for graduate school, as he pursues a two-year master's degree at U of T. He seems keen to continue on his current path, expressing interest in developing software to help children with disabilities gain more control of their environments.

"In particular, there are many children with high level of disability who are not able to communicate with people and they're not able to do anything to enjoy their environment, for example, turn on a TV or pick up a telephone," he said. "This is something that I hope that the children will be able to do so that it will improve their quality of life."

For Fun…

Brain Teaser

Walking home one day, you take a short cut along the train tracks. The tracks cross a narrow bridge over a deep gorge. At the point you are 3/8 of the way across the bridge, you hear the train whistle somewhere behind you. You charge across the bridge, and, just like in "Stand By Me" jump off the track as the train is about to run you down.

As it happens, if you had gone the other way, you would have reached safety just before being run over as well.

If you can run ten miles per hour, how fast is the train moving?

Engineering Humour

Once upon a time, in a kingdom not far from here, a king summoned two of his advisors for a test. He showed them both a shiny metal box with two slots in the top, a control knob, and a lever. "What do you think this is?"

One advisor, an engineer, answered first. "It is a toaster," he said. The king asked, "How would you design an embedded computer for it?" The engineer replied, "Using a four-bit microcontroller, I would write a simple program that reads the darkness knob and quantizes its position to one of 16 shades of darkness, from snow white to coal black. The program would use that darkness level as the index to a 16-element table of initial timer values. Then it would turn on the heating elements and start the timer with the initial value selected from the table. At the end of the time delay, it would turn off the heat and pop up the toast. Come back next week, and I'll show you a working prototype."

The second advisor, a computer scientist, immediately recognized the danger of such short-sighted thinking. He said, "Toasters don't just turn bread into toast, they are also used to warm frozen waffles. What you see before you is really a breakfast food cooker. As the subjects of your kingdom become more sophisticated, they will demand more capabilities. They will need a breakfast food cooker that can also cook sausage, fry bacon, and make scrambled eggs. A toaster that only makes toast will soon be obsolete. If we don't look to the future, we will have to completely redesign the toaster in just a few years."

"With this in mind, we can formulate a more intelligent solution to the problem. First, create a class of breakfast foods. Specialize this class into subclasses: grains, pork, and poultry. The specialization process should be repeated with grains divided into toast, muffins, pancakes, and waffles; pork divided into sausage, links, and bacon; and poultry divided into scrambled eggs, hard-boiled eggs, poached eggs, fried eggs, and various omelet classes."

"The ham and cheese omelet class is worth special attention because it must inherit characteristics from the pork, dairy, and poultry classes. Thus, we see that the problem cannot be properly solved without multiple inheritance. At run time, the program must create the proper object and send a message to the object that says, 'Cook yourself.' The semantics of this message depend, of course, on the kind of object, so they have a different meaning to a piece of toast than to scrambled eggs."
"Reviewing the process so far, we see that the analysis phase has revealed that the primary requirement is to cook any kind of breakfast food. In the design phase, we have discovered some derived requirements. Specifically, we need an object-oriented language with multiple inheritance. Of course, users don't want the eggs to get cold while the bacon is frying, so concurrent processing is required, too."

"We must not forget the user interface. The lever that lowers the food lacks versatility, and the darkness knob is confusing. Users won't buy the product unless it has a user-friendly, graphical interface. When the breakfast cooker is plugged in, users should see a cowboy boot on the screen. Users click on it, and the message 'Booting UNIX v. 8.3' appears on the screen. (UNIX 8.3 should be out by the time the product gets to the market.) Users can pull down a menu and click on the foods they want to cook."

"Having made the wise decision of specifying the software first in the design phase, all that remains is to pick an adequate hardware platform for the implementation phase. An Intel 80486 with 16MB of memory, a 300MB hard disk, and a SVGA monitor should be sufficient. If you select a multitasking, object oriented language that supports multiple inheritance and has a built-in GUI, writing the program will be a snap. (Imagine the difficulty we would have had if we had foolishly allowed a hardware-first design strategy to lock us into a four-bit microcontroller!)."

The king had the computer scientist thrown in the moat, and they all lived happily ever after.