



IEEE NEWSLETTER

KITCHENER - WATERLOO SECTION



March 1996

Mark these dates on your calendar:

March 20th: Student Papers Night, University of Waterloo, Davis Centre, Room 1302, 7:00 p.m. (see page 2).

March 21st: Leonard Chow on Simple Capacitance Formulas, University of Waterloo, Davis Centre, Room 2577, 5:30 p.m. (see page 2).

April 16th: From Information to Knowledge - Andrew Wong, University of Waterloo, Davis Centre, Room 1302, 5:30 p.m. (see page 3).

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STUDENT PAPERS NIGHT, WEDNESDAY MARCH 20TH

Presented by: K-W Section; Student Branch A, University of Waterloo; and Student Branch, Conestoga College.

Date: Wednesday March 20, 1996, 7:00 p.m.

Place: University of Waterloo Davis Centre, Room 1302

You are cordially invited to the annual Student Papers Night.

Students from Conestoga College and the University of Waterloo will deliver oral presentations of their technical papers. The best paper from the College is awarded the Ken McKenzie Award and the best paper from the University receives the George Dufault Award: the awards include cash prizes.

Refreshments will be provided.

LEONARD CHOW ON SIMPLE CAPACITANCE FORMULAS

Date: Thursday, March 21, 1996, 5:30 p.m.

Place: University of Waterloo, Davis Centre 2577

Speaker: Professor Leonard Chow, Dept. of Electrical and Computer Engineering, University of Waterloo

Dinner: Meet the speaker for dinner after the seminar. Please contact Shesha Jayaram for details (519-885-1211, ext 5337).

Refreshments will be served at 5:00 p.m.

Subject: It has been analytically proven that the capacitance of an isolated but arbitrary conducting body, e.g. a square plate, a sphere and a cube, is given by

$$C = cf\epsilon_0\sqrt{4\pi S}$$

where S is the surface area, and the shape factor cf is a very slowly changing function of the body shape. This leads to the result that $0.9 < cf < 1.1$ for many practical body shapes.

From this simple and versatile formula, many other formulas of good accuracy for multi-bodies can be derived with the help of some recently derived techniques. Such formulas include: oarakkek okate, Pythagorean-for touching conductors, metamorphosed shapes, regularly shaped conductors near a dielectric, electric field near edges and corners, inductance of spirals, via through ground, multipiping strips, point source near long wire, Green's functions in layered media, AC resistance and current density in superconductor.

The above formulas can be simply calculated with a hand held calculator, with errors of 4% or less compared to moment method. The reason for such accuracy is that all formulas are actually derived, not from exact Maxwell's equations, but from approximate but accurate assumptions such as eq (1).

The Kitchener-Waterloo Section of the Institute of Electrical and Electronics Engineers serves all members whose mailing address is in Bruce, Grey, Perth, Waterloo or Wellington Counties.

FROM INFORMATION TO KNOWLEDGE - ANDREW WONG

Date: Tuesday April 16, 1996, 5:30 pm
 Place: University of Waterloo Davis Centre, Room 1302
 Speaker: Dr. Andrew K.C. Wong, University of Waterloo
 Dinner: Meet the speaker for dinner at the University Club after the seminar. Please contact Manh Le for details (519-884-1710).

Refreshments will be served at 5:00 p.m.

Subject: From Information to Knowledge: A Unified Approach. A fundamental question in the study of natural and machine intelligence is whether there is a quantitative basis for information from which order, patterns and rules can be derived from sensed data. If such a basis exists, a follow up question is whether it is possible to fashion a unified framework from which concepts and knowledge can be represented. This lecture will present an overview of the rationale and historical background of one such development. Specifically, it will cover: 1) the search of information measure from diverse sources such as biomolecular sequences, text, digital images and structural patterns; 2) the incremental formulation of a unified representation framework; 3) the development of machine learning and high order pattern discovery of fixed-mode data based on this framework; 4) application of such representation and reasoning process to computer vision, autonomous robotics and knowledge and data based systems.

Speaker: Dr. Andrew K.C. Wong is currently a full professor in the Department of Systems Design Engineering and the Director of the Pattern Analysis and Machine Intelligence Laboratory (PAMI), both at the University of Waterloo. Over the years, he has conducted extensive research in pattern recognition, machine intelligence, computer vision and intelligent robotics. He has published over 230 papers, edited the book, Machine Intelligence and Knowledge Engineering for Robotics Applications, authored over 12 chapters in other books, and written numerous technical reports from various research projects. He has received grants and contracts from the provided consulting services to numerous government and industrial agencies both in Canada and the United States. In 1986, he founded VIRTEK (Vision, Intelligence Robotics Technological Incorporated) to transfer technologies to industry. Professor Wong received his B.Sc. (Hons.) and M.Sc. in Engineering from Hong Kong University and a Ph.D. from Carnegie Mellon University in 1968. He is currently Honorable Professor of the Electrical and Electronic Engineering Department of Hull, United Kingdom. He is the 1991 recipient of the Federation Canadian Chinese Professionals Awards of Merit.

CONFERENCES IN CANADA

1996

- Apr 17-18 TechNet Canada 96 "Government and Industry Info Exchange on Transition to the Future" presented by AFCEA Canada (Armed Forces Communications and Electronics Association). Ottawa. M. Fuller 613-563-0093
- Apr 23-25 Broadband Communications 96. Montreal. L.G. Mason 514-765-7836. e-mail: bb96@inrs-telecom.quebec.ca

- Jun 2-5 18th Biennial Symposium on Communications, Queen's University, Kingston, Ont. 613-531-9210. e-mail: events@adan.kingston.net Deadline for abstracts to H.T. Mouftah 613-545-2934, e-mail mouftah@eleceng.ee.queensu.ca, Jan 22 1996.
- Jun 16-19 1996 IEEE International Symposium on Electrical Insulation. Montreal. R. James 615-574-6213
- Jun 19-22 ICCI 8th International Conference of Computing and Information. Waterloo, Ont. Farhad Mavaddat 519-885-1211
- Jul 9-11 3rd Workshop on Finite Element Methods in Electromagnetic Wave Problems. Halifax. Z.D. Chen fax 902-422-7535 or G. Pelosi e-mail FEW96@ingfil.ing.unifi.it
- Aug 15-16 Selected Areas in Cryptography. Queen's University. Stafford Tavares 613-545-2945, email SAC96@ee.queensu.ca Deadline for papers June 7 1996
- Aug 18-21 IEEE International Engineering Management Conference EM 96. Vancouver. W.A. Wallace 518-276-6854, e-mail: wallaw@rpi.edu
- Aug 26-27 International Conference on DSP in Telecom. Toronto. GAO Research & Consulting 416-292-0038.

1997

- May 20-22 IEEE Instrumentation & Measurement Technology Conference IMTC 97. Ottawa. R. Myers 301-287-1463, e-mail: bob.myers@ieee.org
- Jun 8-12 ICC 97 - IEEE International Conference on Communications. Montreal. Celia Desmond 905-615-6507. e-mail: c.desmond@ieee.org
- Jul 14-18 IEEE AP-S International Symposium and URSI Radio Science Meeting. Montreal. Stanley Kubina 514-848-3093, or G. Delisle 514-765-8202, e-mail: delisle@inrs-telecom.quebec.ca
- Oct 7-10 IEEE Ultrasonics Symposium. Toronto. S. Foster e-mail: stuart@owl.sunnybrook.utoronto.ca

1998

- May 4-7 1998 IEEE/IAS Industrial and Commercial Power Systems Technical Power Conference (I&CPS). Edmonton. M. Bince 403-468-6673

1999

- Jul 18-22 1999 IEEE Power Engineering Society Summer Meeting. Edmonton. D. Fraser 403-448-3554

ICR ONE-DAY COURSES

(For further information contact Jean Webster, ICR, University of Waterloo, Tel: (519) 885-4530, Fax: (519) 885-1208, email: jrwebste@icr.uwaterloo.ca)

Hypermedia, Multimedia, Metamedia, and the Web April 2, 1996

Michael McCool, Ph.D.

The World-Wide-Web (WWW) is a very successful client/server hypermedia system which is currently one of the best ways to distribute information over the Internet. In this course, we will discuss the architecture of the Web, its capabilities and limitations, how to set up and maintain a server, and how to prepare hypermedia content for distribution over the Web. The course will also survey some next generation distributed information systems and applications, including distributed virtual reality, executable content, and metamedia.

WWW browsers/clients use the Hypertext Markup Language (HTML), a variant instance of the Standard Generalized Markup Language (SGML), to describe the structure of hypermedia documents. We will present HTML syntax, provide some discussion on the portability, security, efficiency, and extension of HTML, and compare it to SGML. As part of our HTML overview, we will discuss how to set up and process interactive forms. We will also show how you can use SGML to protect your investment in your information service from changes in the Web infrastructure, and prepare yourself for the future.

About the Instructor

Michael McCool is a faculty member at the University of Waterloo, and a member of the ICR Computer Graphics Lab. Michael was a former member of the Dynamic Graphics Project at the University of Toronto. His two primary research interests are analytic computer graphics rendering algorithms and interactive media. In particular, the latter interest includes the use of computer software and executable content as substrate for a universal "metamedium".

An Introduction to Specification and Description Language (SDL) May 9, 1996

Stefan Leue, Ph.D.

Precise, unambiguous and formally founded descriptions of software requirements and designs are key factors for the engineering of high quality software products. This course provides an introduction into the Specification and Description Language SDL, a specification technique standardised by the International Telecommunications Union Telecommunications Standards Sector ITU-T (formerly CCITT) in recommendation Z.100. SDL has become an industrial de facto standard for requirements and design specifications of telecommunications software systems, mainly due to its appealing graphical syntax, its standardization, as well as the good commercial tool support provided for SDL.

We will give an introduction into the basic SDL concepts and discuss examples of communication systems specifications. We will then present extensions made to the language in the course of the last revision of the SDL standard in 1992, which

led to the definition of SDL-92, and finally point at a recently defined ITU standard (Z.105), which links the data type definition language ASN.1 to SDL.

About the Instructor

Stefan Leue is a Faculty Member in the Department of Electrical and Computer Engineering of the University of Waterloo. He received his Master's degree in computer science from the University of Hamburg (Germany) and his Ph.D. from the University of Berne (Switzerland). Before joining the University of Waterloo, he was a research associate at the University of Berne and had previously worked as an information technology consultant in the German life insurance industry. His primary research interests are in software engineering for telecommunications systems, in particular in the use of formal methods.

Cost per one-day course: \$200 + GST (employees of ICR Corporate Partners/Corporate Associates free)

UW STUDENTS TAKE THIRD PLACE IN ACM COMPUTER PROGRAMMING CONTEST

A team of computer science and computer engineering students from the University of Waterloo captured third place in an Association for Computer Machinery international computer programming contest recently held in Philadelphia. The students, Michael Van Biesbrouck, Philip Chong and Ka-Ping Yee, were required to solve eight questions in five hours. Waterloo has placed in the top 10 for the last four years in a row. Forty-three teams competed in the final competition with the University of California Berkeley taking first place and Harvard placing second.

Ka-Ping Yee also earned \$1000 for winning the inaugural ACM Student Webbie Award. This prize is awarded for the best World Wide Web page created by a student.

PUZZLE

What do you call microprocessors which are used to control conventional nuclear reactors?

Answer on page 5.

FROM A TO B WITHOUT SEA - THE IEE 1996 FARADAY LECTURE ON THE CHANNEL TUNNEL

Reviewed by Tom East.

The British Institution of Electrical Engineers (IEE) presented their annual Faraday Lecture before a live audience in London: they and the IEEE broadcast it by satellite simultaneously on February 7th at 1 pm EDT: it was transmitted on Rogers Channel 20 (KW and Cambridge), and has been repeated since on Channel 20.

The "lecture" consisted of a dialogue between a British engineer, Nicholas Storer, and an actor playing the part of a French engineer, Thome de Gamond, who, in 1830, proposed a channel tunnel from France to England (not the first one to do so, but a contemporary of Faraday). The dialog, in which the Brit acted as straight man to the Frenchman's clowning, was interspersed with a few diagrams and film clips of construction and the trains.

I found the dialog very tedious (perhaps my taste for English humour has faded since I left England 44 years ago), but some interesting facts emerged. The question period afterwards (involving Canadian and US viewers as well as those in the theatre) was somewhat marred by communication difficulties, but brought out further ideas.

In 1830, Thome de Gamond, using very crude home made diving equipment, picked up samples of the seabed to confirm that it was practical to tunnel beneath it - the final tunnel runs through chalk marl.

Earlier this century, a tunnel was actually started, but abandoned.

In the late 1980s, the tunnel was bored from each end, using English and French Tunnel Boring Machines: they cut two running tunnels 9m dia (7.6m after being lined with concrete segments) and a service tunnel 4.8m dia in between. The TBMs progressed at 11 km per month. The French TBM was pulled back to France, but the British one is buried under the middle of the tunnel and is used as a system ground connection. The tunnels start from the loading stations at Folkestone and Calais and descend at 1 in 90 (1.1% grade) to get 40m below seabed: the UK tunnels turn under the water at Dover.

The TBMs were guided by lasers. When they were about 100m apart, a test hole was bored and it was found that the two tunnels were only a few centimetres out of line. There is a small amount of seepage of water: there are five drainage pumps in the system, and only three are normally in use.

About 12,500 jobs were involved in the project, which cost about eight billion pounds (about \$18B Can) including inflation and interest, and was financed by 200 banks. Traffic has been running for a year, and is covering costs of operation: to recover the total project cost will take "into the next century".

It takes about 2,500 people to operate the system. Trains run every 3 minutes in each direction (with an improved signalling system this could be reduced to 2 minutes). Half the trains, called "le Shuttle", are car and truck ferries, built by Bombardier of Quebec, and run from Folkestone to Calais - this takes 35 minutes (28 minutes under the water): each train is 800m long. The other trains are passenger trains, mainly from London to Paris and Brussels, and freight trains which can continue over major lines in Britain and Europe. The electric locomotives contain power converters using Gate Turn Off (GTO) thyristors so they can operate from British, French and Belgian supplies (25kv AC, 750v DC and one other). Each loco has traction power of 5 MW, so that it can pull a train up the grade at 140 km/hr, and, in an emergency, push a dead train out of the tunnel in front of it. The system uses up to 200 MW from each end.

There are, of course, extensive safety measures. For instance, each railway carriage has its own fire detecting and extinguishing system so an affected carriage would be pulled out of the tunnel to be dealt with on the surface.

There are several communication systems. One of them uses a fibre optic cable running through the tunnel, with converters at intervals to radiate signals to the trains.

Much attention was paid to environmental factors during construction, and Eurotunnel received awards from environmental organisations. It is hoped that the tunnel will boost the use of rail freight and hence relieve the congestion and pollution on highways.

NEWS FROM INDUSTRY

Hewlett-Packard (Canada) Ltd now owns a plot of land at the north end of Phillip Street behind the Parkdale II Plaza and has started construction of a 7000 square metre office/factory building for the Panacom Automation Division, which designs and manufactures X-stations.

Open Text Corporation is now quoted on NASDAQ as a result of a recent \$69,000,000 US share offering: the shares rose sharply in price after they were put on sale. The company has been recruiting software developers and others again.

Waterloo Maple Inc. signed a contract with a Malaysian company during the trade mission lead by the Prime Minister. It involves a Malaysian version of Mathplus for Malaysian schools. Also, under another contract, CRC Press of Florida will use math software from Maple in a CD-ROM version of its widely used tables.

NEW NETWORK ACROSS CANADA

The CANARIE National Test Network is being combined with CA*net to make a high speed ATM network. Several Internet providers and provincial and municipal research networks will be connected to the network to start with.

VIRTUAL STIFFS

Students at the University of Montreal are to use multimedia displays to learn human anatomy instead of cadavers, which are costly to maintain.

ANSWER TO PUZZLE

Fission chips.

New from IEEE Educational Activities...

Cellular Radio and Personal Communications

A self-study course offering an in-depth introduction to the fastest growing area of communications. Focuses on fundamental system design, mobile radio propagation, modulation techniques, cellular networking, cellular systems, and standards.

The course includes a comprehensive study guide, a course reader, and a final exam. The course offers dozens of examples and exercises that help the student test knowledge and prepare for actual applications. Students earn 8 Continuing Education Units after completing the course successfully.

Product Number HL5709
\$279.00 (Member), \$369.00 (List)

To order, call 1-908-981-0060
or toll free (in USA) 1-800-678-IEEE

New from IEEE Educational Activities...

VHDL: Features and Applications

This self-study course provides comprehensive instruction on the features and applications of the programming language VHDL. VHDL: Features and Applications provides instruction in commonly-used features of VHDL, how to write VHDL models for more complex and practical designs, and modeling styles.

Topics of study include: VHDL language elements, behavioral modeling, dataflow modeling, structural modeling, subprograms and overloading, packages and libraries, advanced features, and model simulation.

Students who successfully complete the course earn 7 CEUs and a certificate of achievement.

Product Number HL5712
\$229.00 (Member), \$299.00 (List)

To order, call 1-908-981-0060
or toll free (in USA) 1-800-678-IEEE

New from IEEE Educational Activities...

Protection of Synchronous Generators

This video tutorial provides instruction in everything from the fundamentals of power system protection through field ground protection and system backup protection to generator breaker failure and generator tripping. The video gives students the knowledge they need to apply to real-life problems.

The protection of synchronous generators involves the consideration of more harmful abnormal operating conditions than the protection of any other power system element, yet is one of the more misunderstood areas of power system protection.

NTSC Product Number HL6908
PAL Product Number HV6909
\$599.00 (Member), \$799.00 (List)

To order, call 1-908-981-0060
or toll free (in USA) 1-800-678-IEEE

New from IEEE Educational Activities...

Introduction to Modern Control Systems

This comprehensive self-paced course provides details about all major modern control methods used in practical control systems. The course helps students understand the key similarities and differences between the methods and identifies the most appropriate control system analysis/ design approach for any given application.

Topics of study include: classical control system concepts, tools for modern techniques, linear and nonlinear systems, optimal control, identification, digital systems, and computer-aided control.

Students who successfully complete the course earn 8 CEUs and a certificate of achievement.

Product Number HL5714
\$219.00 (Member), \$289.00 (List)

To order, call 1-908-981-0060
or toll free (in USA) 1-800-678-IEEE