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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 online bi-monthly. Contact the editor to have a printed copy mailed.
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Upcoming Events

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

Toyota Plant Tour in Cambridge

Vehicular Technology Chapter presentation
October 30, 2006, 1:15 pm

The tour will take you right into the heart of Toyota Motor Manufacturing Canada Inc to see how robots and Team Members build the Corolla, Matrix and Lexus RX330. The tour guides will communicate directly to you through an audio headset as you travel on a motorized tram into the action.

· See production and quality control systems in action
· Learn about just-in-time manufacturing

For more information, visit
http://www.cambridgetourism.com/sub/Toyota/default.asp
Location: Bus Stop at Davis Centre on U of W Campus
Fee: $10
Attendance is limited - RSVP to wzhuang@uwaterloo.ca by October 12.
(The tour takes about 1 1/4 hrs plus ride from U of W to Cambridge and back)

Call for IEEE Mentors!

IEEE is offering its members the opportunity to participate in an online program which will facilitate the matching of IEEE members for the purpose of establishing a mentoring partnership. By volunteering as a mentor, individuals use their career and life experiences to help other IEEE members in their professional development. As a mentee, you lead your partnership by selecting your mentoring partner from among those who have volunteered to serve in this capacity. We ask that you review the time and effort commitment to the program to ensure a successful mentoring partnership.

Presently, IEEE is offering potential Mentors, like you, the opportunity to enter the program first. IEEE has partnered with The Training Connection, a vendor that has developed a web-based mentoring program to facilitate the matching process.

Participation in the program is voluntary and open to all IEEE members above the grade of Student Member.

If you are interested, please go to http://www.ieee.org/mentoring for information on the roles and responsibilities of each mentoring partner, the program, as well as additional information on time and effort commitments. To access the online program site visit the IEEE Membership Benefits page listed under Core Benefits "New for 2006" at http://www.ieee.org/web/membership/benefits/index.html . This will then take you to the online mentoring program site. We encourage you to take advantage of the IEEE network of technical professionals and sign up for the online mentoring program today.

If you have any questions, please contact Cathy Downer, IEEE Mentoring Program Coordinator, at c.downer@ieee.org

Recent Events

Senior Member Upgrades

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

Ming Li –Canada Research Chair in Bioinformatics
Professor, David R. Cheriton School of Computer Science Research interests: Bioinformatics, Kolmogorov complexity and its applications, computational learning theory, computational complexity, and design and analysis of algorithms.
See http://www.ieee.org/ra/md/smprogram.html for more information on this program.

The First Sound Broadcast, Reginald Fessenden's Feat

IEEE co-sponsored event

On Friday June 2, in the Great Hall of Luther Village, about 120 members of Kitchener-Waterloo community, including residents of Luther Village, members of the local section of the IEEE, and members of the Kitchener Waterloo Amateur Radio Club, were treated to a short talk by Dr. Thomas W. R. East, followed by a three act play, highlighting the life of Reginald Fessenden.

The play was written by Dr. East, a long-time member of the IEEE. His author biography stated that "Dr. East has a B.A. from Cambridge University and a Ph. D. from McGill University, Montreal. He worked on radar in World War 2, and on weather radar at McGill. From 1958 to 1987, he was with Raytheon Canada Limited in Waterloo, working on air traffic control radar, navigational aids and telecommunications. He is the co-author of Satellite Communications Fundamentals."

The first act of the play was set at Chemong Lake near Peterborough, in 1893, where Reginald Fessenden, played by Tom East, is discussing wireless transmission of sound with his uncle Cortez Fessenden, played by Morris Fraser. Both actors showed the enthusiasm that accompanies engineers and inventors as they discuss the latest in

technology, in this case the transmission of sound without wires. With the cry of a loon, the audience was transported to this Ontario lake, and so the image of ripples in the water from a stone as being like a continuous sound wave was something everyone in the audience could vividly imagine. Reginald Fessenden had to fight to prove that his theory of a continuous wave, in contrast to others such as Marconi who felt that sound was transmitted through a whiplash effect, was correct.

A short scene change gave us Fessenden's laboratory at Brant Rock, Plymouth Massachusetts. In the first scene, in October 1900, Fessenden, his engineer assistant Adam Stein, played by Dave Brooks, and his wife, Helen Fessenden, played by Dorothy Hobson, reenacted the first wireless transmission of voice, receiving a Morse code reply. The message was quintessentially Canadian, as befitting an engineer and inventor born in Quebec, as Fessenden asked about the weather.

In the second scene, six years later in September 1906, we see the three hoping to send a wireless transmission. Alas, it was not to be as we hear a Morse code message informing them that a tower has fallen in the wind, dooming the experiment to failure. The scene nicely set up the dramatic tension for scene three, which occurred on Christmas Eve of 1906. Wireless operators for ships in the Atlantic had been told to expect something unusual. Fessenden then sent the first radio broadcast of both voice and music. As the last notes of the violin solo performed by Tom East as Fessenden died away, the audience held its collective breath waiting for the sound of Morse code as a reply, hoping that this time, there would be success. There were smiles all round as the replies from the Atlantic, praising a clear broadcast, were received.

Fessenden, while a visionary engineer, unfortunately did not receive much credit for his work, and his patents were seized by his partners. In the last scene of Act 3, Dorothy Hobson did an excellent job of expressing the distress of discovering that Fessenden's life work was to be taken away. Bill Bergey, as T. H. Given, a partner in the National Electric Signalling Company nearly stole the show as he showed up at the lab with an employee, played by Henk van Duren, to dismantle the lab and remove the patents. The scene change was handled particularly deftly as the two actors then dismantled the lab in front of our eyes.

In the last act, we see a much older Fessenden and his wife at their house in Bermuda in 1928. They are reflecting on the many inventions of his life, and the few times when Fessenden was honoured for his work. As they sort through the mail, Fessenden opens a letter from the Institute of Radio Engineers (one of the two societies merged to form the IEEE), muttering that it is likely a letter asking for his annual dues. As he read the letter, we were able to share in the pride of knowing that he received a Medal of Honour from the IRE. The year was a good one for Fessenden, as he also finally received a settlement for his patent lawsuits.

The play was very enjoyable, and John Kerr as director obviously did a fine job working with his cast of amateur actors. Everyone involved in the production was a resident of Luther Village. While there was, ironically, a few initial technical glitches with the

sound, this in no way detracted from the audience's enjoyment of the play once it started. It was a wonderful (and apparently technically accurate as I am told even the Morse code messages were correct) way to learn more about a great Canadian inventor and engineer.

Computational Intelligence for Green Production Systems

IEEE co-sponsored seminar by Professor Hossam A. Gabbar of Okayama University

There is a worldwide shift towards safe and clean production systems. Such move requires effective process modeling and simulation environment that will enable the identification and evaluation of different production scenarios in view of internal and external requirements and constraints, with respect to safety and environmental impacts. Due to the complexity of the target production chains, computational intelligence techniques are investigated that are employed to design intelligent systems for process design and operation. Robust modeling methodology and static and dynamic simulation approaches are proposed on the basis of knowledge engineering concepts. Intelligent network structure analyzer is proposed to generate and evaluate different production scenarios for optimum supply chains. The proposed modeling & simulation environment is illustrated using a case study of renewable energy production chains.

Constrained Coding for Long-Haul Optical Fiber Transmission Systems

IEEE co-sponsored seminar by Prof. Frank R. Kschischang of University of Toronto

Fiber nonlinearity, the major impediment to optical fiber transmission systems at data rates exceeding 10 Gb/s, manifests itself in different ways depending on the system design and regime of operation. For example, in dispersion-managed soliton systems, nonlinearity results in undesirable pulse-to-pulse interaction, which may corrupt transmitted data. In optical transmission systems operating in the quasi-linear regime, nonlinearity results in the formation of so-called "ghost pulses." In both cases, these pulse interactions may be regarded as a form of intersymbol interference, and hence these impairments are not overcome simply by increasing transmission power.

In this talk we show that constrained coding can have very positive benefits in optical fiber transmission systems: intersymbol interference can be reduced significantly, and, somewhat surprisingly, data rates can be increased! Data rate improvements arise by encoding information in the previously redundant "white space" between pulses. Simulations show that data rate improvements of up to 50% are possible with low-complexity encoders and decoders, and hence constrained coding represents a promising approach for future long-haul optical fiber transmission systems.

Conestoga Students Control House with Blackberry

KW Record

By combining electronics, programming and the ever-present Blackberry, graduating students demonstrated a system to remotely control household appliances, lights and locks. The system won the Tech@Work competition at Conestoga College.

Top 20 Under 20 Award
UW media

Keith Peiris, a Waterloo Engineering student in nanotechnology engineering, received one of Canada's Top 20 Under 20. The award recognized outstanding innovation and leadership and achievement.
http://www.top20under20.ca/en/Awards/Awards3.htm

Nortel and NSERC establish wireless networks research chair
UW Media

Professor Amir Khandani, chair of the local IEEE Information Theory chapter was appointed senior chair focused on technologies that will help shape the future of wireless networks.

The research program will focus on third (3G) and fourth (4G) generation broadband wireless technologies, leveraging Nortel's wireless innovation leadership, the University of Waterloo's reputation as one of the world's top technology research centres and NSERC's proven track record of supporting Canadian university research in science and engineering.

Dalsa's Digital Movie Camera Shoots Shorts
KW Record

The Origin, Dalsa's 8M pixel camera, has been used to record a Snickers chocolate bar commercial and a short Sci Fi movie called "Postcards from the Future".

Dalsa has also produced a 111M pixel chip destined for a telescope.

Hearing Aid/Cell Phone Link
KW Record

AMI Semi-conductor, formerly Dspfactory, is designing a wireless link that would allow hearing aids to be used with cellphones and adjusted with a remote control.

Maplesoft Debuts Podcasts
KW Record

Maplesoft now mixes education, history and new product information into podcasts. "This company has a lot of stories that need to be told". The podcasts are designed to get people talking about the company's products.
http://www.maplesoft.com/community/podcast/

Engineers and the World

Advertising the Engineering Profession

IEEE

TryEngineering.org is a new web site which combines interactive activities with information on careers in engineering. TryEngineering.org is a resource specifically designed to educate counselors, teachers, parents, and students about the different engineering disciplines and the impact engineers have on society. TryEngineering.org provides visitors with the unique ability to find accredited engineering programs at universities throughout the US and Canada. The site also provides visitors with preparatory guidelines for students looking into an engineering career and classroom activities that demonstrate engineering principles. The site was developed in partnership with IBM and The New York Hall of Science and was launched 5 June 2006. Sixteen days after launch, the website received over 18,813 hits and over 3,110 unique visitor sessions. The next steps for the project are to expand the university database, translate the site for non-English speaking countries, and expand the lesson plan database. Check out TryEngineering at http://www.tryengineering.org.

UW Students to Build Green Co-op

UW Alumni

UW students and Cambridge community members are addressing a shortage of student housing space by building an environmentally-friendly cooperative. The construction will employ straw bale construction, recycled wood for the flooring, non-toxic paint, solar panels, a green roof and a wastewater and grey-water filtration and recycling system. For more information about the house and their "Buy-a-bale" fund raising effort see: http://www.grandhouse.wacsa.org.

GridWise Appliances Demonstrate Savings

InformationWeek

Two hundred homes in the Pacific Northwest are using computer controlled dryers, water heaters and thermostats to save energy and money for consumers and providers. The homes receive real-time price information through a broadband Internet connection and automated equipment will adjust energy use based on price. In addition, some customers will have computer chips embedded in their dryers and water heaters that can sense when the power transmission system is under stress and automatically turn off certain functions briefly until the grid can be stabilized by power operators.
http://www.pnl.gov/news/2006/06-01.stm

New Technology Incubator

Waterloo Tech Digest

Infusion Development, an IT services company based in New York and Toronto that counts several UW graduates among its staff, has opened a Waterloo office called Infusion Angels. It is looking to provide angel funding for ideas from UW students and alumni. Infusion Angels calls itself a full-service incubator and says it's interested in "novel, commercializable concepts of any kind." Infusion Development also plans to use its angel arm to develop internally-generated product ideas that it would otherwise not be able to commercialize. http://www.infusionangels.com/index.html

Invest in the Future and Save Money

UW Media

Gerald Van Decker's (BASc '93, MASc '96) Power-Pipe™ looks rather unassuming for all the potential power is holds. His Waterloo-based company, RenewABILITY Energy Inc., has developed a drain water heat-recovery device that recycles heat from warm water, which otherwise is lost down the drain. By attaching the Power-Pipe to current plumbing systems in residential, institutional, industrial and commercial settings, there are dramatic cost savings for customers and reduced pressure on the environment.

For more info, see:
http://www.renewability.com/

The $100 Laptop is Coming

IEEE USA

Some manufacturers Dr. Mary Lou Jepsen approached about producing and selling a laptop computer for $100 laughed at her. Despite this chiding and disbelief, the One Laptop Per Child (OLPC) chief technology officer has persevered, and the $100 laptop is on track to be shipped next spring.

Jepsen describes the OLPC program in “Working on the $100 Laptop” in the July issue of "IEEE-USA Today’s Engineer Online."

OLPC is a non-profit association dedicated to researching and developing a low-cost laptop to serve as an educational tool for children in the developing world. The cheapest laptops on the market today typically sell for about $499, a price completely out of reach for most of the world’s children and their parents. The $100 laptop has the potential to transform education in the world’s poorest countries.

Jepsen writes that Billy Edwards, AMD’s chief strategy officer “describes our design of the $100 laptop as the first fundamental revisit of personal computer architecture since IBM launched the PC in 1981. Twenty-five years, and now, for the first time, we’re redesigning the whole architecture — hardware, software, display — and we’re coming up with some remarkable inventions and innovations.”

The $100 laptop, which will have online capability, will also have features that most typical laptops do not. These include instant on, three to four times the range of WiFi antennae, a hand crank to recharge the battery, one-tenth the power consumption, and a higher-resolution display.

“This is not a cost-reduced version of today’s laptop,” Jepsen writes.
“It's an entirely new approach to the idea of a laptop.”

For more information: www.todaysengineer.org

Engineering Humour

What do you mean by Vegitarian?

Tom East

In 1997, I attended a large international conference on Solar Powered Satellites at a five star hotel in Montreal. At the banquet, I was sitting next to a scientist who had flown in from India, to present an award to someone.

On the application form, you are asked whether you will be attending the banquet, and whether you want meat, fish or "other". The man from India had evidently written "vegetarian". When he checked in at the conference, he was asked "What do you mean by vegetarian?" He had replied "anything made of vegetables and rice will do".

At the banquet, while I was being served beef and mashed potatoes, he was given a finger salad of raw carrots and celery, and a bowl of rice pudding. For this he had paid $35.00.