

IEEE NEWSLETTER

KITCHENER-WATERLOO SECTION

November 1999

Meetings

Please mark these dates on your calendar

- November 9 University of Waterloo DC 1302: Prof. Kostas Kontogiannis
Software Engineering: See page 4
- November 23 University of Waterloo DC1304 Prof. Eleftheriades
Millimeter-wave integrated antennas: See
page 5
- December 1 Annual General Meeting - Election of Officers and
Presentation by Prof.Karanossios on the electronic classroom
University of Waterloo Davis Centre room 1302 See
page 3**
- December 14 University of Waterloo DC2577 Prof. Shen
Wireless/IP Interworking See
page 5
- (Note date changed from December 7)

Feature Articles

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- Thomas Brazil described CAD
modelling of microwave devices page 6

Conestoga College Student Branch
appeals for books page 6

Signal Processing Chapter
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News from Industry page 8

Metrication is not
rocket science page 9

News from the Internet page 9

Windmill farm starts up page 9

Section Officers

Chair: Wai-Cheung Tang, 622-2300
waicheung.tang@comdev.ca

Vice-Chair: John Mowbray, (519)884-1710
ext 5371, 5176
e-mail: mowbray@golden.net

Secretary: Mauro Rossi (519)885-1211 ext3819

Treasurer: Slawo Wesolkowski
e-mail: s.wesolkowski@ieee.org

Chapter Chairs

Computers: David Wang (519)885-1211
ext 3968

Antennas and Prop.,
Microwave Theory
and Technique: Raafat Mansour (519)622-2300
(Combined Chapter) ext 246

Circuits and Systems Tajinder Manku (519)885-1211
ext 4420

Electron Devices: Arokia Nathan
(519)885-1211 ext 4803

Signal Processing: Weihua Zhuang
(519)885-1211 ext 5354

Committee Chairs

Education: Rosalind Hood-Morris
(519)886-4571
e-mail: rhoodm@netcom.ca

Program: Shesha Jayaram
(519)885-1211 ext 5337

Membership
and Transfers: Vacant

Publications: Tom East (519)746-7809
(Newsletter) e-mail: tieast@ieee.org
Nominations: David Wang (519)885-1211 ext 3968

Student Activities Chairs

Conestoga College: Rudy Hofer (519)748-5220

University of Guelph: Bob Dony
(519)824-4120

University of Waterloo:
e-mail: ieeesb@electrical.watstar.uwaterloo.ca
(519)885-1211 ext 6955
fax: (519)746-3077

Stream A: Richard Hornsey (519)885-1211
Winter 2000 ext 4097

Stream B: George H. Freeman
Winter 1999 (519)885-1211 ext 2876

Address: IEEE
K-W Section
c/o Elect.&Comp.Eng. (DC 2597)
University of Waterloo
Waterloo. Ont. N2L 3G1

EDITORIAL

It is time once again to hold a General Meeting to elect the officers of this section for the next two years. Please plan to attend on Wednesday December 1st (See page 3)

May the wind be at your back and the Y2K bug stay away from your door!

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.

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ANNUAL GENERAL MEETING KITCHENER-WATERLOO SECTION IEEE

Date: Wednesday December 1st 1999
Time: 5.30 pm
Place: University of Waterloo, Davis Centre Room 1302

1. ELECTION OF OFFICERS - K-W-SECTION, IEEE.

The Nominating Committee (chairman David Wang) has proposed a slate of names to serve on the K-W Section's Executive Committee from January 1 2000 to December 31 200: see SLATE PROPOSED below.

The names of the individuals are listed below.

Members may nominate other members as alternative candidates for officer (Chair, Vice-Chair, Secretary, or Treasurer) under the following conditions:

For each nominee

- a) obtain agreement in writing to stand,
- b) obtain supporting signatures of two percent of the voting members,*
- c) submit these documents to the Secretary, Mauro Rossi by November 25, addressing them to:
 Secretary, IEEE KW Section
 c/o Department of Electrical and Computer Engineering, room DC2597
 University of Waterloo
 Waterloo, Ontario N2L 3G1

and mark the outside of the envelope AElection@

If alternate nominations are received, elections will be held at the Annual General Meeting.

*This section has about 580 voting members.

2. PRESENTATION BY PROFESSOR VASSILY KARANASSIOS

of the UW Department of Chemistry on AThe Electronic Classroom@

SLATE PROPOSED BY THE NOMINATING COMMITTEE FOR 2000-2001

Section Officers:

Chair:	John Mowbray, NCR Canada
Vice Chair:	Slawo Wesolkowski, University of Guelph
Secretary:	Open
Treasurer:	Mauro Rossi, Allied Signal

Chapter Chairs:

Antennas and Propagation, Microwave

Theory and Techniques:

Circuits and Systems:

Raafat Mansour, ComDev

Tajinder Manku, U. of Waterloo

Electron Devices: Arokia Nathan
 Computers: David Wang, U. of Waterloo
 Signal Processing: Robert D. Dony, U. of
 Guelph

Committee Chairs:

Education: Rosalind Hood-Morris
 Membership and Transfers: Open

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Publication: Tom East
 Publicity and Program: Kingsley Fregene
 Nominations: Wai-Cheung Tang

Student Activities Chairs:

Conestoga College: Rudy Hofer
 University of Guelph: Bob Dony
 University of Waterloo:
 Stream A: Winter 2000 Richard Hornsey
 Stream B: Summer 2000 Open

**COMPUTER CHAPTER MEETING
 PROFESSOR KONTOGIANNIS ON SOFTWARE ENGINEERING**

Date: Tuesday November 9, 1999 **Time:** 5.30 pm
Place: University of Waterloo Davis Centre, room DC1302
Subject: Software Engineering: An Emerging Engineering Discipline
Speaker: Prof. Kostas Kontogiannis, Dept. of Electrical and Computer
 Engineering, University of Waterloo

Subject: Over the past fifteen years we have experienced a tremendous growth in Information Technology. As a consequence more and more functions of our every day life depend on software systems. Banking transactions, air traffic control systems, power systems, all depend on software. Should these systems fail, the results will be catastrophic in terms of human lives, impact on the environment and the well being of our society.

Software Engineering is the field of Information Technology that allows for software systems be specified, designed, implemented, tested and, maintained in a way that conforms with engineering principles and international standards, which deal with the correctness, reliability, performance, maintainability and usability of software systems.

Software Engineering presents unique challenges and opportunities. Software is unique in that it does not have any physical substance, does not obey any physical laws and can not be measured by conventional methods. Software design and development is an inherently human creative process that can

not be easily standardized.

This presentation will provide an overview of Software Engineering, and discuss the technical challenges and opportunities that relate to the development of large industrial strength software systems. Topics of particular interest include the challenges of specifying, designing, testing and, maintaining mission or life critical software systems.

In addition to the technical challenges, this talk will also present an overview of the existing academic undergraduate and graduate programs and existing study opportunities in the area of Software Engineering in North America.

Speaker: Kostas Kontogiannis is an Assistant Professor at the Department of Electrical and Computer Engineering, University of Waterloo. Kostas obtained a B.Sc in Applied Mathematics from the University of Patras, Greece, a M.Sc in Computer Science from Katholieke Universiteit Leuven, Belgium, and a Ph.D degree in Computer Science from McGill University, Canada. Kostas is leading the Software Re-engineering group at the Department of Electrical & Computer Engineering. He is actively involved in various projects with IBM Canada, Center for Advanced Studies, the Network of Centers of Excellence and the Consortium for Software Engineering Research. Kostas' research is focusing on the design and implementation of tools and techniques that allow for large software systems to be integrated in distributed and Network- Centric environments. Application areas include e-commerce, banking and computer-telephony integration.

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MICROWAVE AND ANTENNAS CHAPTER MEETING PROF ELEFThERIADES ON MILLIMETER-WAVE INTEGRATED ANTENNAS

Date: 1999 November 23 Tuesday
Time: 5.30 pm
Place: University of Waterloo Davis Centre Room DC1304
Subject: Novel Millimeter-Wave Integrated Antennas and Components

Subject: Traditionally millimeter-wave (mm-wave) front-end subsystems have been restricted to military and scientific applications. Nowadays, this situation is radically changing with the emphasis shifting towards commercial applications especially broadband wireless telecommunications. Indeed, as the need for wider bandwidths grows, the operating frequency of the corresponding systems is gradually shifting from microwaves towards mm-wave frequencies. Other emerging applications include collision avoidance, radio frequency (RF) identification tagging and imaging.

In this presentation, some important issues arising from the development of mm-wave integrated circuit front-end subsystems will be discussed. In particular, as the operating frequency is increased, losses such as conductor, dielectric, surface-wave and parasitic-radiation ones become a limiting factor. In addition, the mm-wave wireless channel imposes additional challenges including long delay spreads, excessive shadowing and strong atmospheric attenuation effects. One way to solve these problems lies with the tight integration of mm-wave antennas or antenna-arrays on the same substrate with the rest of the electronics, leading to reduced conductor losses. Array processing techniques may be used to mitigate some of the

adverse effects of the mm-wave radio channel. The presentation will be focused on

the development of novel low-loss and highly efficient mm-wave integrated passive components and antennas which lend themselves to easy integration with semiconductor devices.

Speaker: Dr. George V. Eleftheriades earned his Ph.D. and MSEE degrees in Electrical Engineering from the University of Michigan, Ann Arbor, in 1993 and 1989 respectively. He received a diploma in Electrical Engineering from the National Technical University of Athens, Greece in 1988. In the period 1994-1997 he was with the Swiss Federal Institute of Technology in Lausanne, where he was engaged with the design of millimeter and submillimeter-wave receivers and the implementation of CAD tools for planar microwave circuits. In August 1997 he joined the University of Toronto as Assistant Professor. Dr. Eleftheriades has authored or co-authored more than 30 articles in refereed journals and conference proceedings. He was a co-recipient of the Best Paper Award at the 6th International Symposium on Antennas (JINA), France in 1990, a recipient of a Student Paper Award in the 1992 IEEE Antennas Propagation Symposium and he also received the Distinguished Achievement Award from the University of Michigan in 1991.

SIGNAL PROCESSING CHAPTER PRESENTS PROFESSOR CHEN ON WIRELESS/IP INTERWORKING

Date: Tuesday, December 14, 1999 (Note date changed from December 7)
Time: 5:30pm
Place: University of Waterloo Davis Centre, Room 2577
Subject: An Exposition on Wireless/IP Interworking
Speaker: Prof. Xuemin Shen, Centre for Wireless Communications,
Department of Electrical and Computer Engineering, University of
Waterloo

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Subject: The increasing reliance on information available on Internet, and the rapid growth of the wireless subscriber population suggest a need for Internet users to maintain communications as they move from place to place. However, a mobile user needs to have a stable Internet protocol (IP) address in order to be stably identifiable, and a stable IP address is counter to the concept of mobility. Mobile IP proposed by the Internet Engineering Task Force (IETF) is the emerging standard for mobile Internet applications. It allows a mobile user to change its location without restarting its applications and without disrupting any ongoing communications. Mobile IP is transparent to the physical medium over which a mobile user communicates. On the other hand, the wireless access to fixed wirelined IP networks gives rise to a number of issues related to the transport control protocol (TCP) performance. The nature of wireless data links and the user mobility have an evident impact on the performance and usage of TCP/IP. This presentation gives an exposition on wireless/IP interworking, a solution to the problem of transferring information through Internet to and from users anywhere and at anytime.

Speaker: Xuemin Shen received the B.Sc. (1982) degree from Dalian Marine University (China) and the M.Sc. (1987) and Ph.D. degrees (1990) from Rutgers University, New Jersey (USA), all in electrical engineering. From September 1990 to September 1993, he was first with Howard University, Washington D.C., and then University of Alberta, Edmonton. Since October 1993, he has been with the Department of Electrical and Computer Engineering, University of Waterloo, where he was a Visiting Research Scientist and is currently an Associate Professor. Dr. Shen's research focuses on control algorithm development for mobility and resource management in interconnected wireless/wireline networks (traffic flow control, connection admission and access control, handoff, end-to-end performance modeling and evaluation); Mobile IP, Voice over IP, stochastic process and filtering. He is the coauthor of the books - Singular Perturbed and Weakly Coupled Linear Systems-A Recursive Approach, Springer-Verlag, 1990, and Parallel Algorithms for Optimal Control of Large Scale Linear Systems, Springer-Verlag, 1993.

THOMAS BRAZIL DESCRIBED CAD MODELLING OF NON-LINEAR MICROWAVE DEVICES

On September 22nd, a small audience heard a presentation to the Microwave and Antennas chapter on the Computer Aided Design of high frequency circuits, with particular emphasis on the non-linear characteristics of active devices. It was given by Prof T. Brazil of UCD at the National University of Ireland. It is an important subject in the design of mobile wireless devices, because of the impact on the transmitted spectrum.

One major challenge is to characterise the actual transistors in a chip, which are embedded in a set of connections: measurements have to be made through these connections, which have to be accurately modelled, otherwise serious errors in the characteristics result, no matter how accurate the actual measurements. An EM solver is

recommended to characterise everything outside the actual junctions.

As for the analysis of complete systems, Prof. Brazil mentioned many models. One that he described is the Discrete Convolution Analysis. The junctions (which are non-linear) are modelled in the time domain by their impulse response: the circuit surrounding them is linear and is modelled in the frequency domain. The interfaces between them are completed by convolution integrals.

The European Union is supporting this work through a project called EDGE: it is highly successful at the technical level, but it is difficult to evolve a successful business model, according to Prof. Brazil.

CONESTOGA COLLEGE STUDENT BRANCH APPEALS FOR BOOKS

If you have books on VHDL or Spread Spectrum Communications which you could donate to the college student branch, please contact Rudy Hofer at r.hofer@siriusmicro.com.

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SIGNAL PROCESSING CHAPTER HAS MATERIAL FOR LOAN

The Signal Processing Chapter has received the following materials from IEEE:

- a) 1996 IEEE International Conference on Acoustics, Speech, & Signal Processing (ICASSP'96) Conference Proceedings,
- b) Signal Processing - The Emergence of a Discipline 1948 to 1998 by Frederik Nebeker, and
- c) Fifty Years of Signal Processing - The IEEE Signal Processing Society and its Technologies 1948-1998 by the IEEE Signal Processing Society.

These materials can be borrowed for a short period. If interested, please contact Professor W. Zhuang (wzhuang@bcr.uwaterloo.ca or 888-4567 ext. 5354).

CONFERENCES IN CANADA

1999

Oct 31-Nov 3 1999 IEEE Conference on Network Protocol. Toronto. Dr. Bannister. (310)822-1511 x 717

e-mail: jwwong@bcr.uwaterloo.ca

<http://boa.crl.mcmaster.ca/~icnp99>

Dec 13-17 LASERS 99. Quebec City.
(703) 642-5835

2000

Apr 9-12 INTERMAG 2000. Toronto. Ms Dopkin (202) 973-8668 e-mail
magnetism@courtesyassoc.com

Apr 30-May 4 2000 IEEE VLSI Test Symposium. Montreal. IEEE Computer Soc. (202) 371-1013

May 7-10 2000 Canadian Conference on Electrical and Computer Engineering. Halifax. CCECE Secretariat. (902) 494-6198
e-mail: ccece2000@ieee.org
<http://is.dal.ca/~ccece00/>

May 23-25 2000 IEEE 7th International Conference on Parallel Interconnects. Quebec City. IEEE Computer Society (202) 371-1013

Jun 10-14 2000 27th International Conference on Computer Architecture. Vancouver. A. Berenbaum (908) 582-3655
e-mail: adb@bell-labs.com
<http://www.cs.rochester.edu/~ISCA2k>

Jul 30-Aug 2 ANTEM 2000. Winnipeg.
(204) 474-6469
e-mail: antem@ee.umanitoba.ca
<Http://antem.ee.umanitoba.ca>

Sep 10-13 ICIP 2000 7th International Conference on Image Processing. Vancouver. R.K. Ward(604) 822-6894
e-mail: rababw@cicsr.ubc.ca
<http://icip2000.ece.ubc.ca>

Oct 1-4 Adaptive Systems for Signal Processing Communications and Control. Lake Louise, Alberta.
L. Brooks (905) 525-9140 x 24291 e-mail: brooks@mcmaster.ca

Oct 23 North American Power Engineering Conference. Waterloo. Ont

2001

Apr 28-May 2 IEEE 43rd Cement Industry Technical Conference. Vancouver. A. Moore (604) 946-0411
e-mail: amoore@tilbury.lehighcement.com

May 12-19 IEEE 23rd International Conference on Software Engineering. Toronto. H.A. Muller (250) 721-7630
e-mail: hausi@csr.uvic.ca <http://www.csr.uvic.ca/icse2001>

May 13-17 2001 URSI International Symposium on Electromagnetic Theory. Victoria. C.M. Butler
e-mail: ebutler@eng.clemson.edu
or: staffan@tet.kth.se

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Jul 7-13 ICCV: IEEE 8th International Conference on Computer Vision. Vancouver. IEEE Computer Society. (202) 371-1013

Jul 15-19 IEEE Power Engineering Society Summer Meeting. Vancouver. Y. Mansour (604) 473-2730
e-mail: yakout.mansour@bchydro.bc.ca

Jul 16-20 NSREC 2001: IEEE Nuclear and Space Radiation Effects Conference. Vancouver. M. Shaneyfelt (505) 844-6137 e-mail: shaneymr@sandia.gov <http://www.nsrec.com/npsnews>

Aug 13-17 EMC 2001: IEEE International Symposium on Electromagnetic Compatibility. Montreal. B. Nadeau (514) 822-6000 e-mail: bnadeau@ieee.org

2002

Jun 24-28 IGARSS 2002: IEEE International Geoscience and Remote Sensing Symposium. Toronto. IGARSS Business Office (281) 251-6067 e-mail: tstein@phoenix.net <http://www.igarss.org>

NEWS FROM ACADEMIA

The University of Waterloo has launched a new undergraduate program in Bioinformatics, which is defined as a combination of information storage and retrieval with biology.

Wilfrid Laurier University has opened a new campus in Brantford. Besides two core courses, one on The 20th Century and the other on the Grand River Watershed, first year students can take courses such as communications studies and computing, and continue them at the Waterloo campus in the second year.

The University of Waterloo has joined **Wilfrid Laurier University and Conestoga College** in a \$5M fund called the Waterloo Ventures Fund to support small start-up businesses. The Fund is backed by a labour-sponsored fund - Working Ventures Canadian Fund.

NEWS FROM INDUSTRY

CME Telemetrics of Waterloo is to receive help from Boston University's Photonics Center in developing its device for monitoring blood glucose in patients. The company was founded by Ted Cadell, formerly of UW: he is now a scientific advisor to the company.

Electrohome Limited of Kitchener plans to sell its last manufacturing operation to Christie Inc. of Cypress, California, a movie projector company. The operation, which manufactures high-tech projectors, will continue to operate in the Kitchener plant.

Finline Technologies of Waterloo has won a \$1.6M contract from HornAfrica Media to supply a system that will provide 6 TV channels to half a million homes and businesses in Mogadishu, Somalia.

LivePage of Waterloo (formerly Inforum, an offshoot of WATFAC) has been bought by Janna Systems Inc. of Toronto. Inforum was founded by the late Wes Graham of UW. LivePage develops personalization software and web page management. Janna is involved in customer relationship software.

MKS of Waterloo is to move to a new 9,000 square metre building being built on a new Atechnology campus@ being established on the east side of Albert Street, north of Columbia Street and south of Parkdale Plaza. MKS has donated \$25K to the K-W Chamber of Commerce Doctor Recruitment Fund: the shortage of family doctors adversely impacts attracting highly qualified employees to the company.

Pixstream Inc. of Waterloo is to provide equipment to Bell Canada for a trial in a luxury condominium in Toronto. Pixstream VDS5000 equipment will pass 140 ExpressVu and music channels and provide Sympatico internet service through copper pairs

(conventional phone lines).

RIM of Waterloo is to provide its Inter@ctive pager and Blackberry products to **Descartes Systems**

Group, also of Waterloo, which will include them in its DeliveryNet scheduling systems. RIM plans to offer shares on the US market. It is supplying its Blackberry system to three internet service providers in the US.

NEWS FROM THE INTERNET

Combined Xchange Telecom (CXT) of Waterloo plans to offer internet services to Waterloo businesses soon. It will use the fibre-optics network owned by Waterloo North Hydro, which will become part owner. It expects to charge less than Bell. The company plans to expand into other parts of Waterloo Region next year.

The **Durham Library** is to set up free internet stations in the town. Federal grants are to pay for the stations.

Most schools are hooked up to the internet, so that 90% of Canadian schoolchildren have access, according to StatsCan. In Ontario, on average, there is one computer for every 6 high school students.

If you want to buy a **Ford**, you will have the option of ordering it through the internet, under a joint scheme of Ford and Microsoft. You will be able to select model, accessories and colours, and you will then be sent to a dealer who will have the car you want, which may have been made to your order.

Disappearing Inc. of San Francisco offers an encryption scheme by which you can send an encoded message and set it to self-destruct after a certain time. This would reduce the chance of your boss recovering an embarrassing memo, providing the person at the other end did not save it or print it out.

S and P Data of St. Catharines suffered system crashes because of a hacker, one of their employees. The hacker pleaded guilty to a charge of Amischief to data@ and was ordered to pay the company \$250,000. However, he had not been able to come up with \$500 bail, so the company may be out of luck.

WINDMILL FARM STARTS UP

In Saint-Ulric-De-Matane, Quebec, 133 three-bladed windmills are feeding power into the Hydro-Quebec system (if the wind is blowing). The wind farm is located on the south shore of the St. Lawrence river, and has a maximum capacity of 100 megawatts. It has increased the total wind farm capacity of Canada by five times. The wind turbines come from Denmark.