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.

Recent Events

Origins of Ground-Based Radar Research in Canada

IEEE seminar by Professor Emeritus Don R. Moorcroft from University of Western Ontario

The radar equipment and techniques used in studies of Earth's atmosphere in this country evolved out of Canadian experience with radar during the Second World War. Starting from the late 1930s, I will briefly trace the developments that led to the research uses of radar for atmospheric studies in the immediate post-war period. During the next decade or so the foundation was laid for all subsequent work in the field, both in terms of the techniques which were used, and the individuals who would use them. Thus, the focus of this talk is on the history of ground-based radar up to the 1960s, with occasional reference to later studies as appropriate.

An Introduction to Chaotic Pattern Recognition and Blurring

IEEE seminar by Professor John Oommen of Carlton University

Pattern Recognition is the study of how a system can observe the environment, learn to distinguish patterns of interest from their background, and make decisions about their classification or categorization. In general, a pattern can be described with features where the dimensionality of the feature space can range from a relative few to thousands. Our aim is to design a chaotic neural network that mimics olfactory structures that exhibit periodicity and chaotic activity during sensory recognition. In this talk we describe

chaotic neural networks which recognize various input patterns by resonating sympathetically when target samples are presented.
We also consider the inverse problem: When and how does a PR system lose its recognition capabilities? We investigate the architecture of a neural network that loses its capacity to recognize patterns even though the quality of the stimulus may be perfect. We believe that this approach provides a chaotic rationale for both perception and its failure; it also presents a rationale for some well-known visual illusions.
[A joint work with Dr. Calitoiu and Dr. Nussbaum]

Accounting and Charging Support for IP Services

IEEE seminar by Prof. Dr. Burkhard Stiller University of Zurich, CSG@IFI

This talk presents a focused overview on current key activities undertaken at the Communication Systems Group CSG, Department of Informatics IFI, University of Zurich, which addresses work on accounting and charging in an IP-based networking environment.
Decentralized control and relevant management aspects are covered as well in this context.

Initially, in the application domain of grid services, the need to go mobile has been taken up to develop suitable mechanisms in support of mobile grids and their users. Existing networking mechanisms like AAA, A4C, QoS, and security have been integrated into existing grid models, while technology and business models have been combined effectively.
Furthermore, the application of a network management and charging approach requires in a distributed multi-provider environment a heterogeneous and efficient accounting paradigm to be established. The work performed addresses interaction schemes, protocols, and parameters for any kind of distributed accounting for Internet services.
Finally, the popularity of fully decentralized control has increased dramatically, but security and market management aspects have been neglected for quite some time. The work sketched in this area targets at suitable models and technology to enable accounting and charging support for decentralized services.

Conestoga Student Part of Winning LaunchPad 50K Team

Conestoga College

Andrew Kolb, a student in Conestogas Graphic Design program, has used his skills to contribute to the winning team in what is known as the LaunchPad 50K Venture Creation Competition.

In LaunchPad, emerging entrepreneurs, including students from Conestoga and the three area universities (Waterloo, Guelph and Wilfrid Laurier) develop and present plans for new ventures to a panel of judges from the business and investment community. The idea for the competition, promoted by Communitech, is to bring together students, alumni and others, for the purpose of developing business plans that can be turned into viable, sustainable and scalable new enterprises.

The three top winning proposals share $50,000 in money and in-kind services.

The first-place proposal, called The Nesting Space, won $12,500 in cash and a similar amount in business services. The proposal was developed by Wilfrid Laurier graduate Christine Robinson, along with team members Brent Steinmann, a current business student at Laurier, and Conestogas Kolb.

The Nesting Space is a novel parent-and-child facility. The idea is to establish a friendly, welcoming, accessible place that can serve both parents and children. For the children, there are play areas and day care services; for the parents, educational and learning resources, as well as wellness programs. Robinson hopes to open her first centre in Waterloo, but one of the strong features of her proposal is that it is a concept that can be replicated in other neighborhoods and cities, meaning that The Nesting Space could offer franchising potential.

Kolb is from Kitchener. His contribution to the team included concept designs and applications with regard to the business logo, branding campaign, wordmark, business cards and other business items. In addition, he was instrumental in development of the business plan layout and what was known as the techvibe presentation - an interactive networking exhibition and competition.

Communitech is based in Waterloo Region. It is a business, industry and education partnership organization dedicated to advancing Waterloo Regions technology sector through leadership, outreach alliances and promotion.

Com Dev takes $9M hit, wins $39M contract

Waterloo Tech Digest

A problem with a multiplexer order could end up costing Com Dev as much as $9 million. The company is working with its customer to determine how much work will need to be redone, and will recognize most of the costs in the quarter ended April 30 (Q2 07). The company says it has identified and fixed the underlying problem and that it only affected the one program. At the end of the month, Com Dev announced that it had received a follow-on civil space contract valued at $39 million.

Premier’s Innovation Awards

Canadian NewsWire

Premier and Minister of Research and Innovation Dalton McGuinty honoured Ontario's top research and innovation talents at the inaugural Premier's Innovation Awards ceremony held at the MaRS Discovery District.

“Progress is made through people who have the vision to see beyond the status quo," said Premier McGuinty. "By imagining new possibilities, taking new risks and finding a better way, these winners have made great achievements that will ultimately change the world for the better. I am proud to support and celebrate their extraordinary accomplishments."

Local winners of the Premier's Catalyst Awards for excellence in innovation include:

- Innovator of the Year: En-Hiu Yang, Waterloo
- Lifetime Achievement in Innovation: Savvas Chamberlain, Waterloo
- Company with the Best Innovation: Research In Motion, Waterloo.

UW Graduates’ Invention Top 10 in Popular Science

KW Record

A life-saving glove invented by two recent graduates of the University of Waterloo has been recognized as one of the year’s top 10 inventions by Popular Science magazine. The magazine’s June issue will feature the CPR Glove as the only Canadian invention on its top 10 list.

The glove is filled with sensors to monitor compressions administered during CPR. The students were inspired to make the glove after learning that most people trained in CPR forget what the learned within six months.

Engineers and the World

World's most 'intelligent' community

UW Media

Waterloo was named the world's top "intelligent community" for 2007, beating out six other finalists as the award was presented in New York by the Intelligent Community Forum.

In announcing Waterloo as the Top Intelligent Community, Lou Zacharilla of ICF referred to Waterloo as a North American community like no other. "What makes Waterloo special is that in the heart of the technology triangle, the tradition of community barn raising, looking after one another from the very young to the very old, is kept alive today. It's a place where people wake up and give thanks for the fruits of their works and for their good fortune."

http://www.intelligentcommunity.org/

Engineer evaluates new golf clubs for Golf Digest

UW Media

For John McPhee, the invitation to evaluate all the new golf clubs out this year for Golf Digest magazine was a dream come true. In fact, the Waterloo systems design

engineering professor and former Canadian junior golfer originally thought the invitation to the Georgia event from the magazine with a readership of 1.6 million was a hoax. "I was happy to find out it was on the up and up," McPhee says.

Prof. John McPhee has always been a golf enthusiast both on and off the course - his first published paper in the 1988 American Journal of Physics was on the aerodynamics and 3D trajectories of golf balls. He got to know MIT professor Kim Blair at a sports engineering workshop and, in turn, Blair recommended McPhee as a technical advisor (scientist) to Golf Digest.

Last October McPhee attended the Hot List Summit at Callaway Gardens in Georgia, to which the magazine's editors invite golfers, golf retailers and technical advisors to evaluate the hundreds of new clubs introduced this year. "The 'scientists' were there to evaluate the manufacturers' claims and to explain the underlying science of the clubs in layperson terms to the editors."

For a golfer, being able to get his hands around brand-new clubs was exciting, but McPhee admits it was hard work. The evening he arrived he was presented with all the manufacturer's specs for new drivers followed by five-inch-thick documents on irons, wedges, putters, hybrids and fairway woods.

"At the end of one day, we managed to go to the driving range with several hundred clubs to test. We then grabbed about 50, threw them into the back of a golf cart and squeezed in 18 holes before dark. I played terribly, but I loved the conversation about the new clubs and their technology."

His own golf bag will be getting a makeover this spring. "I will definitely be upgrading my ancient clubs. I like the new Callaway X-20 irons - and they didn't pay me to say that - but I'm still undecided about the new driver I'll buy."

Since his Hot List experience, McPhee has submitted a conference paper on the biomechanics of the golf swing. He is also supervising an undergraduate student design team that is developing a camera-based swing analysis system recently demonstrated to the golf pro at Waterloo's Grey Silo golf course. As well, he is working with Willem Petersen, a German exchange student, on the modelling of impact between club heads and balls to scientifically evaluate the effects of golf club parameters like moment of inertia and groove design.

A native of Cape Breton, McPhee grew up regularly playing 18 holes of golf in the morning and nine at night and played in the 1978 Canadian Junior Golf Championship. The father of a daughter, seven, and two sons, five and two, he doesn't have a lot of time to golf these days, but expects that to change in the future - his kids are already learning to swing a club.

For more information about the Golf Digest Hot List, visit their site online, http://www.golfdigest.com/hotlist/

Physical Space: the psychologist's frontier

UW Media

Colin Ellard has spent much of his career studying the brains, behaviour and navigational prowess of gerbils. Now, he is turning his attention to humans.

"How do we manage the challenges of finding our way through space?" he asks. As it turns out: not very well. "When I started to do research with people, I was amazed at how poorly they did in comparison with gerbils, rats and mice!" says Ellard. Compared to animals, humans are remarkably -- and sometimes disastrously -- unsophisticated. Cats can find their way home, it seems, but without the aid of crumb trails, maps and GPS tracking devices, human beings have a strong tendency to get lost.

According to Ellard, our relationship with space -- our spatial cognition -- is extraordinarily complex, particularly our visual processing of the built and natural environments. To better understand just how we interpret, and sometimes misinterpret, the spaces that surround us, he is turning to the emerging technologies of virtual reality.

Ellard and his students are developing "immersive virtual environments": simulated three-dimensional spaces. Outfitted with a visor containing specialized visual displays and a motion detector, users enter a virtual space that they are able to explore visually and (with the help of a joystick) walk through. "The setup is still pretty rudimentary," says Ellard. "Very soon, though, we'll be upgrading to a newer system that will enable a much richer and more realistic experience, where people will be able to walk around freely in virtual worlds, without the encumbrance of wires or joysticks."

Then he'll be able to examine such factors of human spatial cognition as depth perception, distance estimation, target location, and patterns of navigation. Rather than simply observing from the outside, he will be able to track from the inside, as it were: monitoring, recording, and comparing the precise behaviours engaged in by human participants as they move through a space.

The new VR technology will also open up possibilities in related fields. "I've spoken with architects and urban planners who are very excited about the prospects VR holds out for enhancing design," says Ellard. "With VR, buildings and urban spaces can be `walked through' and improved while still in the pre-build, design phase." Likewise, social interaction researchers look forward to being able to use virtual environments. By observing social behaviour as it takes place in consistent, carefully designed virtual spaces, such researchers will be able to eliminate many of the variables that plague "real world" experiments. Psychologists studying human attention and collaborative cognition, too, have recognized the potential of VR technology to help them record how people work together to solve cognitive problems.

Finally, VR technologies hold out exciting possibilities for psychotherapists, particularly in the area of phobia therapy. A widely adopted behavioural intervention for individuals suffering from phobia is desensitization through gradual, repeated confrontation with the

feared object or environment. Such therapy, however, can be impractical, socially awkward, at times even dangerous. VR technology will enable a realistic and more easily monitored and controlled simulation of such therapeutic interventions. Instead of having to buy a ticket and step onto an actual plane, an individual seeking to lessen a fear of flying would be able to engage in a virtual experience of boarding, waiting, and taking off. "Virtual environment technology can be used as a tool to immerse human beings in all kinds of alternative realities - it's almost like being able to do experimental metaphysics. Such a tool has obvious applications for experimental psychology, and for a wide range of other disciplines as well," says Ellard.

U of G Profs Help Towns Plan for Influx of Windmill Farms

University of Guelph

Windmill farms are cropping up faster than some rural municipalities can plan for, so University of Guelph landscape architects have developed guidelines to help communities incorporate these towering structures without sacrificing their idyllic landscapes.

Jim Taylor and Robert Corry of the School of Environmental Design and Rural Development recently conducted a study for the Ontario Ministry of Agriculture, Food and Rural Affairs to develop best practices for siting wind energy facilities in rural Ontario. The report was based on research conducted for the Municipality of Grey Highlands on wind farm zoning.

“There’s been a whole shift towards renewable energy,” said Taylor. “Ontario was virgin territory for wind energy, and now all of a sudden operators of commercial wind generation are looking for places here. Small rural areas are having wind farms dropped on them.”

The recent move by the province to support renewable energy, including wind energy, has made it a viable economic business in Ontario, said Taylor. But with most wind turbines standing at least 100 metres high and the average wind farm stretching a couple of kilometres, this new form of rural industry can cause significant change to the rural landscape, he said.

“Wind generators are strong visual elements, and people react to them. Some like them and some hate them.”

One of the biggest concerns rural communities have about the towers is that they destroy the scenic view that attracts residents and tourists to the area.

In developing the zoning plan for the Municipality of Grey Highlands, Taylor and Corry considered the landscape as well as the impact on residential and recreational activities. Corry said spots near major roads, scenic viewpoints and residential areas are typically not suitable for wind farms.

“But in locations where there are trees nearby, they might work as a good place because the trees would act as a visual blocker,” he said.

The final plan developed for Grey Highlands includes three distinct zones: areas that shouldn't have wind farms because the towers would conflict too much with the scenic value; areas that are physically sensitive to towers and should require an environmental assessment before an application for a wind farm is accepted; and areas that are suitable for wind generators because the towers won't conflict with the scenery or any residential or recreational activities.

The researchers used field observations and geographic information system technology to model such factors as visibility, visual absorption capacity, visual quality and policy protection zones.

Since development of the zoning plan last year, a number of rural municipalities in Ontario have turned to it to help manage inquiries from companies, said Taylor.

"This methodology will help give municipalities an idea of how to approach the influx of wind farms and how to defend decisions on where these farms can and can't go. Ontario's rural landscape is going to change with the increasing number of wind farms, but our view is that it should be managed and well-informed."

Game Fuses Shakespeare, Technology to Improve Literacy

University of Guelph

Reading Shakespeare can be a daunting and even dreaded task for kids. That is, until a University of Guelph English professor added a futuristic spaceship and an outer-space mission into the mix.

Daniel Fischlin has found an innovative way to use Shakespeare's language to teach literacy skills through a fast-paced computer game called, 'Speare. It was officially launched today on campus and could soon become commonplace in the classroom.

The first of its kind, 'Speare raises the bar on Flash technology and is a pioneer in educational gaming. It was designed to teach students about literacy within a familiar arcade environment, using cutting-edge technology to create a highly interactive educational tool.

"'Kids love this game, and when we tested it, we found that literacy scores increased by an amazing 72 per cent after just one hour of game play," said Fishlin, who created the video game with the Canadian Adaptations of Shakespeare Project (CASP) team.

"Imagine the possibilities considering statistics show the average young person spends six hours or more playing video games each week."

Aimed at students age 10 to 15, 'Speare starts with the player building their own battle ship. Then they are sent out on an outer-space mission to reclaim stolen knowledge spheres, containing the words of Shakespeare's play Romeo and Juliet. The spheres are needed to restore peace in the galaxy, which players accomplish by stringing together

recaptured spheres to form Shakespearean phrases. Players are then scored based on how well they do on the literacy component.

“Gamers are rewarded for making it through all five levels of the game by being linked to an interactive version of Romeo and Juliet,” said Fischlin. “The Interactive Folio is quite simply the most interactive form of the book we were able to imagine.”

To complement these online learning opportunities, CASP has created a new online Learning Commons in consultation with local school boards that will feature learning modules for teachers and students, he said. The Learning Commons is open to everyone and includes lesson plans with specific activities and strategies using ’Speare in the classroom as part of a comprehensive literacy program.

“Our goal is to have ’Speare on every kid’s and parent’s desktop in the country,” Fischlin said.
More information on ’Speare is available on the CASP website. The game can also be played online at: http://www.canadianshakespeares.ca/speare.cfm .