IEEE NEWSLETTER
KITCHENER-WATERLOO SECTION

November 2001

Meeting
Please mark this date on your calendar
28 November: Annual General Meeting: election of officers for 2002-2003
Mate Prgin on Starting/running a high-tech company in Waterloo
University of Waterloo Davis Centre Room DC1302   page 3

Feature articles

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Stream B:          ) Sivoththaman
   Fall 2001       )
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EDITORIAL

It is time again to decide who should be the officers of this section for the next two years. The Annual General Meeting will be held on Wednesday November 28th at 7 pm, at the University of Waterloo Davis Centre, room DC1302. This is an important event, and will include a presentation by Mat Prgin on starting a company, which should interest everyone. Spouses are welcome.

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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 28th November 2001
Time: 7.00 pm
Place: University of Waterloo, Davis Centre Room

1. ELECTION OF OFFICERS - K-W SECTION, IEEE.
The Nominating Committee (chairman Wai-Cheung Tang) has proposed a slate of names
to serve on the K-W Section's Executive Committee from January 1 2002 to December
31 2003: see SLATE PROPOSED below, where the names of the individuals are listed.
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, Karim Karim, by November 25, addressing
them to:
> Secretary, IEEE KW Section
> c/o Department of Electrical and Computer Engineering, room 2597
> University of Waterloo
> Waterloo, Ontario N2L 3G1

and mark the outside of the envelope A Election@
If alternate nominations are received, elections will be held at the Annual General
Meeting.

2. PRESENTATION BY MATE PRGIN ON STARTING A BUSINESS
Following the AGM, there will be a presentation:

Speaker: Mate Prgin

Subject: Starting/Running a High-Tech Business in Waterloo.

VideoLocus Inc. was founded in May 2001 in Waterloo, Ontario to develop next
generation video compression technologies and solutions, with a specific emphasis on
low bit rate, high quality, full resolution, and full frame rate applications. The company
is focused on enabling DVD-quality (and above) video compression at bit rates that are 3
to 8 times lower than equivalent MPEG-2 video compression.

Mate Prgin is a co-founder, and President and Chief Executive officer at VideoLocus. He
was most recently a Firmware Designer at PixStream Incorporated, which was acquired
by Cisco Systems in December 2000. In his role at PixStream, Mate focused on
developing video encoding and transcoding components, and designed and implemented
the Conditional Access (CA) system. Mate has an extensive background in real-time SP

development and optimization, as well as MPEG-2 video. Previously, Mate was a member of the Leitch Technologies Digibus Development Team. He also worked on several academic projects at the University of Waterloo, ranging from video compression to autonomous vision. Mate holds a Bachelor of Applied Science degree in Systems Design Engineering from the University of Waterloo. He is also an active member of the IEEE.

SLATE PROPOSED BY THE NOMINATING COMMITTEE FOR 2002-2003

Section Officers:
Chair: Slawo Wesolkowski
Vice Chair: Mauro Rossi
Treasurer: Karim Karim
Secretary: Open

Chapter Chairs:
Antennas and Propagation/
      Microwave Theory and Techniques: Raafat Mansour, U of Waterloo
Circuits and Systems: Shawki Areibi,U. of Waterloo
Electron Devices: Arokia Nathan, U of Waterloo
Computers/ Signal Processing: Mohamed Kamel, U. of Waterloo
Communications/ Vehicular Technology   Roauf Boutaba, U. of Waterloo

Committee Chairs:
Education: Magdy Salama
Membership and Development: Tony Kormos
Publication: Open
Publicity and Program: Kingsley Fregene
Nominations: John Mowbray
GOLD: (Graduates Of the Last Decade):   Tasreen Chariana

Student Activities Chairs:
Conestoga College: Rudy Hofer
University of Guelph: Shawki Areibi
University of Waterloo:
      Stream A: Winter 2002
      Stream B: Summer 2002

DISCOUNTS ON BUDGET RENT-A-CAR

By quoting discount number X520000 when renting a car from Budget, as a member of IEEE you should be able to get a discount of up to 25%, in Canada, United States, Europe, Latin America, Australia and Asia. The discount may vary due to location, date and currency fluctuation. That's one more reason for keeping your IEEE membership card in your wallet. When making a reservation, use discount number X520000.

For more information, call Global Travel Services at +1 732 562 5387.

NEWS FROM ACADEMIA

Professor Bob Dony of the **University of Guelph** has come up with a view of an American battleship sunk in muddy water in Pearl Harbor. Divers had taken many close up shots of the vessel, the Arizona, and Dony mosaiced them together to make a complete picture. Prof. Dony was recently on the executive of the KW Section.

The **University of Waterloo** has started a program leading to a degree in Software Engineering. The new program will be a coop program and starts with Engineering Year 1, then specializing in Computer Engineering, then the Software Option. This is expected to satisfy provincial licensing bodies (such as PEO, formerly APEO) who, in the past, have objected to the illegal use of the title Engineer by programmers who do not have engineering degrees or other required qualifications. (Microsoft has asked its Microsoft Certified Systems Engineers in Canada to drop that title and to use MCSE.)

Construction of a Co-operative Education and Career Services building is under way, near the main entrance of the university.

Nortel Networks is investing $600,000 over five years, matched by NSERC, to endow two positions in software engineering for telecommunications.

The University of Alberta is establishing a National Institute of Nanotechnology, which will link teams in many Canadian universities, including one in UW.

The long awaited development of the North campus of UW (currently a golf course and cornfield) seems to be a little closer. The city of Waterloo is committed to contributing $7.7M and the Region $5.7M to development of a Research and Technology Park. The provincial and federal governments have each been asked to match this funding. The University of Waterloo would contribute the land.

A student of **Waterloo Collegiate Institute**, Heather Hughson, came fourth in the engineering contest at the Intel International Science and Engineering Fair in California. Her submission, called "Not with a bang" consisted of a computer simulation of her concept for the creation of the universe.

NEWS FROM INDUSTRY

Canada's Technology Triangle is to have volunteer "ambassadors" to promote local companies around the world. Babcock and Wilcox, and Northern Digital are among the first ambassadors. Bell Canada has become a corporate partner, contributing $25,000 a year to CTT.

Profit Magazine has listed three local companies among Canada's 100 fastest growing companies. They are Fred Systems, Open Text and Research In Motion (RIM).

Research Infosource listed six local companies among the 100 Canadian companies who spent the most on Research and Development. They were Com Dev, Descartes, Dalsa, Mortice Kern, Open Text and RIM.

Campana Systems of Waterloo has received a contract from the AAA Ohio Auto Club to provide its AXIS Auto Club Management System, which was originally developed in the CAA operation in Kitchener.

Cisco Systems has closed down its Waterloo operation, formerly **Pixstream.** One of the founders of Pixstream, Stephen Basco, has started **AdExact** of Kitchener: see our May 2001 issue. Mate Prgin and three other former Pixstream employees have founded **VideoLocus** of Waterloo: see AGM 2001 on page 3. The company has received $600,000 in capital investment. Dave Caputo has founded **Sandvine Incorporated**, located in the building formerly occupied by Cisco on Columbia Street in Waterloo, and hired many former Pixstream employees, but it will strike out in a new direction.

Com Dev International of Cambridge has received an order for satellite equipment worth over $20M. The company has decided to sell its wireless components activity, but it is developing M/ERGY, a system for delivering mobile, broadband internet service. Val O'Donovan, founder of Com Dev, has received the John H. Chapman Award of Excellence from the Canadian Space Agency.

DALSA Inc. of Waterloo has introduced Dalstar, a new line of cameras with increased number of pixels (up to 3k by 2k), and 12 bits instead of 8 bits brightness resolution. The company has opened a sales and support office in Tokyo, Japan.

Descartes Systems Group Inc. of Waterloo has acquired TranSettlements Inc. and Centricity Inc., both involved in trucking management systems in North America. Descartes is also providing a delivery and logistics network to Apple Computers. It has suffered substantial losses and has cut staff, but expects to recover.

Fakespace Systems of Kitchener (part of Electrohome Limited) is in partnership with the US Army's Tank Army Command, which uses virtual reality in combat simulations. Fakespace has contracts with four customers involved in analyzing seismic data obtained in oil exploration. It has received a $7M contract from the Los Alamos National Laboratory for a simulator of nuclear explosions.

FibreTech, which was formed about two years ago by the three local Hydro companies, Waterloo-North, Kitchener-Wilmot and Cambridge-North Dumfries, uses their fibre optic networks to provide high speed data access to local companies, and includes the Waterloo Region Education and Public Network.

Ignis Innovations Inc. of Waterloo, a start-up company founded by UW professors Paul Doherty and Arokia Nathan, is developing displays which are literally flexible, and could

be wrapped into curved shapes. Nathan is chair of the Electron Devices chapter of the KW section.

Inscriber Technology Corp. of Waterloo has received two contracts. Its TitleExpress video software will be used in Adobe Systems Premiere 6.0 software, and its TitleMotion software will be used in Sony Corp's XPRI suite.

Kickstarts.com of Waterloo has awarded its first package of professional services to Arash Mirbagheri of the University of Waterloo. The company, founded by four UW graduates, sorted through about 70 submissions, which consisted of proposals for a new technical business. The winning entry was for a wireless communications device. The accounting, marketing and other services in the package are intended to let the winner develop the proposal into a viable company.

Two thieves who broke into a **Microage** warehouse in 1999 have received jail sentences. They had stolen more than 200 computers and one of them set the building on fire as a coverup.

Mitra Inc. of Waterloo is being bought by Agfa-Gevaert N.V. of Belgium, which is reducing its activities in analog imaging, to concentrate on the digital imaging developed by Mitra. Mitra will operate as an autonomous business.

Mortice Kern Systems has changed its name to **MKS**. It has also closed down its **Vertical Sky** unit.

NCR Canada of Waterloo made its 50,000th Automatic Teller Machine in May.   Its machines dispense about $2M every minute. A security feature developed by Spinnaker of Britain can be installed into a machine, so that if the machine is broken into, the money comes out covered in dye and therefore worthless.

The **Perimeter Institute for Theoretical Physics** has already hired several scientists who are at work in a temporary location in downtown Waterloo. The site of their new building beside Silver Lake has been razed: the building is expected to be ready in about 18 months.

RIM (Research In Motion) of Waterloo has given the Toronto Blue Jays baseball team a Blackberry pager for each player and coach: Rogers AT&T Wireless provide the connection. Others who are on the road are New York brokers: according to a report, many often use them rather than their laptops. Bill Gates is said to be another user. RIM has bought the Phillip Street building put up by Hewlett Packard in 1996, mainly so that it can build a driveway from Bearinger Road in to the back of the former Stack-a-Shelf building, which RIM bought earlier.

Rodin Communications Corporation of Cambridge supplies videoconferencing and networking services to businesses, and has set up a fibre optic network between London and Ottawa. It has filed for bankruptcy protection.

Switchview Inc. of Waterloo was merged with MDR Technologies of Oakville earlier this year. Now the Waterloo location has been closed and the operations concentrated in Oakville.

Virtek Vision has set up two subsidiaries to more accurately reflect its activities: **Virtek Biotech** and **Virtek Laser Systems**.

NEWS FROM THE INTERNET

New domain names are being opened up, beside the old ones – .org, .com and .net. They include .biz and .info. It is hoped that new regulations will prevent piracy, and ensure that an internet name is appropriate to its user. (It has been known that someone will register the name of a product and demand a ransom for the real owner to use it.)

Some users of the Rogers@Home service, who suffered frequent slow (or no) service, but had to continue to pay the standard fee, have opened a class action suit against the company.

A new Ottawa company, Bird Satellite Communications Inc., put in a bid for one of the last remaining geostationary orbit locations - at 118.7 degrees west: it intended to launch a satellite to provide high-speed internet service to rural locations. However, Industry Canada awarded the location to Telesat Canada, who also promised to use an innovative technology, "making a significant contribution towards fulfilling the Government of Canada's goal of making high-speed broadband services available to all communities". [Apparently this will be a Ku (20GHz) satellite, as Industry Canada already awarded a license for a Ka (30GHz) satellite].

REGION'S SCHOOLS WIRED WITH FIBRE

By this fall, Waterloo's schools, libraries and public buildings (227 sites altogether) will be connected by a network called WREPNet which uses 550 km of fibre-optic cable. A demonstration earlier this year included a TV broadcast of the KW Symphony Orchestra to schools. It is claimed that it will be the largest community network project of its kind in the world.

At the 2001 Showcase Ontario meeting in Toronto, WREPNet was awarded a "diamond" award in the category of "Working Together".

A BILLION MICROFARADS

A new type of capacitor, called the Ultracapacitor or Electric Double Layer Capacitor, is now on the market. It uses a porous carbon-based electrode to maximize the area, and a polarized liquid layer to minimize the thickness of the dielectric. Ness Corporation claims that its NESSCAP 1200P is rated at 2.3 volts, and has a capacitance of 1200 farads and equivalent series resistance of 0.6 milliohms: it is only 10 cm x 9 cm x 3 cm. A stack of such units could energise the starter motor of a car, allowing the use of a smaller lead-acid battery, and would be useful in regenerative braking.

LIMITS ON SILICON CHIPS

During the Middle Ages, theologians used to debate how many angels can dance on the head of a pin.

The March 2001 issue of the Proceedings of the IEEE is devoted to papers which discuss how many transistors can be put on a silicon chip. In 1999 the Semiconductor Industry Association issued an "International technology roadmap for semiconductors", projecting advances for the following 15 years.

Table 1 in the paper by Plummer and Griffin shows the changes predicted in DRAMs (Dynamic Random Access Memories) between 1999 and 2014: the number of bits per chip would increase from 1 billion to 192 billion: this would be achieved by reducing minimum feature size from 180nm (millionths of a millimeter) to 35 nm, increasing chip size from 400 mm^2 to 860 mm^2, reducing minimum supply voltage from 1.5-1.8v to 0.5v, increasing dielectric constant of the capacitor from 22 to 1500 and other changes. It is not clear how some of these changes can be achieved, particularly in a manufactured product.

Figure 5 in the paper by Keyes shows that a typical chip can carry up to a kilometer of conducting paths, and by 2008 this figure could be 4 km.

The August 2001 issue of the Proceedings contains a paper by Y. Wada called "Prospects for Single Molecule Information Processing Devices." It is suggested that a DRAM memory cell, a transistor, a NAND gate or a NOT gate etc. could each consist of a molecule (consisting of hundreds of carbon and other atoms), and they could be manipulated by using a scanning tunneling microscope. The June 2001 issue of IEEE AES magazine contains a paper by Glenn Wright, Marek Zgol, Susann Keaton and Larry Kirkland titled "Nanotechnology-based Molecular Test Equipment" which contains the formula for a proposed molecule with 111 carbon atoms, together with oxygen, nitrogen, sulphur and hydrogen atoms, to act as an OR gate. None of these molecules have been made to date, as far as we know.

ALTERNATIVE ENERGY

Helios, a solar powered aircraft built by NASA and AeroVironment Inc. was successful in its first test flight, reaching a height of 23,000 metres, nearly twice as high as a typical transatlantic flight path.

In Japan, students at Keio University demonstrated an eight-wheeled car powered by a Lithium-ion battery. The battery takes one hour to charge and the car can then run for 300 km.

Ballard Power Systems of Burnaby, BC has received a contract worth $34.5M to supply fuel cells to Ford Motor Co. Ford and DaimlerChrysler have increased their ownership share in the company. Ballard has also developed a fuel cell to run off sewage gas: it will be used in Tomakomai, Japan.

Fuel cells are being used to power various vehicles: the fuel is hydrogen, either stored in liquid form or in a metal hydride, or generated in the vehicle from gasoline or methanol. Toyota is road testing a Sport Utility Vehicle powered by a hydrogen fuel cell, and Honda has unveiled an improved fuel-cell car, to be on sale in 2003. However, Ballard Power Systems of BC, in cooperation with DaimlerChrysler, has developed a fuel cell which uses methanol directly. For demonstration purposes, the methanol fuel cell is driving a go-kart.

Fuel cells are not the only way to use hydrogen. BMW has shown a car with a twelve cylinder internal combustion engine running on hydrogen instead of gasoline. It is not known how the hydrogen is stored.

Texaco, the gasoline giant, is also getting into the alternative fuel game. It and Energy Conversion Devices will spend $150M US to mass produce batteries for electric and hybrid cars. [Perhaps they will follow up on a Russian invention, in which the thick lead plates in lead-acid batteries are replaced by aluminium plates coated with 1 mm of lead: all the action takes place in the first mm of a conventional lead plate anyway. – Ed].

In Pickering, Ontario, a wind turbine is being installed: it is claimed to be the largest in North America.

Meanwhile, back in Kitchener, the city's fire prevention officers are getting a Toyota Prius, a hybrid gas-electric car. And in Waterloo, at the Regional landfill site on Erb Street West, methane gas is being collected in gas wells and used in conventional generators to generate 3.5 MW (this could go up to 8 MW).

STOLEN COMPUTER CALLS "STOP THIEF"

According to the IEEE Canadian Review for spring 2001 (page 4 Dec 22):

"Absolute Software announced the recovery of a laptop, which used its Computrace® product. The stolen laptop began to call the Computrace Monitoring Center every 15 minutes over the internet. The police were able to trace the 18 received calls and raid the thief's hideout the same day."

THE BIBLICAL PARROT

A wealthy man was trying to come up with a special gift for his mother's hundredth birthday. He knew that she liked to read the bible every day, but her eyesight was failing. He had a bright idea: he obtained a parrot, and had the church elders teach the parrot to recite the entire bible. All the mother would have to do was to call out the book and chapter, and the parrot would read the text to her.

Unfortunately, a crisis prevented him from attending her birthday and giving the parrot to her, but he managed to send it to her by courier.

Three days later her received a letter saying "Thank you so much, dear boy: the chicken was delicious".

Conclusion: Software is worth more than hardware, but only if it comes with adequate instructions.