

IEEE NEWSLETTER

KITCHENER-WATERLOO SECTION

September 1999

Meetings

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- September 22 University of Waterloo DC 2577
Prof T J Brazil: Non-linear High Frequency CAD
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- October 19 University of Waterloo DC 1304
Prof Christen Rauscher: Microwave Active Filters
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- November 9 University of Waterloo DC 1302
Prof. Kostas Kontogiannis: Software Engineering
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Fall 1999

EDITORIAL

Here's hoping you had a good summer. Our activities start up again with a presentation by the Antennas and Microwave Chapter September 22nd (page 3)

Many in the University of Waterloo and the software industry will be saddened to hear of the death of Wes Graham (page 4).

This summer has been a busy one for the electronics industry in our territory, with mergers, contracts and working arrangements (page 5).

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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K-W Section
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Waterloo. Ont. N2L 3G1

MTT CHAPTER MEETING
PROF. BRAZIL ON NON-LINEAR HIGH-FREQUENCY CAD

Date: 1999 September 22nd
Time: 5.30 pm
Place: University of Waterloo Davis Centre room DC2577
Subject: Non-linear High-Frequency CAD: the Key to Success in Wireless Design
Speaker: Professor T. J. Brazil, UCD, National University of Ireland.

Subject: Wireless technology has emerged as an increasingly attractive medium for digital communications - mobile telephony being the most conspicuous success to date, but other applications such as video delivery and broadband Internet are also coming into view. Circuit and system designers face major challenges to maximise performance, minimise cost and meet tight market opportunity windows. In this context, high-frequency CAD has become a critical enabling technology for the successful realisation of RF functions.

This talk will discuss two central concerns for this kind of CAD. In the first place effective device non-linear modelling is needed over a wide range of competing or complementary technology options (BJT, HBT, MESFET, HEMT or CMOS). Secondly, the complex digital modulation formats create a host of new simulation challenges, to describe obvious and more subtle system impairments over an exceptionally broad excitation signal bandwidth. A range of examples will be given to illustrate the capabilities of existing non-linear CAD techniques and to identify some areas where further improvements are needed.

Speaker: Thomas J. Brazil was awarded the Ph.D. degree in Electronic Engineering by the National University of Ireland in 1977. He subsequently worked on microwave sub-system development at Plessey Research (Caswell) UK. He returned to UCD in 1980, where he is now a Professor in the Department of Electronic and Electrical Engineering.

His research interests are in the fields of non-linear component modelling and device characterization techniques. He also has interests in non-linear simulation algorithms and microwave sub-system design. He has worked in several areas of science policy, both nationally and on behalf of the European Union. He is Co-ordinator of the European EDGE project, which is the major ESPRIT project in the area of high-frequency CAD.

MTT CHAPTER MEETING:

CHRISTEN RAUSCHER ON MICROWAVE ACTIVE FILTERS

Date: 1999 October 19th
Time: 5.30 pm
Place: University of Waterloo Davis Centre room 1304
Subject: Microwave Active Filters: The Search for New Solutions to a Long-Standing Problem
Speaker: Dr. Christen Rauscher, Naval Research Laboratory, USA

Subject: Through increased utilization of MMIC technology, substantial advances have been made in reducing size, weight and cost of high-frequency system components. Despite reliance on innovative circuit architectures and efficient use of dielectric materials, microwave filters remain among the lone hold-outs impeding continued system miniaturization efforts. Against this background, microwave active filters present themselves as attractive alternatives to passive-circuit approaches

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by permitting selective filter characteristics to be obtained without a need for bulky, high-Q circuit components. Following a review of conventional passive-circuit methods, the talk goes on to explore contemporary active-filter techniques, each with its own attributes and limitations, and concludes with a discussion of issues related to the realization of space-efficient filter banks.

Speaker: Christen Rauscher received his doctorate degree from the Swiss Federal Institute of Technology. He has been with the Naval Research Laboratory since 1977, engaged in research on linear and non-linear microwave circuits. Dr. Rauscher is the recipient of the 1987 IEEE Microwave Prize and the 1999 Microwave Application Award. He is an IEEE Fellow and is currently serving a three-year term as IEEE Distinguished Microwave Lecturer.

PROFESSOR KONTOGIANNIS ON SOFTWARE ENGINEERING

Advance Notice:

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

For more details see the section web site:

http://ece.uwaterloo.ca/~ieeekw/ieeekw_home.html

OBITUARY - PROF. WESLEY GRAHAM

Emeritus Professor Wesley Graham of the University of Waterloo died of cancer on August 22nd. He joined the university in 1959, and pioneered the teaching of computer programming to engineering students. In 1965, he and a small team converted FORTRAN, the existing number-crunching program, to WATFOR, which was much easier to use and to teach: this program continued to evolve and was widely used throughout the world. In 1981 he helped three colleagues found WATCOM, a software company in Waterloo which was later taken over by Sybase.

On August 19th, just three days before he died, Graham was invested as an Officer of the Order of Canada.

CHANDRA KUDSIA NAMED FELLOW OF EIC

The Engineering Institute of Canada has elected Chandra Kudsia of Com Dev, Cambridge, former Chair of this section, to the grade of Fellow for his Aexceptional contribution to engineering in Canada@.

SECTION MEMBERS PUBLISH

Wayne Fisher and Slawo Wesolkowski have published two articles recently: AWhen Does the Job End@ in IEEE Today=s Engineer for Spring 1999, and AThe Social and Economic Costs of Technology Resistance@ in the IEEE Canadian Review for Winter 1999.

Also Mohamed S. Kamel and Slawo Wesolkowski are the guest editors for a special issue on Document Image Analysis of the Canadian Journal of Electrical and Computer Engineering for April 1999.

HAMILTON BOY WINS IEEE SCHOLARSHIP

Michael Belshaw, a high school student from Hamilton, won the inaugural IEEE Presidents= Scholarship worth US\$10,000. Michael received the award from IEEE President Kenneth Laker at the 50th annual Intel International Science and Engineering Fair held in Philadelphia in May. The world=s largest pre-college science competition, often called the AOlympics@ of science fairs because of its international reach and

scientific breadth, the International Science and Engineering Fair is the only global science fair representing all life sciences - from biochemistry to zoology - for students in grades nine through twelve. This year=s fair drew students from 47 countries, including Brazil, Isreal, Russia, South Africa and Japan. The finalists emerged from a field of approximately one million high-school students who

competed in local fairs. Nearly half the participants in this year's fair were young women. For his project, Robotic Revolution, Michael constructed a computer-actuated robot arm.

CONFERENCES IN CANADA

1999

- Sep 26-29 International Seminar on the Technology of Inherently Conducting Polymers. Toronto. Matt Aldissi (813) 854-4332 e-mail: fractals@infobridge.com
- Oct 31-Nov 3 1999 International Conference on Network Protocol. Toronto
Dr. Joseph Bannister
(310) 822-1511 ext 717 <http://boa.crl.mcmaster.ca/~icnp99>
- Dec 13-17 LASERS=99 Quebec
(703) 642-5835

2000

- Apr 9-12 INTERMAG 2000. Toronto Ms Rebecca Dobkin (202) 973-8668 e-mail: magnetism@courtesyassoc.com
- Apr 30-May 4 2000 VLSI Test Symposium. Montreal. (202) 371-1013
- May 23-25 IEEE 7th International Conference on Parallel Interconnects. Quebec City.
(202) 371-1013
- Jun 3-7 27th International Symposium on Computer Architecture. Vancouver A. Berenbaum
(908) 582-3665
e-mail: Adb@bell-labs.com
- Sep 10-13 ICIP 2000: 7th International Conference on Image Processing: Vancouver
R.K. Ward (604) 622-6894
e-mail: rababw@cicsr.ubc.ca
- Oct 1-4 ASSPCC 2000 Adaptive Systems for Signal Processing, Communications and Control. Lake Louise, Alberta. Lola Brooks (905) 525-9140 x 24291
e-mail: brooks@macmaster.ca <http://symposium2000.mcmaster.ca>
- Oct 23-24 North American Power Symposium. Waterloo. Ont.

2001

- May 12-19 IEEE 23rd International Conference on Parallel Interconnects. Quebec City. (202) 371-1013
- Jul 7-13 IEEE 8th International Conference on Computer Vision. Vancouver (202) 371-1013
- July 15-19 IEEE Power Engineering Society Summer Meeting. Victoria. Y.Mansour (604) 473-2730
yahout.mansour@bchydro.bc.ca

2002

- Jun 24-28 IGARSS 2002 - IEEE International Geoscience and Remote Sensing Symposium. Toronto. (281) 251-6067 e-mail: tstein@phoenix.net

NEWS FROM INDUSTRY (June through August 1999)

Campana Systems of Waterloo has supplied its Auto Club software package to AAA clubs in the Buffalo- Syracuse and Hudson Valley areas, following deliveries of similar software to 26 Canadian and US clubs previously. Campana also supplies health-care software to non-profit nursing homes in Ontario.

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Com Dev International of Cambridge has a new CEO, Keith Ainsworth. He replaces Val O=Donovan, who co-founded the company in 1974 in Montreal, and moved it to Cambridge in 1979. O=Donovan intends to stay in Cambridge and continue tending his magnificent gardens. He and his wife have donated one million dollars to fund a hospice for dying patients. Ainsworth joined the company one year after it was founded, and managed satellite communications: he became President in 1990. Among its many other contracts, Com Dev provides C and Ku band multiplexers for Hughes satellites.

DALSA Inc. of Waterloo has a new president, Brian Doody, who was formerly VP of operations. The company=s founder, Savvas Chamberlain, who was its president, keeps his position as CEO and Chairman of the board. The company recently acquired Silicon Mountain Design of Colorado, whose product line of high-speed cameras complements DALSA=s image sensors and electronic cameras.

Electrohome Limited of Kitchener has sold off its projection systems business to Christie Inc. of California. Among the contracts which would presumably be part of the deal are: a contract believed to be worth several million dollars to supply 186 projectors to AT&T (which will be used in a Avideo wall@ at AT&T=s Global Operations Network Center in New Jersey, to monitor telephone traffic flow around the world); and a three year agreement to supply projector technology to LucasFilm Ltd., which produced Star Wars: Episode 1. Christie Inc, which manufactures movie projectors, will be able to get into the digital cinema business. It plans to continue the manufacturing operation in Kitchener.

Fakespace Systems of Kitchener, essentially the remaining portion of Electrohome Limited, has merged with Pyramid Systems of Novi, Michigan. The head office will be in Kitchener. The company provides tools which allow engineers and researchers to visualize complex computer-generated data.

Mitra Inc. of Waterloo and Hewlett-Packard are involved with St. Mary's Hospital of Kitchener, which is a world-wide test site for a program in which cardiac surgeons and cardiologists send heart images around the globe.

Northern Digital Inc. of Waterloo is to expand its line of motion-tracking equipment by means of a partnership with Mednetix Ag of Villigen, Switzerland. Northern Digital's current designs use tiny infra-red marker lights attached to a person or object, which are detected by digital cameras so that positions can be stored with an accuracy of better than one-tenth of a millimeter. The Swiss technology uses magnets, so that it is not necessary that the detectors have line of sight to the sources - important in surgery.

Sales by **Open Text** of Waterloo grew 2651 percent in 5 years according to Profit magazine. Its software is used by financial giant Merrill Lynch, among others.

The company has acquired Microstar Software of Ottawa, and PSSoftware Solutions Ltd.

Peartree Software Inc. of Kitchener has become the first Canadian company to be on Honda America's list of approved software providers. Honda of America suppliers must use approved EDI and barcode software.

Pixstream Inc. of Waterloo is to supply video networking systems to Kingston Vision, a subsidiary of Kingston Communications (Hull) plc, UK, for use in a technical trial of its new interactive television services using ADSL technology. The Pixstream system encodes video and audio at low bit rates, to be used over copper (telephone) channels. (Kingston Communications is a private telephone company serving Kingston-upon-Hull, usually abbreviated to Hull, in north east England).

Pixstream has signed a global distribution agreement with Newbridge Networks: this includes the VDS5000 video networking system which accepts video from any source, and transmits it as MPEG-2 compressed video. The company has split off its CompactPCI line to a new company called Kaparel, set up by a group of Pixstream employees, to be located on Weber Street North in Waterloo.

Raytheon Canada of Waterloo is to supply one of their ASR-10SS solid state primary surveillance radars to be installed at London's Heathrow airport for approach control. The digital radar data from the ASR-10SS will be fed to the Heathrow control tower and to the London Air Traffic Control Centre at West Drayton. The subcontract by Raytheon Systems Limited of the UK (formerly Cossor) will be worth several million dollars.

RDM Corporation of Waterloo will market its eCheck software to IBM customers. The electronic commerce software allows businesses to create, transmit, receive and deposit money over the Internet. RDM has been in business for 12 years: it supplies software and hardware to test checks for electronic processing. In a recent contract with Fidelity Express Money Order Company of Sulphur Springs, Texas, RDM will supply scanners and software to process cheques at the cash register.

Research In Motion (RIM) of Waterloo plans to expand into the European market. Their hand-held wireless device is used to send or receive e-mail, and to act as a two-way pager. It is claimed to have 10 times

the battery life of its nearest competitor. The company employs about 400. It ranked 38th in speed of sales growth in Canada, according to Profit magazine, having grown 2131 percent in 5 years. RIM and Intel of Arizona won the 1999 Award for Canadian-American Business Achievement. Under a contract worth \$13M, RIM is to supply its BlackBerry Internet Edition wireless devices to RCN Corporation of Princeton, New Jersey, an internet provider with over half a million subscribers. **Shadow Factor** of Waterloo has been bought by Microsoft after being in existence for less than two years, and having only one product. The four partners have been hired by Microsoft and are moving to Redmond, Washington. Their product, an internet voice channel for people playing video games remotely, will be incorporated into a Windows program next year.

Uni-Park, the site at the south-west corner of Columbia and Phillip Streets in Waterloo, is up for sale. MKS, Open Text and RIM are located there.

Unitron Industries of Kitchener has acquired another hearing aid company, Lori Medical Laboratories of Minneapolis. This will more than double Unitron's US market share.

Virtek Vision of Waterloo intends to buy the ply layup templating business of GSI Lumonics, a competitor in the aerospace manufacturing field. Virtek grew 8210 percent in sales growth over five years, making it the fourth fastest growing company in Canada, according to Profit magazine. It is now listed on the Toronto Stock Exchange.

NEWS FROM ACADEMIA

Conestoga College has been granted a license to operate a low-power FM radio station at 88.3 MHz. We reported its application to the CRTC in our last issue. The station will broadcast from a tower in Paris, Ont., for 24 hours per day, 7 days per week. It will provide training for students in the radio/TV broadcasting diploma program. Programs will include campus news, and some for-credit courses.

The college recently opened an addition to its Doon campus, including an added 400 square metres of machine shop area, and 23 new classrooms, and an expansion to the robotics and automation training area. There have also been changes at the Waterloo campus, which will be an information technology training centre, and at the Guelph campus to expand its metal working facilities. Ontario government funding was involved.

Emeritus Professor J. Wesley Graham of the University of Waterloo was named an Officer of the Order of Canada, for his pioneering work in computer engineering, but passed away shortly afterwards. (See Obituary - Prof Wesley Graham)

P.ENG LICENSING OF SOFTWARE PRACTITIONERS

At its May 29th meeting, the Council of Professional Engineers Ontario (formerly APEO) ratified a document called AExperience Requirements for Cross-Discipline Applicants Practicing in the Software Engineering Field@. It is intended to clear up difficulties in assessing applicants.

For licensing purposes, an applicant=s experience must generally be in an area related to the applicant=s background. However, there are no accredited software engineering programs, and many software practitioners have been educated in unrelated disciplines, so the experience of software practitioners has up to now been assessed on an ad hoc basis.

As outlined in the document, to be eligible for a P.Eng. licence, software practitioners must possess knowledge of control theory, mathematical foundations, digital systems and computer architecture, and software design and programming fundamentals, as well as three of the following: communications, optimization, data management, real time and control systems, performance analysis, parallel/distributed systems, and human interfaces and ergonomics. They must also meet all of PEO=s other licensing requirements.

PEO plans to publicize this licensing opportunity through news releases.

The Canadian Council of Professional Engineers has an on-going dispute with Memorial University, Newfoundland, claiming that graduates of Software Engineering courses should not be called engineers, since their qualifications do not conform to provincial licensing standards.

DNA DATA BASE MOVES TO TORONTO

The Human Genome Database has been moved to Toronto=s Hospital for Sick Children from Johns Hopkins University, who had to give it up because of cutbacks in US government funding. The Database is being

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developed by the Human Genome Project, which hopes to map all the 100,000 genes in human DNA by 2001. The Sick Kids Hospital stores the data on two computers, a donated IBM Deep Maple (RS/6000SP) and a Silicon Graphics Origin 2000. Information from these computers goes to twelve sites around the world. The hospital=s genetics research centre has mapped many disease genes: in 1989 Dr. Lap-Chee Tsui and his colleagues discovered the cystic fibrosis gene.

[Human DNA is a molecule contained in almost all human cells, and is in effect a string of three billion digits in which digits are to base 4 (called A, T, C, G for Adenine, Thymine, Cytosine, and Guanine). They are arranged in words of three digits, so that each word has 64 possible values, defining 20 proteins (allowing for some redundancy and for error detection) - Tom East].

INTERNET NEWS

AT&T Canada, which has 350 km of fibre cable in Waterloo Region and to Guelph, is now offering internet, data and voice services, starting in Kitchener-Waterloo.

The MaxLink Communications Group provides Local Multipoint Communications System high-speed access by wireless links through rooftop antennas, in 207 major centres in Canada.

Starnet Communications of Vancouver was raided by police under suspicion of illegal gaming and distributing pornography over the internet. They cooperated fully and have not been charged.

Cleveland Free-Net will close on October 1st, because it is impractical to make its software free from the Y2K bug. It is located at Case Western Reserve University.

Domain names (such as www.ieee.org) are considered so important that they command a high price. Wallstreet.com was sold to a Venezuelan company for \$1M US. Drugs.com was auctioned off, and fetched at least \$270K US.

Two internet access providers, **America Online** and **Prodigy Communications Corp.**, are offering rebates on the purchase of computers which amount to giving them away, provided that the purchasers sign up for three years service. AThere is no such thing as a free lunch.@

On the other hand, **AltaVista** is offering free access to its internet provider. However, you would have to give them your age, gender, postal code and other information so they could target advertisements at you. AThere is no such thing.....@

On June 22, chess champion **Garry Kasparov** started playing the world through the internet. After each of his moves, a team of four experts suggested a countermove which was voted on by anyone who cared to vote through the internet: each move and each countermove takes 24 hours. At the time of writing, the game is still going on. Kasparov is regarded as the world=s greatest chess player, though two years ago, he lost to IBM=s Deep Blue computer.

Newbridge Networks of Kanata, Ontario has bought TimeStep Corp. of Kanata and Northchurch Communications Inc. of Andover, Mass. to strengthen its capability in Internet Protocol (IP) technology. It uses the rival Asynchronous Transfer Mode (ATM) in its switching products.

Metafilmics of Los Angeles plans to produce a feature movie specifically to be downloaded by subscribers to Sightsound.com. It will take a high speed internet link to download a full length movie in a few minutes.

ALTERNATIVE ENERGY

The fact that gasoline lawnmowers create an appreciable proportion of the air pollution in North America has encouraged many to use electric lawnmowers. However the power cord is a disadvantage, as it can easily be cut by the mower. Now there are battery powered mowers which will mow a large lawn on one charge. You can buy one from Waterloo North Hydro, for \$449.

The Waterloo Recreation Complex has tried out a battery powered ice-grooming machine called Collect. Are the days of the propane powered Zamboni numbered? Its fumes have been known to make goalkeepers ill.

In Calgary, more than 1000 residents have signed on to a scheme under which they pay a few dollars per month extra on their hydro bill, to support wind power generation.

And in Vancouver, a fuel-cell research and test centre is to be set up by the federal government. This is a condition for Ballard Power Systems to set up a high-volume factory. Ballard is working closely with Ford and Daimler-Chrysler, who hope to have fuel-cell

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powered cars on the road by 2004.

Fully electric cars are also available in limited supply: they have limited range between chargings, because of the battery. However, the 3M Company has announced that they have developed a Lithium Polymer battery which has twice the range of present batteries: it will need several years of road testing.

IRIDIUM IN BANKRUPTCY PROTECTION

The Iridium consortium has filed for protection from its creditors. The lead member of the consortium is Motorola, and Raytheon is a member. Com Dev of Cambridge has supplied several major components for the satellites.

The system has a constellation of 66 satellites in low earth orbit, and numerous ground stations, which provide coverage to special mobile phones almost everywhere in the world. It was the subject of a talk to this section on October 7 1992 by Mark Gerecke of Com Dev: see this newsletter for September and November 1992.

The financial problem was caused by the very low numbers of subscribers, only 15,000 by recent count. Consumer resistance came from the high price of the telephone (\$3500 US), the high cost of calls (\$9 per minute) and the size and weight of the phone.

INTERACTION BETWEEN HUMAN AND MICROWAVE DEVICE

At the IEEE-AP Conference on Antennas and Propagation for Wireless Communication held in Waltham, Massachusetts in November 1998, a session was held on Human Interaction. The seven papers and discussion, chaired by Prof. Yahya Rahmat-Samii, were summarised as follows:

1. The casual manner in which users hold their handset units impacts the antenna design.
2. The proximity of the head and hand can considerably influence the radiation patterns, polarization states, impedance match, and efficiency of handset units.
3. On the average, 30% to 60% of the total power radiated by the antenna is absorbed in the biological tissues.

4. The penetration depth within the tissue depends on the frequency.
5. An important factor in determining power absorption is the proximity of the Ahot@ current spots, near the head and hand, an observation that suggest that novel antenna designs may help reduce the interaction.
6. The health-hazard aspects of handset units are not yet fully understood, and research and data-collection efforts are on-going.
7. As lower-powered units are introduced, the peak average SAR (specific absorption rate) levels are reduced.
8. Even moderately larger separation between antenna and tissues can reduce SAR considerably.
9. Internal integrated antennas can be useful, if they are kept away from the hand and head.
10. Diversity and directive antennas could play an important role in certain applications.
11. When proper numerical models are used, most of the existing computational techniques predict similar results, within variations on the order of 10%.
12. Antenna/human interactions must be evaluated in various configurations, in order to obtain statistical averages of the overall performance, for system-link evaluations.
13. Elaborate measurement techniques have been developed for antenna/tissue-interaction characterization.

From IEEE Antennas and Propagation Magazine vol 41 no 1 February 1999 pages 101-102.

NUCLEAR POWER BLAMED FOR STRONTIUM 90

Regular checks on Long Island of discarded baby teeth from children born since 1990 show levels of strontium-90 approaching that found in the 1960's, just before above-ground testing of nuclear bombs was stopped. The rate of breast cancer in that area is also high. It has been suggested that the plumes from nuclear power stations are the cause.

HELP WANTED

Companies looking for electrical,
electronics
and computer engineers can advertise
in this space.

E-mail your requirements to:

Slawo Wesolkowski

s.wesolkoski@ieee.org

and follow-up with a certified cheque for
\$50.00

made payable to **AIEEE**

Kitchener-Waterloo

Section@. This will cover the fee for
a quarter page in one issue of this
newsletter.

YUGOSLAV BRAIN DRAIN

According to a story on CBC television news, an architect in Kosovo took the hard drive and a few circuit boards out of his computer and smuggled them across the border as he fled into Albania. He rejoined his family, who had fled by another route. When they arrived at a transit camp in Canada, he installed the hard drive and circuit boards in a borrowed computer, and was able to display designs for a house and a shopping mall in full colour. Another refugee hid her cellphone in her baby's diaper, according to a story on the internet.

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KWNEWS-10
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