KITCHENER-WATERLOO SECTION

November 2003

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GOLD (Graduates of Last Decade)
vacant

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Upcoming Events

Check http://ece.uwaterloo.ca/~ieee_kw/presentations.html for updated information.

CCECE 2004 - Technology Driving Innovation.

Tony Kormos
The next Canadian Conference of Electrical and Computer Engineering will be held in Niagara Falls in May 2004. This conference, organized by local IEEE sections, provides a forum for Canada's best emerging Engineering talent and industrial leaders to present, participate, sponsor and network between partners in Canada's high technology frontier. For more information, see: http://www.ieee.ca/ccece04

CCECE 2004 – Student Member Funding

In May 2004, the Canadian Conference of Electrical and Computer Engineering (CCECE) conference is being held in Niagara Falls, Ontario.

As student participation in the conference is both critical to its success and a unique development opportunity for students as future engineers, the IEEE Kitchener-Waterloo Section offers to it's Student Members (in good standing) a subsidy of up to $100 per student to attend CCECE 2004. Effectively, this reduces the IEEE Student Member conference registration fee by 50%.

This subsidy is available on a first-come-first-serve basis to a maximum of 20 Students Members from our section. Student Members may apply for the subsidy by contacting the following section representative:

Treasurer: Joseph Shu 747 3969 x103 jshu@handshakeinteractive.com

Deadline for application is coincident with the conference pre-registration deadline of February 20, 2004. Following the conference and confirmation of participation, IEEE Kitchener-Waterloo Section will upon request to the above contact, reimburse the approved students directly.
There is also funding available for travel. The application form can be retrieved from the site: http://ewh.ieee.org/reg/7/ccece04/st_fund.htm

Agilent Laboratories and Applications of Photonics

IEEE MTT-Chapter presentation
November 5, 2003 10:00 am in DC 1302, University of Waterloo Davis Centre
Presenter: Dr. Waguih S. Ishak

We are approaching an era in which people will need 1-Gbit/s communications ports in their offices, their homes, and even on the road. These high-speed communications ports will enable telecommuting, telemedicine, tele-education, and a variety of multimedia applications for entertainment and computing. These demands for high-speed

communications will require new telecommunications and data communications infrastructure with terabit/s data rates.
We are also approaching an era where we will see networked sensors everywhere to monitor, manage and control the environment and improve the way we live.
Photonics technology has played, is and will be playing a CRITICAL role in the way we communicate, measure and, eventually, manage our environment.
At Agilent Labs, we have major research programs to develop technologies needed for high speed communications, interconnects, and sensing. Specifically, optoelectronics, fiber optics, micro optics, integrated optics and high-speed electronics are base core technologies and are considered key to the development of high-speed communications and sensing networks. Taking these technologies form the research labs to products will be key.

System Support for Application Adaptation

IEEE seminar Nov 6, UW DC 1304
Presenter: Eyal de Lara, Assistant Professor, Dept. of C.S & Dept. of E&CE, University of Toronto
ABSTRACT:
The need for applications to adapt to the limited and variable resources, such as bandwidth and power, that characterize mobile environments is well established. This talk will consist of two parts. First, I will introduce Component-Based Adaptation, a novel approach that supports powerful adaptation policies without requiring modifications to the application's source code. In Component-Based Adaptation, the applications expose a runtime Application Programming Interface (API) to enable adaptation. The system adapts applications by calling their API methods. Because source code modification is not necessary, even proprietary applications, such as productivity tools from Microsoft's Office suite, can be adapted, and applications can be adapted long after they have been deployed. Even if source code is available, development time for implementing adaptation is much reduced. In the second part of the talk, I will describe Adaptation-Aware Editing and Progressive Update Propagation, two novel mechanisms that enable authoring multimedia content and collaborative work on mobile devices. Adaptation-Aware Editing enables editing content that was adapted to reduce download time to the mobile device. Progressive Update Propagation reduces the time for propagating content generated at the mobile device by transmitting either a fraction of the modifications or transcoded versions thereof. With Application-Aware Editing and Progressive Update Propagation, an object present at a mobile device is characterized not only by a particular version, as in conventional replication, but also by a particular fidelity. I will demonstrate that replication models can be extended to account for the content's fidelity independently of the mechanisms used for concurrency control and consistency maintenance. As a result, these two techniques can easily be added to any replication protocol, whether optimistic or pessimistic.

Workshop on Image Processing: Methodologies and Applications.

UW-IEEE workshop at University of Waterloo, Ontario, Canada, November 6-7, 2003
Registration deadline: Oct 15
Information: Mailto:uwip_workshop@yahoo.ca

Inspiration: From Concept To Commercialization

Communitech

An event for aspiring high-tech entrepreneurs in Southwestern Ontario is being held on November 25th from 3:00 p.m. to 7:00 p.m. at Federation Hall on the University of Waterloo campus. This event will expose aspiring entrepreneurs to a number of successful high-tech entrepreneurs who will talk about their experiences, give real-life views of what being a high-tech entrepreneur is all about, and share their strategies for getting companies started. For more information see:
http://www.communitech.org/events.cfm?itemid=5149

Recent Events

Senior Member Upgrades

The following local members have earned the professional recognition of their peers for technical and professional excellence.
David A. Clausi
Daniel E. Miller
Navid R. Zargari
See http://www.ieee.org/ra/md/smprogram.html for more information on this program.

ATS Wins Bell Award

KW Record

The Bell Innovation Technology Award recognizes excellence in innovation, adaptability and the successful application of new technology. This year it was awarded to ATS as "The award judges were very impressed with ATS's commitment to ongoing technological innovation and their ability to perform consistently for decades in many diverse industries"

Dalsa boss wins tech honours

KW Record

Savvas Chamberlain was named Ontario Entrepreneur of the Year in the technology and communications category. He built Dalsa, a successful digital imaging hardware company, from a one person consulting firm to the current 775 person international company. He also donates extensively in the local area.

Professor Vlach Described Working Life In Czechoslovakia

Tom East

On October 8th, Prof. Jiri Vlach gave an account of his life in his native Czechoslovakia, until coming to North America. His earliest experience with radio was probing a galena crystal with a metal "cats whisker" to achieve diode action. Next came a three tube receiver with three tuning controls, tricky to adjust.

France had signed a treaty to defend his country if attacked, but when Hitler invaded in 1938, France stood aside. Because of student riots against the German occupation, Czech

universities were closed. Vlach took "special courses" after high school, learned German and worked as a draftsman in a Junkers plant on a J360 aircraft, which had as large a wingspan as a Boeing 747. He also learned Russian and English.

Some interesting comments on World War II radar from the German point of view: they thought that wavelengths less than 50 cm were useless, until the Americans flew a prototype of a 10 cm radar over the Netherlands, where it was shot down: not only did the Americans lose their only model, but the Germans gained the knowledge of the value of 10 cm. A German corporation had several factories, and a separate headquarters building: the allies bombed the HQ, and the outputs of the factories increased. In spite of the severe threat to Atlantic shipping by submarines, which depended on batteries for propulsion, the allies never bombed the battery factories.

At the end of the war, an election was held in Czechoslovakia, and the Communist party won. In 1968, Vlach and his family travelled from Czechoslovakia to Yugoslavia for a vacation and conference, just before the Russian army invaded their homeland. He headed for Illinois for a year, and then came to the University of Waterloo, where he is well known for his work and teaching on analog circuits.

'Slow down', say U of G professors, health professionals

UofG

Members of the University of Guelph and the Wellington-Dufferin-Guelph Health Unit worked together to host a series of events to encourage people to find ways to make more time for themselves and their families. The local initiative, called "It's About Time," is affiliated with the international Oct. 24 "Take Back Your Time Day."

US Coast Guard Tests Raytheon Canada Surface Wave RADAR

Tom East

In July, the US Coast Guard completed tests of Raytheon Canada's High Frequency Surface Wave Radar at Sugarloaf Key, Florida. The version tested this time, which uses vertical polarization at 15 MHz, detects ships from the shore out to 150 km. The radar is expected to contribute to Maritime Domain Awareness, a critical element of US national security. The Coast Guard is now an essential part of the US Department of Homeland Security.

In 2002, a highly successful demonstration of the system was given in the Bahamas to the US Counter Drug Technology Program Office.

The development of the HFSWR was spearheaded by Dr. Tony Ponsford, who has just been appointed to the rank of Raytheon Engineering Fellow, the first such appointment in Raytheon Canada's 47 year history. He is a member of the IEEE, and was a member of the IEE in the UK.

Fay Dowker Discussed Time at Perimeter Institute Lecture

Tom East

It was a full house of about 400 at the Waterloo Memorial Recreation Complex for the Perimeter Institute lecture on October 1st. Professor Fay Dowker's talk was entitled "The

Science of Time". She was a graduate student under Stephen Hawking, and is now at the Imperial College in London, but is working at the Perimeter Institute for a year.

She described three eras in science - before Einstein, the "common sense view", on which the physics of Galileo and Newton was based; after Einstein, "it makes more sense in a certain sense"; and the future "restoring the flow of time by the use of quantum theory of gravity".

Einstein introduced the concept of four-dimensional space, three dimensions of distance and one of time. The existence of a person or any object from birth to death traces out a "world line" in these four dimensions: it must continue unidirectionally in time, and cannot have a slope greater than the speed of light (c). We cannot see any world line beyond the point on it called "now" [Que sera, sera!].

The time taken to travel from A to B depends on the world line along which you travel: if you are traveling near the speed of light, the time is less. Gravity warps the space-time medium. The universe is 13x10^9 years old. (along the world line of our galaxy). A neutrino, traveling at a speed of c(1-10^-9) would only take one year to go from the big bang to now.

Under Causal Set Theory, space-time is not continuous, but is "pixilated", that is, in 1 cm^3 x 1 sec, there are 10^142 quanta (a similar idea to that presented at an earlier PI lecture). Space-time consists of quantum-like grains which are linked to each other, and new grains are being added and attached to other grains all the time.

The speaker refuses to discuss a "theory of consciousness".

Feeling the pulse of virtual reality

Ottawa Citizen, Selected by C. Hulls

Two Canadian companies used the magic of the Internet to reach out and virtually touch someone in Geneva yesterday. The two companies were using motorized devices to shake hands, check for a pulse and control two robotic arms through the Internet, from a lab in Ottawa's Communication Research Centre Canada.

MPB Technologies Inc. of Montreal provided hardware for two robotic arms and Handshake Interactive Technologies of Kitchener, Ont., provided software needed to make the devices work. The two companies were invited by Industry Canada to showcase their technologies at the International Telecom Union's Telecom World 2003 trade show yesterday.

The companies' two robotic arms mimicked each other. If one was shaken up and down in Ottawa, its counterpart in Geneva did the same. If the robotic arm in Geneva was abruptly stopped, its counterpart in Ottawa did likewise. This way, the thousands of people who stopped at the Canada Pavilion at the Geneva trade show yesterday were given the chance to shake hands with people in Ottawa. A full-motion video and audio Internet link allowed the people in Geneva to see and speak with researchers in Ottawa while shaking hands. "You can see it, you can hear it, and now you can feel it," said Gerry Turcotte, president of the Communications Research Centre Canada. "It will open up a lot of applications. The most practical thing is operations."

On Feb. 28, a surgeon at St. Joseph's Hospital in Hamilton, Ont., successfully performed a complex stomach operation on a woman in North Bay, 400 kilometres away, using a remote controlled robot named Zeus. The procedure was the first of its kind in the world, and the hospital plans to try more in the future. Turcotte said the "handshake" technology could benefit procedures like this because the surgeon would be able to virtually feel human tissue and receive feedback about the pressure being exerted during the remote-controlled operation. To illustrate its practical side, yesterday's demonstration saw people in Geneva use the robotic arm to feel the contours of a mannequin in Ottawa. By positioning the arm over the mannequin, every bump and contour was transmitted to the arm in Geneva and mimicked, allowing a person to feel the mannequin's body. People trying the procedure were also able to feel an artificial pulse within the mannequin.

FibreTech launches Wi-Fi hotspot near UW

Various

FibreTech is today unveiling a Wi-Fi hotspot that covers the University Plaza areas east of UW. People with 802.11-enabled laptops or other devices will be able to access the Internet wirelessly through the FibreTech service over an area of 4 sq km.

FibreTech says it's a free pilot site and plans to expand the service throughout Waterloo Region. It will use Wi-Fi technology to provide high-bandwidth Internet access to residential and small business customers.

'Pinch of salt' helps SNO, U of G scientists further explain mysteries of the sun

UofG

A common commodity that people sprinkle on their food every day has helped scientists at the Sudbury Neutrino Observatory (SNO), including University of Guelph physicists, further explain the mystery of missing solar neutrinos.
For more info see: http://www.uoguelph.ca/mediarel/archives/003321.html

Grant for research on web learning

UW Daily Bulletin, Selected by C. Hulls

A UW research team has received $1.14 million over five years in federal money as part of a Natural Sciences and Engineering Research Council network to develop tools for creating effective training courses and programs on the Internet.
More than 30 partners from the public and private sectors will contribute close to $1 million to the project. They will also provide expertise and resources to ensure that the research results are disseminated widely. The network plans to train some 40 graduate students and six postdoctoral fellows each year.

At UW, Mohamed Kamel of the systems design engineering department, who is Canada Research Chair in Cooperative Intelligent Systems, will lead a team to conduct work on knowledge extraction and learning object mining. The Pattern Analysis and Machine Intelligence group, including Otman Basir, Fakhri Karray and Hamid Tizhoosh, will carry out the research. Their work is also supported by contributions from two local companies: Pattern Discovery Software Systems and Voice Enabling Systems Technology.

"The main goal of Lornet is to build new knowledge in computer and cognitive science to help design and develop the architectures, the tools and the methods in a network of learning objects repositories to maximize its usefulness and efficiency for education and training on the Web," Kamel said.
Learning object repositories are used to make documents, tools and Web services available for learning and knowledge management within organizations.
"Telelearning means accessing knowledge and instruction where and when they are wanted, and it is essential if Canada is to successfully meet the challenges of the global knowledge economy," MP Yvon Charbonneau said on behalf of Allan Rock, federal minister of industry and minister responsible for NSERC. "Canada has invested a great deal in providing access to an on-line infrastructure, but this strategy can be effective only if combined with the development of electronic content," said Charbonneau.
http://pami.uwaterloo.ca/kamel.html

Virtual Tellers to make ATM's more Personal

KW Record
NCR demonstrated an animated teller designed to provide more functions and allow a personal connection with the avatar, as you would develop with a real bank teller. "If <Maddy the avatar> turns you down for a loan, she can be very sympathetic"

NDI makes Movie Video

KW Record
Music students from WLU had their motions recorded using NDI equipment while playing the double bass, clarinet and piano. The motions and music will result in a multi-dimensional, graphic representation of the performance which Northern Digital Inc hopes will build a bigger audience for its line of optical-tracking and measurement tools.

Waterloo Angel investor group formed

KW Record
Angel investors can provide an initial investment into a company but will also play a mentoring role early in the company's life. A new group of investors has been formed in the Waterloo region to streamline developing the connection between new ideas and the money and talent to develop it. See http://www.waterlooangelgroup.com for more information.

Waterloo Regional Children's Museum Opens

Hulls's and KW Record
The new children's museum incorporates many high-tech exhibits built or funded by local companies – too many to list here. The showcase "Pneumatic Cascade" shoots plastic balls 12 meters up and sorts them on the way back down. It was assembled by Meikle Automation's Kitchener workshop. Other exhibits include a Christie Digital Systems display and the complex control of a "satellite" suspended from 4 wires done by ATS.
For more information: http://www.wrcm.ca

Angstrom Engineering on Profit 100

KW Record

Angstrom designs and assembles custom high-vacuum systems that it sells internationally. These are used in areas such as the manufacture of silicon chips, solar cells and fibre optics. The company was ranked number 70 on Profit magazine's list of the fastest growing companies. Andrew Bass, owner, credits some of the success to the supportive community and availability of subcontractors in the region.

Micro and Nano Sensors Snoop Around

IEEE seminar by Professor Henry Baltes of Physcial Electronics Laboratory, Switzerland on Oct 17

Vision and hearing, smell and taste, and the tactile senses are bridges between the external world and our brain. Micro and nano sensors are miniaturized electronic devices, which pick up physical, chemical, or biomedical signals and enter them into the computer. The miniaturization of most kinds of sensors has been achieved, but the "electronic nose" able to detect a broad range of "smells" caused by complex mixtures of airborne chemical compounds is still a dream. But application specific gas sensors or "narrow band noses" are being developed, which can detect and identify gas mixtures in given application areas. Integrated gas sensors based on CMOS IC technology with on-chip microstructures (CMOS MEMS) coated with gas absorbing polymers or metaloxides are presented. The quest of sensor selectivity is tackled by combining different transducer principles (mass sensitive, capacitive, calorimetric) with different polymers or by varying the operating temperature of micro hotplates coated with metal oxides doped with different catalysts. Moving beyond chemo to biosensors, combinations of CMOS MEMS with bio-affinity molecules or immobilized living neural cells are discussed.

What are Superconductors?

WLU

Dr. Doug Dykaar, President of the Ontario Photonic Technology Industry Cluster (OPTIC) presented a special lecture on the work of Alexei Abrikosov, Vitaly Ginzburg & Anthony Leggett, winners of the 2003 Nobel Prize in Physics for their work in superconductivity and superfluidity.

CheckFree I-Solutions niche starting to grow

KW Record

From a basement in Kitchener, Ray Simonson and others have built software that has grown into a strong niche in the business-to-business payments sector. Their products now sell internationally and allow invoices to separated and paid in parts.

Electralogics Supports Advanced Skills Education at Conestoga College

Conestoga College

Electralogics Incorporated has developed products such as specialized modems for data storage and retrieval, kitchen automation systems, several touchscreen-based point of sale cash till systems and associated custom software.

It recently donated nearly $750,000 worth of top-of-the-line, nearly new turning and machining equipment to Conestoga College's Institute of Technology and Advanced Learning.

Think tank for health informatics

UW Daily Bulletin, selected by C.Hulls

The Waterloo Institute for Health Informatics Research has unveiled a key component of its Industry Outreach Program: The Waterloo Health Informatics Think-Tank (WHITT). WHITT is a forum for industry and academic leaders to explore, examine, critique and analyze information-related problems and solutions in health informatics. Health informatics is the discipline that investigates how information, information management, and information and communications technologies can deliver value in the area of health.

The goals of WHITT are to understand health system challenges, discover realistic and comprehensive solutions and connect interested organizations to the research and development capabilities of the Institute and its industry partners.

Space Mapping: Modeling and Optimizing Complex systems

IEEE Seminar Oct 6

John Bandler presented his space mapping approach to engineering model enhancement and design optimization which intelligently links companion "coarse" (ideal or low-fidelity) and "fine" (practical or high-fidelity) models of different complexities. Examples include full-wave electromagnetic (fine) simulations with empirical circuit-theory based (coarse or surrogate) simulations, or an engineering device under test coupled with a suitable simulation surrogate. The methodology has been adopted for diverse design applications: electronic components, magnetic systems, civil and mechanical engineering structures. Space mapping facilitates efficient optimization while avoiding direct optimization of the fine model. It is a simple CAD methodology, which closely follows the traditional experience and intuition of engineers, yet is amenable to rigorous mathematical treatment.

The Tradeoff between Diversity and Freedom in Wireless Systems

Tom East

On September 24, over 30 people turned up to hear Prof Tse of University of California/Berkeley discuss space diversity in wireless systems, for example, the up link between cellphones and base station. Because of multipath effects, the path is subject to rapid fades, typically 10 dB or more (and also to increases in strength above free space level). Fading can be mitigated by space diversity, using separated antennas at the receiving end, and even two antennas at the sending end. The numbers of antennas impact both diversity gain and also spatial multiplex gain. The system can be designed to achieve the best compromise between the two kinds of gain.

One other way of increasing reliability of multipath links, at least for data transmission, is to use a nearby mobile unit as a relay station. The base station sends an acknowledge signal if the transmission has been received. If the call is not going through because of a fade on the path from the originating unit to the base station, a nearby unit which is switched on but not being used, and which has heard the original message, repeats it to the base station: there is a good chance that this second path is not fading while the first one is.

Biomedical circuits and systems to recuperate neuromuscular functions

IEEE presentation

This talk covered the techniques and methods employed to build high reliability Biocircuits and Biosystems dedicated to design and implement advanced implantable and wirelessly controlled devices such as sensors and microstimulateurs. A global view of typical micro-device will be given. In addition, case studies related to peripheral and cortical neural systems were presented. Special attention was paid to low-power management and corresponding circuit techniques of such typical implantable multi-disciplinary systems.

Introducing Fountain Codes

IEEE presentation by Amin Shokrollahi

Fountain Codes constitute a new class of truly variable rate codes. For a given vector of k input symbols, a Fountain Code produces a potentially limitless stream of output symbols. Output symbols are generated independently and at random. Good Fountain Codes have the property that the input symbols can be recovered from a close-to-optimal number of output symbols. This talk introduced two classes of efficient Fountain Codes and exhibited codes in these classes that achieve the capacity of any erasure channel. How Fountain Codes on channels other than the erasure channel and discuss some very recent results about their performance.

Big boost to Canadian astronomers

UW Daily Bulletin

SCUBA-2, a multi-million-dollar astronomy initiative is a major advancement for space exploration. The $12.3-million CFI investment provides for the development of a next-generation, submillimetre-wavelength camera for astronomers. It will begin operating on May 1, 2006.

http://astro.uwaterloo.ca/~scuba2/

Infrastructure for Tetherless Computing

IEEE Presentation by Srinivasan Keshav

In the near future, client applications running on ubiquitous devices, such as Personal Digital Assistants (PDAs), Radio Frequency ID (RFID) tag readers, and mobile telephones, will maintain intermittent and heterogeneously administered wireless connectivity with back-end services running on powerful data stores and compute engines. "Tetherless Computing" brings these elements together to allow novel classes of applications, such as:

- User-centric and geographically-aware clients that offload processing to back-end servers.
- Services that aggregate and coordinate information collected by a large number of edge clients to form a single query-able 'global state'.

The challenges in making tetherless computing infrastructure reliable, seamless, secure, scalable, and with the best possible performance were discussed.

Next Generation Broadband Wireless Access

IEEE seminar by Peiying Zhou of Nortel Networks on Oct 28

Broadband access represents a major driver for the next generation wireless access technologies. Highly spectral efficient technology becomes a fundamental enabler for both macro-cellular and short range wireless access networking.
This talk presented a view of the evolution towards a new generation wireless cellular network and its enabling technologies, challenges and practical hurdles. This included a brief presentation of Nortel's research activities in this area, with emphasis on advanced MIMO-OFDM and the view on the emerging new technologies and their potential to shift the paradigm of the next generation wireless access network.

Cooperative Communication in Wireless Networks

IEEE Seminar by Aria Nosratinia of University of Texas at Dallas
User cooperation is a method to achieve transmit-diversity in cases where mobiles cannot support multiple antennas. Cooperation involves two single-antenna users forming a partnership, where each mobile achieves space-time diversity by using their partner's antenna as a relay. We propose a new framework, called coded cooperation, where cooperation is achieved through channel coding methods instead of a direct relay or repetition. Each codeword is partitioned into two subsets that are transmitted from the user's and partner's antennas, respectively. Coded cooperation achieves impressive gains compared to a non-cooperative system while maintaining the same information rate, transmit power, and bandwidth. Coded cooperation can be realized with block or convolutional codes, and with various methods of partitioning, e.g., puncturing, product codes, parallel or serial concatenation. Compared to relay (repetition) cooperative systems, coded cooperation has many advantages, including better performance especially at moderate Eb/No and non-reliance on inter-user channel state information. We have developed tight bounds on the error rate and demonstrate performance in quasi-static as well as fast fading. Time permitting, I will briefly discuss extensions of coded cooperation, including Turbo coded cooperation and space-time coded cooperation.

Diagnostics of oil-paper insulation by means of dielectric response methods

IEEE Seminar by Stanislaw Gubanski, Fellow IEEE of the Department of Electric Power Engineering, Chalmers University of Technology, Sweden

As a part of the very complex measures to diagnose the state of insulation in oil-paper insulated power equipment (power transformers, measuring transformers and cables) the possibilities provided by dielectric measurements has been recognized since long. Traditionally, measurements of the loss factor and insulation resistance have been performed. However, in recent years, with the continuous development of measuring devices, attention has been directed to new techniques. Three of them have attracted most of the attention and these are: dielectric spectroscopy in frequency domain (FDS), polarization and depolarization currents (PDC), recovery voltage measurements (RVM).

There have been a lot of attempts in progress in recent years aimed at gaining knowledge on the interpretation of the results obtainable by the three methods named above. Also possibilities of modelling the insulation properties as well as comparing the data obtained

by means of different techniques have been under intensive development. CIGRE Task Force 15.01.09 was set up to compare and evaluate these techniques.

In this lecture the work performed internationally is to be presented and conclusions regarding the state of the knowledge on the applicability of the techniques are summarized. Examples of different field measurements are described and analyzed.

Growth and Applications of Carbon Nanotubes

IEEE Seminar by Professor William I. Milne University of Cambridge, United Kingdom On Oct 24

Carbon Nanotubes are a unique form of Carbon filament/fibre in which the graphene layers roll up to form tubes. They have several properties that make them extraordinary materials for technological applications viz.exceedingly high conductivity, high thermal conductivity, high mechanical strength, covalently bonded (limits electromigration) with few dangling bonds. Single Wall CNTS can exhibit metallic or semiconducting behaviour whereas multi-wall CNTS are metallic in nature. This talk covered the growth of both multi-wall and single wall carbon nanotubes and discusses their potential applications.

Dynamic model-based filtering for mobile terminal location estimation

UofG IEEE Seminar by Prof. Kostas Plataniotis of University of Toronto

Mobile terminal location has attracted much interest for emergency communications, location sensitive browsing, and resource allocation. The topic of this presentation was location estimation based on propagation distance measurements from fixed location base stations. The relationship between the measurements and terminal location is complicated by Non Line of Sight (NLOS) propagation when the shortest distance straight line path from receiver to transmitter is obstructed, multipath propagation, receiver noise, and interference noise. In this presentation non-parametric estimation and dynamic filtering for accurate location estimation are reviewed.

The location methods presented reduce the root mean square location error from 100 meters, for the previous methods, to 10 meters for a range error standard deviation of 15 meters. They allow for location prediction in resource allocation algorithms to facilitate efficient cellular networks to carry more data using less bandwidth.

Alternative Energy

Short Notes

Tom East

Azure Dynamics Inc. has received an order to supply up to 2000 hybrid electric vehicle chassis to Purolator Courier Ltd. Purolator has 3,700 vehicles, and is making a start on replacing them with hybrids.

Talisman Energy, a large Canadian oil and gas company, will be a partner with Scottish and Southern Energy to place 200 wind turbines in the North Sea 120 km north of Aberdeen. Each turbine is rated at 5 megawatts. Total cost of the project will be over $1.3M.

Engineering Humor

Space-Time Square

Tom East

The Perimeter Institute has not yet moved into its new building on Father David Bauer Drive, Waterloo, which is still under construction. Meanwhile, it is working hard in a building on King Street North, which used to be a restaurant called "time square". The neon sign with that name is still there, but has been amended to read "space-time square".

The Finer Points of the Law

Tom East

Questions that have been asked by lawyers of witnesses in court, as told by the Honourable Justice R.D. Reilly of the Superior Court of Ontario:

How far apart were the two vehicles at the time of the collision?

How old was the 20 year old witness?

How many times have you committed suicide?

- and a suitable answer -

Lawyer: Did you perform an autopsy on the man?
Doctor: Yes
Lawyer: Was he dead?
Doctor: Yes, of course.
Lawyer: Did you check his pulse?
Doctor: No.
Lawyer: Did you measure his blood pressure?
Doctor: No.
Lawyer: Then how did you know that he was dead?
Doctor: Because his brain was sitting in a jar on my desk.
Lawyer: But he could still be alive?
Doctor: He could still be alive, and practicing law somewhere.

Globe and Mail issues universities ranking

UW Daily Bulletin, Selected by C.Hulls

The Globe and Mail issued its second annual "University Report Card" yesterday, rating Canadian universities on a total of 58 criteria, based on surveys of undergraduate students.

Participants also ranked UW 9th in Canada for graduate studies in law, 8th in medicine and 8th in business. UW does not have a graduate program in law, medicine or business.