IEEE
Canadian Review

La revue canadienne de l'IEEE

Humanitarian Technology Challenge

Toronto holds first conference on
Science and Technology for Humanity

Calgary holds
Innovation for Humanity design competition

IEEE Canada establishes
Humanitarian Initiatives Committee

IEEE Canada
The Institute of Electrical and Electronic Engineers Inc.

IEEE Canadian Review
General Information

The *IEEE Canadian Review* is published three times per year. Its principal objective is to project an image of the Canadian electrical, electronics, communications and computer engineering professions and their associated academic and business communities to:

(i) Canadian members of IEEE;

(ii) Canadian members of the profession and community who are non-members of IEEE;

(iii) The associated Canadian academic (i.e., universities, colleges, secondary schools), government and business communities.

To ensure that the *IEEE Canadian Review* has the desired breadth and depth, editors are responsible for screening articles submitted according to the following general themes:

1 - National Affairs	5 - Power
2 - International Affairs	6 - Communications
3 - Industry	7 - Computers
4 - Education	8 - Electronics

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Editorial / *Éditorial*

Amir Aghdam SMIEEE, Managing Editor / Rédacteur en chef

Les ingénieurs contribuent de façon continue aux efforts humanitaires en améliorant la qualité de vie dans les pays sous-développés. En particulier, les contributions des ingénieurs dans le domaine électrique et celui de l'informatique, bien que significatives, sont le plus souvent indirectes. Cependant, une série de nouvelles initiatives issues d'un groupe de volontaires de l'IEEE Canada a ouvert un nouveau chapitre au niveau de la participation directe. Dans ce numéro nous mettons en évidence une partie de leur travail, en se concentrant sur trois initiatives spécifiques.

La conférence internationale de Toronto sur la science et la technologie au service de l'humanité (TIC-STH) qui s'est tenue en septembre 2009 à l'Université de Ryerson, comportait des articles interdisciplinaires couvrant un large éventail des champs d'activité de l'IEEE Canada. Nous passons en revue l'étendue et le degré d'intérêt pour les sujets présentés. Le comité d'initiatives humanitaires de l'IEEE Canada (CIH) est passé de son statut ad hoc attribué lors de son établissement à l'automne de 2009 à un statut de comité permanent, débordant d'idées pratiques pour soutenir les sections, les chapitres et les membres de façon individuelle au niveau des initiatives humanitaires. Nous comptons sur leurs efforts soutenus et une future direction. Bien qu'organisé indépendamment, l'innovation de mars passé touchant la compétition de conception pour l'humanité qui s'est tenue à l'Université de Calgary constitue un exemple des genres d'activités que le CIH supportera. Lancé par un petit groupe d'étudiants avec un talent pour l'innovation, un membre nous a parlé du succès de la compétition et comment un travailleur de la Croix-Rouge sur le terrain a capté l'attention des participants en parlant des interventions et du travail de soulagement lors des catastrophes naturelles récentes.

Au niveau personnel, je suis fier de produire ma première colonne éditoriale dans un numéro mettant un accent spécial sur cette grande initiative; une coïncidence si plaisante ! Nulle part on ne peut trouver une expression plus belle au sujet de nos engagements humanitaires que dans les paroles du poète persan Saadi du 13ième siècle, dont les lignes suivantes honorent l'entrée du Hall des nations du bâtiment de l'ONU à New York (traduction libre):

Les êtres humains sont membres d'un tout,
Créatures d'une même essence et âme.

Si un est accablé de douleur,
D'autres demeureront affligés.

Si vous n'avez de compassion pour la douleur humaine,
Le nom d'humain ne pouvez conserver.

Dans ce numéro, nous offrons une suite à un article précédent sur les communications à courte portée dédiées intitulé « Performance of DSRC Routing and Security Layers. » Avec une application directe dans l'évitement de collision de véhicules (anticollision), c'est un excellent exemple d'humanitarisme débutant à la maison.

Nous espérons que ces lignes vous inspireront à considérer vos propres opportunités — tant au niveau de votre travail de volontariat qu'au niveau de votre travail quotidien de — « stimuler l'innovation technologique et l'excellence au bénéfice l'humanité. » Bonne lecture !

Engineers continuously contribute to humanitarian efforts by improving the quality of life in under-developed countries. In particular, the contributions of electrical and computer engineers, although significant, are most of the time indirect. However, a series of new initiatives by a group of IEEE Canada volunteers has opened a new chapter in direct involvement. In this issue we highlight some of their fine work, focusing on three specific initiatives.

The Toronto International Conference on Science and Technology for Humanity (TIC-STH) was held in September 2009 at Ryerson University, featuring interdisciplinary papers across a broad spectrum of IEEE fields of activity; we review the extent and depth of the interest in the topics presented. IEEE Canada's Humanitarian Initiatives Committee (HIC) has vaulted from its ad-hoc status when established in the fall of 2009 to a standing committee, brimming with practical ideas to support sections, chapters and individual members in humanitarian initiatives. We catch up with their current efforts and future direction. Although independently organized, an example of the kinds of activities the HIC will be supporting is last March's Innovation for Humanity Design Competition, held at the University of Calgary. Initiated by a small group of students with a flair for innovation of their own, a member reports on the competition's success and how a field worker from the Red Cross held participants' attention captive with first-hand accounts of relief work in recent natural disasters.

On a personal level, I take pride in providing my first editorial column in an issue that has a special focus on this great initiative; such a pleasant coincidence! No where can I find a more beautiful expression of our humanitarian obligations than in the eloquence of the 13th-century Persian poet Saadi; his following verses, as translated by M. Aryanpoor, grace the entrance to the Hall of Nations of the UN building in New York:

Human beings are members of a whole,
In creation of one essence and soul.

If one member is afflicted with pain,
Other members uneasy will remain.

If you have no sympathy for human pain,
The name of human you cannot retain.

Elsewhere in this issue, we offer a follow-up to a previous article on Dedicated Short Range Communications entitled "Performance of DSRC Routing and Security Layers." With direct application in vehicle collision avoidance, this is an excellent example of humanitarianism beginning at home.

We hope this line-up inspires you to see your own opportunities—both as a volunteer and in your daily work—to "foster technological innovation and excellence to benefit humanity." Enjoy!

Cover Photo / *Photo de couverture*

The picture on the cover was taken in the Coope internally displaced persons camp near Gulu, Uganda, by Jaime Bruner, Senior Technical Project Manager with Inveneo. In early 2007 the company (www.Inveneo.org) and its local partners deployed a long-distance WiFi networking, computer and Voip system to serve sponsors CARITAS and BOSCO. The project goal was to dramatically improve communications with seven widely dispersed camps offices, schools and clinics so as to accelerate relief, education and development work. The network has since been expanded for various other humanitarian uses.

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Dear IEEE Canada members:

It is already the last quarter of 2010 although it seems as if just yesterday I took over the position of IEEE Canada President/Region 7 Director. It has been a busy year with lots of travel, countless face-to-face and teleconference meetings for the IEEE Board of Directors (BoD), IEEE MGA, Committees, EIC, and of course IEEE Canada.

One of IEEE BoD's major activities this year has been its transformation and restructuring; it will likely present its recommendations at its November 2010 meeting. Whatever the final structure proposed by the Board, it will require amendments to the IEEE Constitution and will be put to the vote in 2011. Thus, you the members of IEEE will have the final say.

One item that will be of special interest to IEEE Student Members is that Eta Kappa Nu (HKN) has merged with IEEE. Effective September 1, 2010, IEEE-HKN is the official honor society of IEEE and any IEEE Student Branch can now have an HKN Chapter.

Here at the home front:

- The IEEE Canada Board approved three new Committees at its Spring 2010 meeting: History, Humanitarian Initiatives and Teacher-in-Service-Program. Revisions to the IEEE Canada Bylaws and Operating Manual incorporating these committees were considered by the IEEE Canada Board at its meeting in October 2010.

- As reported recently by IEEE Canada's e-Newsletter, winners of both IEEE MGA Outstanding Section Awards 2009 are in Canada: Vancouver (Large Section) and Canadian Atlantic (Small Section). This is a truly outstanding feat. In addition, Kingston Section's Life Members Affinity Group also received the 2009 "Outstanding" rating by the IEEE Life Members Committee. Congratulations to all three units.

- A number of new Sub-sections and Chapters have been established in various parts of the country. It is interesting to note that Toronto Section now has Chapters representing all IEEE technical Societies. I understand that it is the second IEEE Section anywhere in the world to have achieved that. Well done.

- Four new IEEE Milestones have been celebrated in Canada this year:

  1) First Television Broadcast in Western Canada – 1953

  2) First Radio Astronomical Observations Using VLBI (Very Long Baseline Interferometry) – 1967

  3) Eel River HVDC Converter Station – 1972

  4) TRIUMF Cyclotron – 1974

- At least four international conferences sponsored by various IEEE technical Societies have been approved for being held in Canada during 2011-2012. Also, our two IEEE Canada conferences, CCECE and EPEC, were held successfully in Calgary and Halifax in May and August, respectively.

The above provides a glimpse of IEEE activities in Canada. I would first like to congratulate all those involved for their efforts and excellent work. It shows that our Members, Sections, Chapters and Affinity Groups are active in providing IEEE membership benefits on all fronts. I urge you all, Members of all grades, to resolutely engage in these activities and take full benefit of what IEEE has to offer on the technical, professional and inter-personal fronts.

I will be remiss if I did not thank all members of the IEEE Canada Executive Committee and Cathie Lowell, IEEE Canada Administrator, for the help and support that I continually receive from all of them.

If you have any comments or suggestions, please contact me at maliko@ieee.org. Wishing you all the best,

Chers membres de l'IEEE Canada,

Nous sommes déjà au dernier trimestre de 2010 et on dirait qu'à peine hier j'entrais en poste comme président du IEEE Canada/directeur de la Région 7. Ça a été une année occupée avec beaucoup de voyages, d'innombrables réunions face à face et via téléconférence pour le conseil d'administration (CA) de l'IEEE, MGA, comités, ICI, et bien sur l'IEEE Canada.

One des activités majeures du CA de l'IEEE cette année a été sa transformation et restructuration; il prévoit présenter ses recommandations à la réunion de novembre 2010. Quelle que soit la structure finale proposée par le CA, cela exigera des amendements à la Constitution de l'IEEE et sera soumis au vote en 2011. Ainsi, vous les membres de l'IEEE aurez la décision finale.

Un item qui sera d'intérêt particulier pour les membres étudiants de l'IEEE est que l'organisation Eta Kappa Nu (HKN) fusionnera avec l'IEEE. À partir du 1er septembre 2010, IEEE-HKN sera le club officiel des meilleurs étudiants (« honor society ») de l'IEEE et toute branche étudiante de l'IEEE pourra avoir un chapitre HKN.

Plus localement:

- Le CA de l'IEEE Canada a approuvé la création de trois nouveaux comités à sa réunion du printemps 2010 : Histoire, Initiatives humanitaires, et Programme d'enseignants intégré (« Teacher-in-Service Program »). Les révisions aux statuts et au manuel d'opération de l'IEEE Canada incorporant ces comités seront considérées par le CA à sa réunion d'octobre 2010.

- Tel que relaté récemment par le e-Bulletin du IEEE Canada, les gagnants des deux prix du IEEE MGA pour Sections Exceptionnelles 2009 sont au Canada : Vancouver (grande section) et Canada Atlantique (petite section). C'est un exploit vraiment remarquable. De plus, le Groupe d'intérêt des membres à vie de la section de Kingston a été désigné Groupe Exceptionnel 2009 par le Comité des membres à vie de l'IEEE.

- Un certain nombre de nouveaux chapitres et sous-sections ont été établis au pays. Il est intéressant de noter que la section de Toronto a maintenant des chapitres représentant toutes les sociétés techniques de l'IEEE. Je crois qu'il s'agit de la seconde section de l'IEEE au monde à avoir atteint ça. Bravo.

- Trois nouveaux Jalons de l'IEEE ont été célébrés au Canada cette année:

  1) Première diffusion télévisée dans l'Ouest du Canada – 1953

  2) Premières observations radio astronomiques utilisant l'interférométrie à très longue base (VLBI) – 1967

  3) La station de conversion HVDC d'Eel River – 1972

  4) TRIUMF Cyclotron – 1974

- Au moins quatre conférences internationales commanditées par diverses sociétés techniques de l'IEEE ont été approuvées pour avoir lieu au Canada en 2011-2010. De plus, nous deux conférences IEEE Canada, CCGEI et CEE/EPEC, ont été présentées avec succès à Calgary et Halifax en mai et août, respectivement.

Le texte ci-haut fournit un aperçu des activités de l'IEEE au Canada. Je voudrais tout d'abord féliciter tous ceux qui ont été impliqués pour leurs efforts et leur excellent travail. Cela démontre que nos membres, sections, chapitres et groupes d'intérêt s'activent à livrer les services de l'IEEE sur tous les fronts. Je vous invite tous, membres de tous grades, à vous engager résolument dans ces activités et prendre avantages de tout ce que l'IEEE offre sur les plans techniques, professionnels et inter-personnels.

Je serais négligent si je ne remerciais pas les membres du comité exécutif de l'IEEE et Cathie Lowell, administratrice de l'IEEE Canada, pour l'aide et le support que je reçois continuellement de leur part à tous.

Si vous avez des commentaires ou suggestions, veuillez me contacter maliko@ieee.org. Que mes vœux vous accompagnent,

Dr. Om Malik, P.Eng., LFIEEE, FCAE, CEIC, FEIT, FEIC
2010-2011 IEEE Canada President and Region 7 Director

Canadian Newslog / Coupures de presse canadienne

Newslog Editor

Rédacteur des Coupures de presse

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Veuillez faire parvenir les coupures de presse proposées par e-mail à alexandre.abecassis@ieee.org

VICTORIA, BC. Oct. 27, 2010. Streetlight Intelligence announced that it has received a purchase order for an adaptive street light management system that will be used in the Highway One expansion portion of the Gateway development project within the Trans Canada Highway corridor through greater Vancouver. The new system is comprised of approximately 130 Lumen IQ lamp controllers that will be fitted into high-pressure sodium street light fixtures. This new system is scheduled for installation in 2011 as part of the Highway 1 Expansion Gateway Program.

MONTREAL, QC. Sep. 23, 2010. iBwave has been ranked 37th fastest growing technology company in Canada in the 2010 Deloitte Technology Fast 50 awards. This ranking is based on the percentage of revenue growth over five years. iBwave provides in-building wireless software that delivers solutions to a global client base of more than 230 leading telecom operators, system integrators and equipment manufacturers. In particular, iBwave offers industry-specific planning and design software solutions to improve accuracy and standardize designs that are shared across the in-building community.

BURNABY, BC. Sep. 22, 2010. Photon Control announced that it has filed two lawsuits in the United States, the first against Azbil North America, Inc. and the second against Yamatake Corp., a Japanese company with offices in Tokyo, Japan, parent company of Azbil. According to its announcement, Photon Control has learned in 2010 that Azbil and Yamatake had filed several patent applications at the United States Parent and Trademark Office, the Japanese Patent Office and the Chinese Patent Office that are directed to optical temperature sensor technology of the type developed by Photon Control. The claim against Azbil is for damages for breach of contract, including breach of confidentiality, non-disclosure and non-disparagement obligations, misappropriation of trade secrets and interference with its rights to its technology, and for an injunction against Azbil to preclude the continued disclosure of confidential information, technology and trade secrets and continued disparagement of Photon Control. The claim against Yamatake is for damages for misappropriation of trade secrets and injunctive relief to prevent Yamatake from further dissemination and publication of Photon Control's trade secrets and confidential information.

TORONTO, ON. Sep. 22, 2010. Netflix announced that it has launched its services in Canada. Netflix is known for providing an Internet movie subscription service. The offering will allow Canadians to instantly watch unlimited movies and TV episodes streamed from Netflix to televisions and computers for a subscription. After the United States, Canada is the first country to obtain the service from this company.

GRANBY, QC, Sep. 27, 2010. CADENS Imaging announced that it has received the Jury's Choice in the 2010 Deloitte Technology Fast 50 Awards. Founded in 2007, CADENS Imaging is a private Canadian company that develops, manufactures and markets innovative computer-assisted medical imaging solutions to enhance diagnostic imaging accuracy and cost effectiveness. Its first product, CADENS Colon, supports radiologists performing non-invasive screening of colorectal cancer by virtual colonoscopy.

MONTREAL, QC. 27 oct. 2010. M. Carl-Éric Aubin, professeur titulaire au Département de génie mécanique à l'École Polytechnique et chercheur au Centre de recherche du CHU Sainte-Justine, a reçu le prix d'excellence jeune chercheur 2010 dans le cadre du 28e Bal de la Fondation des étoiles qui avait lieu le 21 octobre dernier au Windsor à Montréal. Les travaux en biomécanique de la colonne vertébrale menés par l'équipe du professeur Carl-Éric Aubin en collaboration avec le CHU Sainte-Justine et Medtronic du Canada révolutionnent la chirurgie orthopédique et positionnent le Québec en tête de file mondiale dans le traitement des maladies de la colonne vertébrale.

MONTREAL, QC. Oct. 22 2010. Bombardier Transportation and Israel Railways (ISR) announced that they have signed a framework agreement for the delivery of double-deck coaches, including a firm order for 78 units. The value of the contract is about US$185 million. The coaches will be manufactured at Bombardier Transportation's Görlitz facility in Germany and in Israel.

MONTREAL, QC. Sep. 29, 2010. CAE announced that it has won defence contracts valued at more than Cdn$75 million. In particular, the contracts include the upgrade of visual and display systems at the German Army Aviation School, the renewal of a long-term CF-18 systems engineering services agreement for the Canadian Forces, the upgrade of C-130J simulators for the U.K. Royal Air Force and the upgrade of a C-130H simulator for a North African defence customer.

QUÉBEC, QC. 14 juil. 2010. L'Université Laval a annoncé qu'un de ses professeurs, le Prof. Maxime Dubois de la Faculté des sciences et de génie, vient de prendre possession d'un des exemplaires du premier modèle branchable de la Prius hybride fabriquée par Toyota. Ce professeur et son équipe vont tester son fonctionnement et notamment ses performances en matière de consommation d'énergie selon les conditions atmosphériques, la conduite, etc. Les résultats permettront la conception des prochaines générations de véhicules hybrides branchables.

TORONTO, ON. May 4, 2010. The University of Toronto announced that one of its professors, Dr. Keigo Iizuka, has developed a new video camera design that provides automatic real-time focus of both near and far images simultaneously — in high resolution. According to Dr. Iizuka, with the use of two point sources at different locations, the distance of the object can be determined without the influence of its surface texture.

IEEE Canada member wins Leadership Award

Toronto, ON, Oct 26, 2010. Jennifer Ng Ain Kin, Ottawa Section WIE affinity group Chair, received the CATA WIT (Women in Technology) Award at a gala event hosted by publisher IT World Canada at Toronto's prestigious Board of Trade.

The award was presented to Ms. Ng for her outstanding work with Carleton University and University of Ottawa student branch WIE groups. With an approach promoting organizational flatness that appeals to both professionals and students alike, some of her mentees have since taken on mentorship roles of their own. You can learn more about Ms. Ng's work and Ottawa Section WIE Activities at http://ieee.org/go/ottawa-wie. *Photo courtesy of* ComputerWorld Canada.

A View from the West

By Terrance Malkinson

School of Health and Public Safety
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On: BC's Innovators, Bridges, Mining, Electrochemistry, MBAs, Heat Capture; Alberta's Best Biz Communities, Museums, Headphones, Aerospace, Forestry; Saskatchewan's Grid, Diversification, Economic Engines, Synchrotron, Coaches, Mining Systems; Manitoba's Farming by Satellite, Arctic, Fastest Biz.

◆ British Columbia

Profiles of twenty innovative organizations that are seen as "movers and shakers" in British Columbia are provided by Danielle Egan et al in *BCBusiness*'s annual survey of innovation ("The Innovators", 38(4):44-61, April 2010, www.bcbusinessonline.ca.) Organizations, large and small, from diverse areas of interest are profiled.

Roger Welch describes many of the engineering aspects of a new and the longest multi-span, cable-stayed bridge in North America crossing over the Fraser River east of Vancouver, in "Golden Ears Bridge" (*Canadian Consulting Engineer*. 51(4):18-21, June/July 2010, www.canadianconsultingengineer.com.) With a total length of 968 meters and five spans supported by four river piers with heights up to 80 meters, this bridge incorporates many innovative features. Its "hybrid" multi-span composite, cable-stayed form is of particular significance.

Historically the mining industry has played a major role in British Columbia. With gold and other mineral prices on the rise, forecasts for many sectors of this industry are on an upswing. Jim Sutherland reports on how the industry has experienced many ups and downs, and discusses prospects for the future ("Return of the Gilded Age", *BCBusiness*, 38(3):46-51, March 2010)

Researchers at the University of British Columbia are developing a process to remove phosphorus from wastewater. This will provide a new source for this element, a primary ingredient of agricultural fertilizers, while at the same time reducing pollution and making a profit: "In Pursuit of P", Tim Lougheed, *Canadian Chemical News*, 62(4):14-17, April 2010, www.accn.ca.

Bryan Arseneau in "The Heart of Business-2010 MBA Guide" (*BCBusiness*, 38(4):79-85, April 2010) discusses how recent graduates from the nine BC universities offering MBA degrees are determined to make the world a better place through their contribution to building a healthy business community.

Highlights from the 217th Annual Meeting of the Electrochemical Society are provided in *The Electrochemical Society Interface*, 19(2):9-11. Summer 2010. www.electrochem.org. Over 1,800 attendees had the opportunity to learn from the 1,849 research papers presented. Keynote lectures included "The Future of Energy Conversion", "Energy Storage for Renewable Generation", and "Carbon Nanotubes for the Rest of Us".

"It Takes a Village" (Colleen Kimmett, *BCBusiness*, 38(5):52-59, May 2010) presents North America's first small energy utility that captures heat from liquid waste and redistributes it to the surrounding neighbourhood where it is used for space heating and hot water. The process, benefits, and financing are discussed.

◆ Alberta

Alberta Venture's annual ranking of best communities for business is provided in the June 2010 issue. Heading the list is the Municipal District of Rocky View where commercial and industrial development complements the rural lifestyle. Links are provided to various categories and a comprehensive online database on business communities in Alberta; www.albertaventure.com.

The environmental systems that match global curatorial standards engineered into the new Art Gallery of Alberta are described in "Art Gallery of Alberta Transformed" (*Canadian Consulting Engineer*, 51(5):20-25, August/September 2010, www.canadianconsultingengineer.com.)

Tricia Tadison discusses how innovative headphones developed by Calgary based start-up Psyko Audio Labs have captured the attention of gamers and audiophiles worldwide: "Psyko Audio Labs is Posed to Break into Big Markets with its Audio Technology", *Alberta Venture*, June 1, 2010.

Many observers believe that the Canadian aerospace industry is poised for substantial growth. Caitlin Crawshaw discusses the issues and opportunities in "Despite Spar's Departure, Insiders Say the Aerospace Industry is Poised for Resurgence" (*Alberta Venture*, July 2010.) The Alberta Government recently published an aerospace industry strategy after consulting stakeholders from government, academia, and industry (www.aviationalberta.com.)

Two articles recently published in the May 2010 issue of *Alberta Venture* discuss prospects for the forest industry. Emily Senger in "Alberta Forestry Mills Looking to Thrive, Not Merely Survive" discusses the serious challenges to this natural resource based industry, and presents an optimistic vision of the future where re-engineering over the past few years of turmoil will position the industry well in the global market as the economy recovers. One substantial industry opportunity is described by Michael McCullough in "Alberta's Forest Industry Strives to Become a Bio-Economy," suggesting carbon-neutral products from forests can take the place of those currently derived from non-renewable resources. This is summarized in "Transforming Canada's Forest Products Industry," a report released by the Forest Products Association of Canada (www.fpac.ca.)

◆ Saskatchewan

Many areas of Canada are looking at substantial and expensive upgrading of their electrical distribution infrastructure to meet the needs of a growing population and industry demands. Much of the infrastructure was constructed 30-50 years ago and is now reaching the end of its productive life. "Transforming the Grid" (Paul Martin, *Saskatchewan Business Magazine*, 31(3):37-39, April-May 2010) discusses the business opportunities involved in enhancing the electrical grid, and profiles Partner Technologies Inc., a Regina based supplier to electrical distributors.

"This Year Country" (John Gray, *Canadian Chemical News*, 62(8), pp 12-17, September 2010) profiles how Saskatchewan's riches in uranium, potash, oil and gas, and arable land are quickly transforming and diversifying its economy to one which is the envy of other provinces.

Penny Eaton introduces a series of articles on one of the new engines of economic growth in Saskatchewan. This involves the eleven Tribal Councils in the province that work on behalf of their member First Nations to coordinate economic development activities as well as other programs of importance to our native people ("Driving Economic Growth", *Saskatchewan Business Magazine*. 31(3):29-35, April-May 2010.)

Tom Ellis, Director of research, Canadian Synchrotron, provides a status report on the six-year-old facility located at the University of Saskatchewan (*Canadian Chemical News*, 62(8):18-23, September 2010.) Scientists use this device to gather information about the structural and chemical properties of materials at the molecular level. This facility is considered one of the best in the world.

Crestline Coach, a Saskatoon company that is Canada's largest ambulance manufacturer, is profiled by Penny Eaton in "Manufacturing Lifesavers" (*Saskatchewan Business Magazine*, 31(4):7-9, June 2010.) The company produces vehicles customized to buyers' specifications, selling to more than 30 countries worldwide. It is seen as one of the industry's most innovative in design and manufacture, as well as in safety of the patient and first responders. Crestline Coach also has other lines of business including small and medium-sized commercial buses and sale of specialty medical equipment.

A Saskatoon based world leader in the manufacture of mining equipment is profiled by Darrell Noakes in "The Complete Package: Prairie

Machine World Leader in a Giant Industry" (*Commerce and Industry Magazine*, 60(2):15-18, www.commerceindustry.ca.) They are the only manufacturer in the world that builds a complete mining system.

◆ Manitoba

In "Farming Success by Satellite" Ritchie Gage tells the story of Winnipeg-based start-up Farmers Edge Precision Consulting, with gross sales of nearly $5 million—and growing (*Manitoba Business Magazine*, pp. 10-15, January-February 2010, www.manitobabusinessmagazine.com.) Start-up challenges and company development are discussed for this business that utilizes satellite imaging of croplands to identify soil types in order to determine rates of fertilizer application on vast acreages. Based on this imaging, soil samples are collected, and in concert with the advice of soil specialists, the company is able to advise the farmer on fertilizer application and other land management practices.

Protecting Canada's sovereignty in the Canadian Arctic is becoming increasingly important, as a combination of climate change, rising resource prices, international politics, and new technologies is opening up development opportunities. One such beneficiary is Churchill, Manitoba, a seaport ideally situated for traffic to and from Europe, Russia, Africa, Latin America and the Middle East. Nancy Temple provides "A Brief History of Intrusions into the Canadian Arctic" in her article published in the *Canadian Army Journal*, 12(3):45-68, Winter 2010, www.army.forces.gc.ca/caj. Her report highlights important considerations with respect to northern security and Canadian sovereignty.

A ranking of Manitoba's 40 fastest growing companies is provided in *Manitoba Business Magazine*'s annual survey (pp. 8-9, January-February 2010). The same issue presents "Profiles in Business" by Bob Armstrong (pp. 16-20), a selection of these companies describing how they are creating opportunities in cities and towns across the province, transforming old businesses and creating new ones.

─ *About the Author* ─

Terrance Malkinson is a communications specialist, business analyst and futurist. He is Vice-Chair of the IEEE-USA Communications Committee, an international correspondent for *IEEE-USA Today's Engineer Online*, editor-in-chief of *IEEE-USA Today's Engineer Digest*, and an associate editor for *IEEE Canadian Review*. He was an elected Senator of the University of Calgary and an elected Governor of the IEEE Engineering Management Society, as well as an elected Administrative Commitee member of the IEEE Professional Communication Society. He has been the editor of several IEEE conference proceedings, and past editor of *IEEE Engineering Management*. Currently, he is with the School of Health and Public Safety/Applied Research and Innovation Services at SAIT Polytechnic in Calgary. malkinst@telus.net

Performance of DSRC Routing and Security Layers

1.0 Introduction

The use of Dedicated Short-Range Communications (DSRC) for public safety and other transportation applications has inspired industrial researchers and academics alike. The European Committee for Standardization formed a technical committee: TC-278. The North American DSRC community spans several work-groups like ASTM–E17.51, IEEE 802.11 and IEEE P1609.x to harness the short-range radio capabilities and guarantee interoperability. This article focuses on the North American DSRC.

DSRC networks are built over two basic units: Road-Side Unit (RSU) and On-Board Unit (OBU) see Figure 1. The OBU is typically a network device installed in roaming vehicles and is connected to both the DSRC wireless network and the in-vehicle network. The RSU is, typically but not necessarily, a stationary unit that connects roaming vehicles to the access network which could be connected to a much larger infrastructure or a core network. The wireless connection between RSU and OBU, based on 802.11p [3] and DSRC 1609.x standards, is called Wireless Access in Vehicular Environment (WAVE) [2]. The cones shown in smaller dots in Figure 1 represent the RSU communication zones while the ellipse represents the radio range of the OBU. As OBUs move between communication zones, vehicles exchange information with the roadside and use the same WAVE media to communicate with each other.

DSRC uses 5.9 GHz radio transmission which provides coverage up-to 1 km diameter. Normally, OBUs join the communication zone of a selected RSU, exchange information, and then leave within very limited time. The limited lifetime of an OBU within a specific RSU communication zone illustrates the peculiar operational DSRC environment. To familiarize the reader with the DSRC environment, its requirements, and applications, we illustrate with a typical case:

Real-time Traffic Rerouting: In this example illustrated in Figure 2, anonymous information messages may reveal the traffic congestion caused by the moving trucks to vehicles away from the truck location. This is achieved through vehicle-to-vehicle messages (V2V) as shown by the curvy yellow lines. While most vehicles in Figure 2 do not benefit from this message, the red and grey vehicles on the left side of the figure may decide to change their red route to the green route to proactively avoid congestion. Another mode of communication is vehicle-to-roadside/roadside-to-vehicle (V2R/R2V), illustrated by the yellow curvy line between the red vehicle (bottom centre of the figure) and the RSU installed on the light post.

In the previous example, vehicles may alert their drivers via an alert box, audio message or process the exchanged message by taking a specific action. The reader is encouraged to read about more applications on the IntelliDrive site [12].

2.0 Relevant DSRC Characteristics

The following paragraphs illustrate DSRC inherent characteristics due to its vehicular communication and mobility nature as well as the characteristics imposed by fundamental requirements.
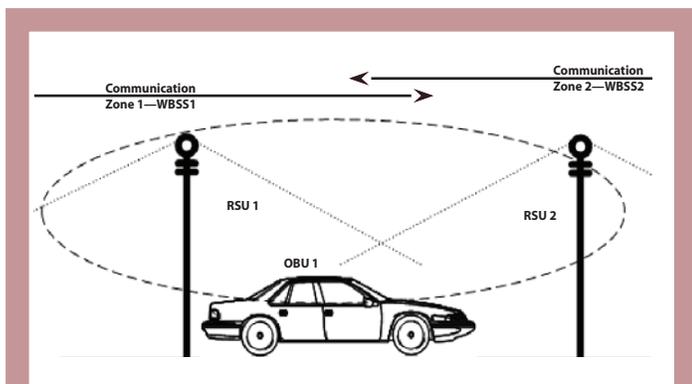
By *Yasser L. Morgan[1], Hossam Kiwan[1], and Moustafa El-Gindy[2]*
[1]University of Regina
[2]University of Ontario Institute of Technology

Abstract

The growing interest in the Dedicated Short Range Communications (DSRC) reflects its lofty potential to resolve much of the vehicular safety issues and to provide low-cost high-bandwidth services for roaming vehicles throughout North America. This article covers the major design approaches in DSRC standards and identifies miscellaneous research topics within the DSRC networking, routing and application layers. It illustrates major short-range vehicular communication hurdles, introduces novel research topics, and contemplates aspirant approaches. The article also directs interested readers to comprehensive references that research related meticulous solutions. [N.Ed. This article furthers one published in our previous issue.]

Sommaire

L'intérêt grandissant pour les Communications dédiées à courte portée (CDCP) reflète son potentiel élevé pour résoudre une grande part des problèmes de sécurité et fournir des services à bas coût et haute bande passante pour les véhicules en mouvement en Amérique du Nord. Cet article couvre les principales approches de conception des standards CDCP et identifie divers sujets de recherche dans ses couches réseau, routage et application. Il illustre des obstacles majeurs pour les communications véhiculaires à courte portée, introduit de nouveaux sujets de recherche, et envisage de nouvelles approches candidates. Cet article dirige aussi les lecteurs intéressés vers des références exhaustives pour la recherche de solutions méticuleuse. [N.Ed. Cet article en complète un publié au numéro précédent.]

2.1 Privacy Principle

One of the most fundamental principles in DSRC is the hiding of users' device identities as they roam. A user identity can be identified by the WAVE device MAC or IP-address. WAVE devices that keep the same MAC or IP-address can be traced by any malicious device listening to

Figure 1: An OBU roaming between two RSUs.

Figure 2: Real-Time Traffic Rerouting Scenario

the wireless media or to its supporting network. The privacy principle stipulates that any malicious device listening to the wireless media or the supporting network cannot trace the roaming vehicle's path.

This principle is fulfilled by different mechanisms. For simplicity, this article assumes a simple mechanism: Each WAVE device adopts a new MAC/IP-address as soon as it joins a new communication zone. The WAVE device also maintains a list of all used MAC/IP-addresses throughout a trip, list that can be stored securely.

Some classical toll applications defy the Privacy Principle. For instance, if the entry point to the toll highway deposits a serial number indicating its geographic location into the vehicle electronic storage, then the exit point reads this number to perform the required accounting transaction. It is fairly simple for a wireless device at the exit point to listen to the communication and detect the vehicular pass. [9]

2.2 Intermittent Communication

As a result of the Privacy Principle and vehicular mobility, DSRC provides inherently an intermittent environment. Communications between devices are regularly interrupted by:

- The frequency by which WAVE devices leave and join communication zones due to physical limitations of short-range communications,

- The frequent introduction or removal of physical barriers between communicating devices, as we combine Line-of-Sight communications and street roaming,

- Variable wireless link quality.

While most WLANs exhibit intermittence, DSRC environments certainly take intermittence to much higher levels. Current IP-based applications struggle with WLAN intermittence and would crumble in a DSRC environment. The development of a new strain of IP-based applications is crucial for DSRC evolution.

3.0 Routing Challenges

DSRC presents a unique environment that introduces several challenges to research community, especially in the area of data routing. In general data routing can be classified into two major types: Roadside-to-Vehicle (R2V) and Vehicle-to-Vehicle (V2V). Vehicle-to-Roadside data forwarding is considered fairly simple.

A typical implementation extracts the RSU MAC address from the IP-service announcement, and then uses MAC layer uni-cast to forward packets to the desired RSU which in turn uses the destination IP-address to route packets through the supporting network toward its intended destination. The following sections focus on V2R/R2V and V2V data forwarding.

3.1 V2R/R2V Data Routing

Downstream traffic destined to a roaming WAVE device presents two major challenges. First, how can the supporting network locate the RSU connected to the destination OBU at a particular point in time – i.e. what is the Best Last Hop (BLH)? Secondly, how can the correct RSU resolve the destination MAC/IP-address to a potentially new MAC/IP-address? The following subsections investigate those two challenges.

3.1.1 Locating BLH (Best Last Hop)

Locating BLH is focused on mobility within the same domain; this is occasionally confused with mobile IP [RFC3344 & RFC4721]. We define the Best Last Hop (BLH) to be the supporting network node(s) that shares the same communication zone with the destination roaming WAVE device at a particular point in time. For simplicity, the discussion in this subsection assumes that roaming devices maintain the same MAC and IP address as they change their point of attachment.

Figure 3 helps illustrating the problem of locating BLH. Assume vehicle X sends a message through $RSU(X_1)$ to a server on the global network and expects a reply. The supporting network must rearrange the routing table of its infrastructure nodes so that this reply arrives to the BLH RSU – considering that vehicle X must have changed its point of attachment to the supporting network.

Typical geographical routing algorithm like DREAM [13], BGR [14], and SiFT [15] would deliver downstream traffic to the closer geographic location like $RSU(X_1$ to $X_4, X_{11},$ and $X_{13})$. A better algorithm may capitalize on common knowledge about traffic rules and delivers downstream traffic to $RSU(X_1, X_3,$ and $X_4)$. Then, a better algorithm may even use knowledge about vehicle road path and delivers the message to $RSU(X_1$

and $X_4)$. Finally, an algorithm that considers vehicle and traffic speed may deliver the message to $RSU(X_4)$ only.

Most current routing algorithms do not take advantage of the DSRC unique environment. Geographical routing algorithms use basic mechanisms to identify the BLH merely based on geographical information. Mechanisms locating BLH end up with a small list of candidate RSUs. The supporting network uses group casting to forward downstream packets to the candidate RSUs.

The authors of this article call for the development of a new breed of routing algorithms that extend geographical routing by adding semi-static rules like traffic regulations in addition to dynamic rules like vehicle speed and traffic patterns.

Such research must realize the need for a standard protocol that communicates future vehicle locations independent of the specific used routing algorithm. It is imperative for a network with the size of the DSRC to utilize multiple cooperative routing algorithms. Both RSUs and OBUs may, internally, use different optimization algorithms but communicate via interoperable protocols to facilitate better routing.
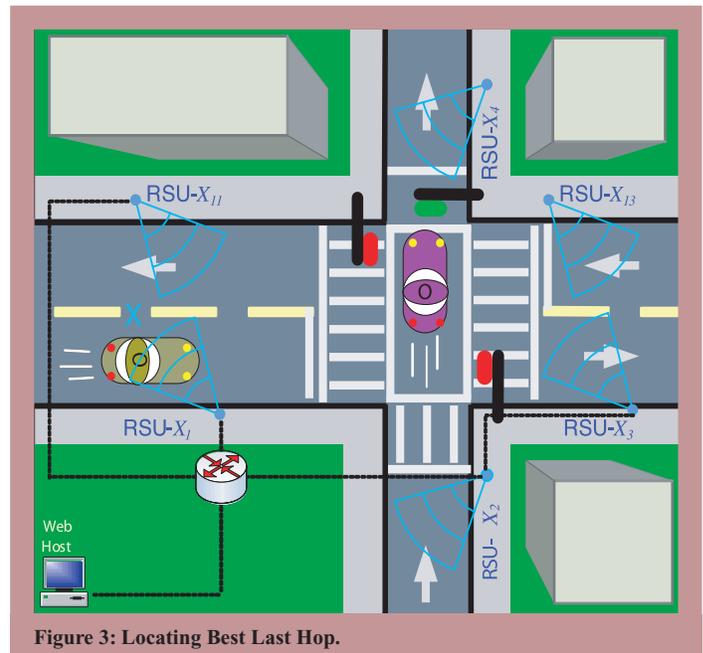
Figure 3: Locating Best Last Hop.

3.1.2 Resolving Destination Address at BLH

As soon as a BLH RSU receives downstream data it uses MAC layer uni-cast to forward the data to the target OBU. Unfortunately, due to the DSRC Privacy Principle if the OBU changes its MAC/IP-address, the BLH RSU cannot predict the latest OBU MAC/IP-address.

A simple solution may apply: The RSU must start the uni-cast by sending a Ready-to-Send (RTS). The target OBU receives this RTS and can review a history of its previous MAC/IP-addresses. If a match is found, the OBU can reply with a Clear-to-Send (CTS) that reveals its new MAC address. The RSU can then start transmission to the new MAC address. This simplified mechanism requires little change to the MAC operations. Malicious users may generate CTS pretending to be other user, but wouldn't be able to resolve secured IP.

As illustrated before, the process of locating BLH typically concludes with a list of candidate RSUs. The target OBU is available in the communication zone of only one RSU. All candidate RSUs initiate the RTS frame and wait for a CTS. If the RSU receives no CTS, relevant downstream data packets are dropped. It is possible to add an Optimization Agent to the supporting network to ensure that at least one, and only one, RSU successfully delivers data. Otherwise, the Optimization Agent can issue a data delivery error to the sending server if required.

3.2 V2V *vs* V2R/R2V Data Routing

You may believe that DSRC supports multi-hop applications; it is a common misconception. Actually, DSRC is built as a single hop MAC layer. V2V is not part of the current WAVE standard but can be enabled through the known IEEE 802.11 ad-hoc mode.

One might ask if it is possible to develop a V2R/R2V routing protocol and perform multi-hop routing based on point-to-point connection. The answer is yes, some ad-hoc routing mechanisms like [6] and [10] can be adopted over the WAVE layer. However, researchers must take a second look at the amount of time each vehicle spends in a single communication zone. Assuming a vehicle moving at 120 km/h and a realistic communication zone of 180 m in long diameter, a vehicle moving along the long diameter spends a maximum of 5.8 seconds in this zone. In other situations, vehicles may not move along the long diameter of the communication zone, or the zone can be smaller due to natural barriers. We estimate that the average connection time of a vehicle moving on urban highways is 3.6 sec. This time is barely sufficient to collect addresses of surrounding vehicles and build routing tables.

Instead of multi-hop routing, we advocate for the development of a routing mechanism on the RSU side and its supporting network in order to provide long-lived sessions for roaming vehicles as described earlier. Also regulating IP traffic using an autonomous, decentralized approach like the one in [4] is central to DSRC network performance. In the case of pure vehicle-to-vehicle communications in the absence of any supporting infrastructure, location-based routing mechanisms like [6] present excellent candidate algorithms.

4.0   Security Considerations

IEEE 1609.2 is the part of WAVE standards focused on MAC layer security. Most of the current relevant publications are either generic and apply to ad-hoc networks in general like in [7], or require sizable changes [11] in order to perform in a dynamic environment like DSRC.

IEEE 1609.2 standards cover all WAVE communication payloads and secure its contents. The proposed mechanisms follow profound and well-known security tools such as Public Key Infrastructure and certification. Yet, many areas have been left open in the current IEEE 1609.2 standards. For instance, the lack of identification for the driver and vehicle in addition to the lack of shared privacy protection understanding leaves engineers puzzled about what exactly need to be protected, topped with the problem of how to protect it.

Knowing the MAC address of a specific user, it is easy to trace the user mobility – thus violating the Privacy Principle. One way to counter this attack is by randomizing the user MAC address periodically. On the other hand, randomizing MAC addresses makes end-to-end communication very hard [8].

Another known issue in WAVE security is the revocation of issued certificates. The Certificate Revocation List (CRL) is expected to be relatively long. To maintain user privacy, [5] proposed a scheme that maintains a list of short-lived anonymous certificates. The short-lived certificates are discarded shortly after being issued. This scheme can be relatively scalable in limiting the CRL, and therefore, improves the search performance. However, a single vehicle may mislead the Certificate Authority into generating many certificates to the same user. Enhancements like those proposed in [1] attempted to improve [5] but those attempts are far from being efficient or complete.

Privacy issues must be resolved at the legislative levels prior to developing a security blueprint. Throughout our experience with the development of WAVE and other standards, we came to appreciate the time it takes to develop the necessary political and legislative consensus prior to discussing the technical outcome.

5.0   Conclusion

Up till now, IntelliDrive has been the major entity working in the area of standardizing application architecture, message exchange and standards. It is important that we pick-up the issues left open by IntelliDrive and continue to identify and research solutions. The reader is encouraged to use the ideas in this article and the references provided for extended reading on routing, network, mobility, service discovery, security, and middleware issues. Issues like synchronization, privacy principle, and short-lived sessions are fundamental to the DSRC design and its environment. Our objective is to motivate or intrigue researchers to investigate problematic topics closely related to real life applications.

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About the Authors

Dr. Morgan is Associate Professor at the University of Regina. He received his B.Sc. and M.Sc. from Cairo University and his Ph.D. from Carleton University (Canada). Dr. Morgan's main research is in the area of vehicular communications at various layers and especially at the MAC layer, with a focus on mobile QoS and service delivery. Since 2004 he has published many journal papers on vehicular communications and made manifest contributions to the IEEE DSRC 802.11p, WAVE IEEE P 1609.3 and P 1609.4 standards.

Mr. Kiwan earned a MS degree from the University of Nottingham in 2007, and a BS degree in computer engineering from the Arab Academy for Science, Technology & Maritime Transport (Egypt) in 2005. He is currently a PhD Candidate at the University of Regina. His research interests include ad hoc networks, wireless and vehicular communications, positioning, and routing algorisms.

Dr. El-Gindy is Associate Professor at the University of Ontario Institute of Technology, a former Senior Scientist at the Applied Research Laboratory of Pennsylvania State University, and Adjunct Professor at the Department of Mechanical and Industrial Engineering of Concordia University (Montreal, QC). He serves as Fellow of the American Society of Mechanical Engineers (ASME) and is former Chair of its Vehicle Design Committee.

LineScout: Award-Winning Technology and Exemplary Partnership for the Power Industry

Last June the Edison Electrical Institute, an association of electric companies based in Washington, DC awarded its prestigious Edison Prize to Hydro-Quebec and British Columbia Transmission Corporation (BCTC) for their joint project in roboticized power line inspection. The LineScout technology was developed at Hydro-Quebec's Research Institute, IREQ, which incidentally is celebrating this year the 40th Anniversary of its foundation, and tested on BCTC power lines. It can inspect high-voltage power lines for long distances, and even perform minor repairs. This could provide important reductions in maintenance costs and considerably lower risks to workers. Demonstrations of this product and other robotic innovations from Hydro-Quebec were presented at the 1st International Conference on Applied Robotics for the Power Industry (CARPI) early October 2010 in Montreal. You can find a video of LineScout by searching for its name on YouTube.

LineScout: Une technologie primée et un partenariat exemplaire pour l'industrie électrique

En juin dernier l'Edison Electrical Institute, une association de compagnies d'électricité basée à Washington, DC a remis son prestigieux prix Edison à Hydro-Québec and British Columbia Transmission Corporation (BCTC) pour leur projet conjoint d'inspection robotisée de lignes électriques. La technologie LineScout a été développée à l'Institut de recherche d'Hydro-Québec, IREQ, qui incidemment célèbre cette année le 40e anniversaire de sa fondation, et testée sur les lignes de BCTC. Le robot peut inspecter les lignes de transport d'énergie à haute tension sur de longues distances, et même effectuer des réparations mineures. Cela pourrait fournir d'importantes économies en coûts de maintenance et une diminution considérable des risques pour les travailleurs. Des démonstrations de ce produit et d'autres innovations robotiques d'Hydro-Québec ont été présentées à la 1ère Conférence internationale sur la robotique appliquée à l'industrie électrique (CARPI) en début d'octobre à Montréal. Vous trouverez un vidéo de LineScout en cherchant son nom sur YouTube.


Robot with on-board robotic arm

Ground control unit of the robot

All Photos: Institut de Recherche d'Hydro-Québec

LineScout deployed in 735 kV powerline inspection over a large water crossing

Photo: Josh Nesbit

Photos on this page and next
courtesy of Inveneo, unless otherwise noted

Science and Technology for Humanity
Toronto, Calgary and IEEE Canada lead the way

by Alfredo Herrera, SMIEEE
Chair, IEEE Canada Humanitarian Initiatives Committee

For some time now it's been clear that IEEE members have embraced the organization's core value "to foster technological innovation and excellence for the benefit of humanity."

In Canada, the Toronto section led the way last year by organizing the International Conference on Science and Technology for Humanity (TIC-STH 2009) at Ryerson University in Toronto [1]. As preparations were taking place, another group was participating in the Humanitarian Technology Challenge [2]; their work has evolved into what now is the IEEE Canada Humanitarian Initiatives Committee [3]. More recently, the University of Calgary held the Innovation for Humanity design competition and attracted individuals of different departments, skills, and perspectives; everyone participated wholeheartedly and enthusiastically [4].

These three initiatives are not the only ones; each year, many IEEE volunteers donate money and time to charities, volunteer in humanitarian projects, or organize events to benefit humanity. If you have the opportunity to ask anyone in these activities, they'll probably mention how proud they are of being part of their IEEE event—matching their know-how with their interest at the intersection of technology and humanity. In their own IEEE way, these events provide members an opportunity to use professional skills outside their current job. It is an interesting career development path for those wanting to explore this area; a part of the IEEE spectrum of experience that may attract new members wanting to to work on world problems.

I hope you will consider activities like the ones described in the following articles as volunteering opportunities.

ology for Humanity

Photo: Erik Hersman,
AfriGadget/Ushahidi

University of Calgary holds
Innovation for Humanity Design Competition

by Kanishka Jayawardene, IEEE Canada Regional Student Representative

Innovation for Humanity was a design competition held last March intended to inspire and challenge students to be more well-rounded and to develop the skills and the motivation essential to their future contribution to society and humanity at large. The design competition's theme of "Innovation for Humanity" was selected to show the vital need for creativity and innovation in design, if these goals are to be met.

Although the majority of teams were comprised of students, the University division was open to anyone on campus who shared an enthusiasm for design. The event attracted individuals of different departments, skills, and perspectives, each of whom took the initiative to offer a unique solution to a common problem, e.g., emergency shelters, small-scale wind generation. Participants honed their teamwork skills, analytical thought, resourcefulness, and a creative approach to handling a project's limitations.

The competition was accompanied by a presentation sharing front-line experiences in emergency response, given by the primary IT contact for the Red Cross Western Canada Zone, Kurt Bryden. During the widespread forest fires raging through British Columbia in 2003, Mr. Bryden established an entire response centre, with 12 offices and a general meeting area, complete with computers, internet, phones, and printing—from scratch—in only 48 hours. His efforts were spurred by the knowledge that the longer it took to set up such a crucial center of operations, the longer it would take for help to come to the victims of the disaster.

According to Mr. Bryden, the technological challenges involved in a crisis situation often go unnoticed by the general public. He found that although many Canadians generously donate time as volunteers as well as food and clothing, many people fail to realize just how sorely needed are donations of a more technological nature, such as cell phones and flashlights. "Simplicity, consistency, and people first" are the keys to

success during times of crisis, Mr. Bryden says. Having listened to the speaker after completing a series of formidable challenges, the students were pleased to hear that although their designs that day may not have had a direct impact on the world around them, their learning experiences most definitely would.

A survey was conducted to obtain participant feedback regarding the event. Approximately 85% of the respondents indicated that they would attend next year, and very positive feedback was received regarding the organization of the event. A vast number of participants said that they thoroughly enjoyed the design challenges and had great recommendations for improving challenges next year.

The event could not have been successful without the dedication of the volunteers who spent countless hours planning design challenges, promoting the event on and off campus, and ensuring the necessary logistics were in place. The University of Calgary IEEE Student Branch would like to thank the IEEE Canadian Foundation and the IEEE Southern Alberta Section for their generous financial support, without which the event would not have been possible.[4]
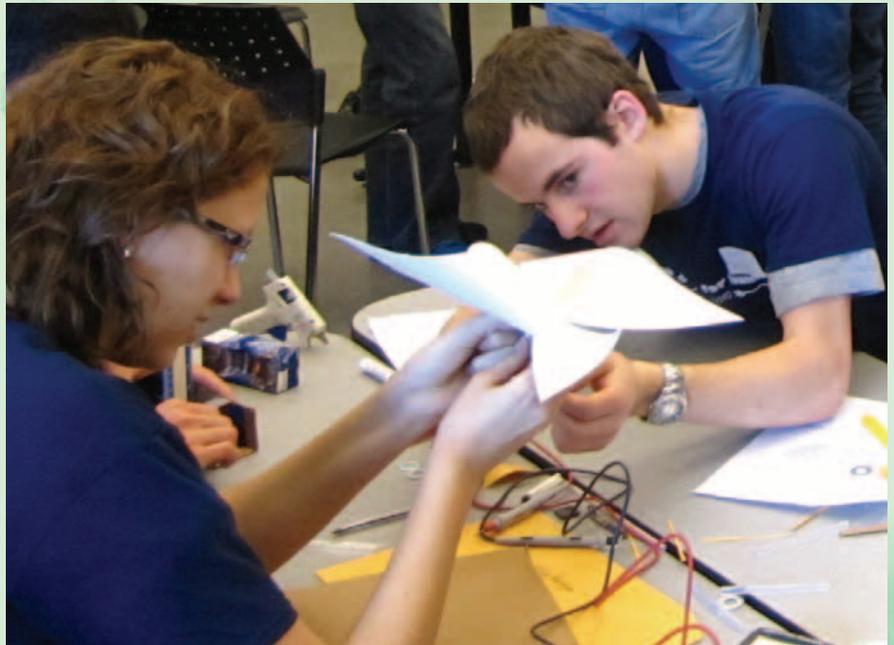
Cooperation and teamwork were the watchwords of the day
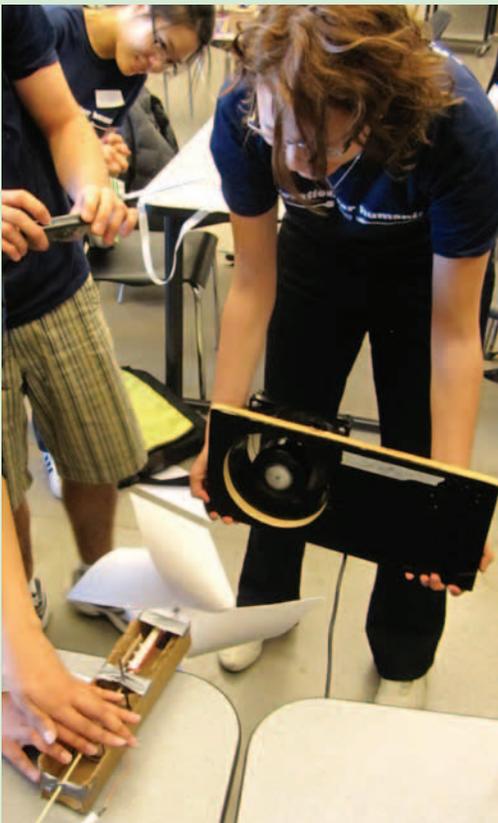
A wind generator gets put through its paces
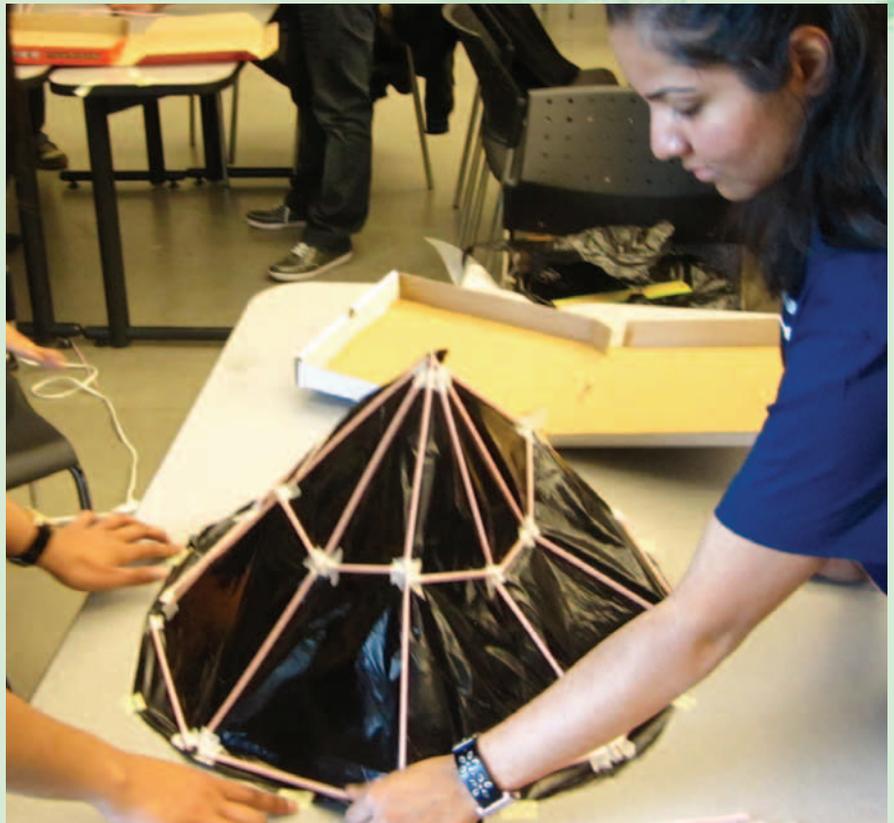
An emergency shelter takes shape

IEEE Toronto Section holds its first International Conference on Science and Technology for Humanity

by Xavier Fernando,
IEEE TIC-STH 2009 Conference General Chair

The IEEE Toronto section presented the International Conference on Science and Technology for Humanity (TIC-STH) at Ryerson University in Toronto, September 26-27, 2009. The conference coincided with worldwide celebrations of the 125th anniversary of IEEE. During this event, organizers commemorated the invention of the first external cardiac pacemaker at a special session. Dr. John Hopps, a pioneering Canadian Biomedical Engineer who worked for the National Research Council, and Drs Wilfred Bigelow and John Callaghan of the University of Toronto, are credited with the invention in 1951 of the world's first external artificial pacemaker. This invention was very significant because it marked one of the first times that engineering technology was applied to medicine. To honour the inventors and their accomplishments a plaque was unveiled in the presence of the Hopps family.

TIC-STH 2009 covered advanced interdisciplinary topics across a broad spectrum of the IEEE fields of interest. The conference attracted 360 papers by authors from 29 countries out of which 186 papers were finally accepted. Full papers were peer reviewed, only the top ones were accepted, and proceedings were set to appear in IEEE *Xplore*. The following tables, extracted from the EDAS Conference Management System, give a more detailed view of the extent and depth of the interest in the conference. In addition to providing a forum for research dissemination and networking, the conference also highlighted three excellent tutorials, five plenary/key note speeches and an award banquet. Close to 250 people attended the conference.

TIC-STH 2009—also referred by some as a "Truly Integrated Conference"—featured remote as well as on-site participation, both by audiences and presenters. Video, audio and presentation slides of all the technical sessions were broadcast online in real time around the world; remote speakers from places like the Massachusetts Institute of Technology (MIT) made online presentations to audiences in Toronto and around the globe. The following three papers were selected "best papers" by the TPC:

- "Preventing future brownfields engineering solutions and pollution prevention policies," Bruce Taylor, lloyd Hipel, Keith W. Hipel, Liping Fang and Michele Heng.

- "The value of the unpopular: counteracting the popularity echo-chamber on the web," Jutta Treviranus and Stephen Hockema.

- "Covert monitoring of the point-of-gaze," Moshe Eizenman, Dmitri Model and Elias D. Guestrin.

The success of the conference was due to a wonderful team effort combined with outstanding technical and professional contributions. The organizing committee extends their sincere thanks to everybody who worked for this conference in numerous ways.

Region	Authors	%
Canada	306	65.2
Europe, Middle East, Africa	73	15.6
Asia/Pacific	49	10.4
United States	26	5.5
Latin America	13	2.8
Other	2	0.4

Table 1: Author Demography

Symposium	Acceptance Rate
Symposium on Information Assurance, Biometric Security and Business Continuity	47.1 %
Symposium on Biomedical Engineering	50.0 %
Symposium on Emerging Scientific Methods, and Technologies	47.6 %
Symposium on Engineered and Natural, Complex Systems-Modeling, Simulation and Analysis	77.3 %
Symposium on Human Factors and Ergonomics	66.7 %
Symposium on Education and Social Implications of Technology	54.8 %
Symposium on Sustainable Development and Energy Availability	48.6 %
Symposium on Technology, Information and Knowledge Management	50.0 %
Special Sessions	66.7%
Symposium on Advances in Systems and Sensors	62.2 %
WEIGHTED AVERAGE	51.6 %

Table 2: Acceptance Rate

IEEE Canada Humanitarian Initiatives Committee: Making Humanitarian work more accessible to IEEE members

by Alfredo Herrera, SMIEEE
Chair, IEEE Canada Humanitarian Initiatives Committee

The Humanitarian Initiatives Committee (HIC) was established as an ad-hoc Committee on October 18, 2009, with an initial mandate to support participation in the IEEE Humanitarian Technology Challenge (HTC) [2], and to explore member interest in—and thus the viability of—a sustained IEEE Canada HIC. Six months later, the progress achieved by the HIC was acknowledged by IEEE Canada's Board: in April of 2010, a motion was unanimously adopted establishing the HIC as a standing committee to serve IEEE Canada's members.

The mission that has emerged for this new committee is to support those participating in humanitarian initiatives or building relationships that will enable members to fulfill IEEE's strategic vision: "to be universally recognized for the contributions of technology and of technical professionals in improving global conditions." The HIC promotes IEEE's core value of advancing technology for the benefit of humanity by raising awareness of how IEEE Canada can best use its strengths and relevant technologies to address societal problems.

One way it believes it can effectively do this is by providing leadership, encouragement, and support to Sections and Chapters interested in humanitarian initiatives. The HIC is currently ramping up its efforts to identify humanitarian activities across Canada to shift its focus closer to home, but without neglecting current collaborations with IEEE worldwide humanitarian committees (like the HTC) and new initiatives like defining Open Hardware for humanitarian projects. In practice this means that the HIC will support the work of IEEE members involved in: relief assistance during natural disasters like ice storms and floods; socio-economic development abroad like improving affordable electricity access in developing countries; or awareness initiatives in our communities like earth day or competitions like the one held at the university of Calgary reported above.

What need is there for IEEE Canada's HIC?

During the discussions leading to the creation of the HIC, members questioned the need for it. Some of the questions were: Should the IEEE divert members' funds away from services to members to instead donate to relief efforts? Aren't groups like Engineers Without Borders (EWB), Canadian International Development Agency (CIDA) and NGOs already doing this type of work? Does the IEEE have the expertise in this area to make a difference?

We believe that there are at least five compelling reasons supporting an entity like the HIC. First, "Service to Humanity" is the first of IEEE's eight core values [5]; it has been a guiding principle of the IEEE for many years and it is at the origin of many of our accomplishments as an organization. Second, it is the right thing to do; many IEEE members have expressed a desire to get involved in world problems, in addition to our responsibility to society as professional engineers.

Third, one of the objectives of the Humanitarian technology Challenge was to leverage the network of sections and student chapters worldwide during the idea generation and implementation phases. This objective is being met with varying levels of success on both the HTC student paper competition and the partnering with sections in developing countries for system trials. Also, IEEE Canada is the only IEEE region that is also a country, this unique trait can be used to organize a concerted purposive effort to support humanitarian initiatives.

Fourth, the task seems so great that an "all hands on board" attitude by the engineering community can certainly help, it seems like there is a real need for engineering know-how in many humanitarian fields like Information and Communication Technologies for Development (ICT4D), UNICEF Innovation and Appropriate Technology initiatives. Fifth, it can be a life changing experience for those involved, not only for

the individuals who will learn new skills but also for the IEEE sections and chapters supporting them.

In 2010, the HIC initially worked on defining its role and drafting the bylaws and IEEE Canada operations manual sections that describes its role, mission, mandate and structure. These guiding principles were forged through the active participation in humanitarian projects: long-range WiFi solution for the Data Connectivity HTC; 1kW mobile charging station an idea for the Reliable Electricity HTC, now hosted by the PES-CSI group; definition of Open Hardware for humanitarian projects; and definition of funding models in collaboration with the IEEE Foundation and the IEEE Canadian Foundation. These projects are on-going, but still welcoming new volunteers. The HIC has now started monthly group meetings in Ottawa, and is looking to help other sections hold similar meetings.

More ambitiously, the HIC launched a nationwide student competition [6]. It is open to undergraduate and master students enrolled in a Canadian college or university. The competition follows a similar goal as the University of Calgary design competition reported earlier: to show how design, creativity, and innovation are needed for the betterment of society and for the advancement of humanity. An abstract of the winner's work will be published in one of the IEEE publications. Prizes will be awarded as follows: first prize, CND $1000; second prize, CND $700; third prize, CND $300.

References

[1] http://www.tic-sth2009.org/

[2] http://www.ieeehtc.org

[3] http://ewh.ieee.org/mu/r7-hic/

[4] http://www.ucalgary.ca/ieee/image/tid/15

[5] http://www.ieee.org/about/strategy/envisioned_future.html#sect2

[6] http://ewh.ieee.org/mu/r7-hic/initiatives/student-design-competition-2010-2011/

IEEE Canada's Humanitarian Initiatives Committee (HIC) seeks to support section-level groups across the country. Above, a gathering of Ottawa Section's HIC group at its monthly meeting.

Xplore: Maximize The Value of Your IEEE Membership

Ferial El-Hawary, Past President, IEEE Canada

While attending IEEE Board Series meetings earlier this year, I was alerted to some wonderful news for IEEE members. IEEE launched a major initiative to enhance benefits to you the IEEE members. In response to 2008 Section Congress Recommendations, the IEEE is offering E-Books and Webinars free to all IEEE members. More than 200 books are now available to download free of charge, all you have to do is to go to IEEE *XPLORE*:

http://ieeexplore.ieee.org/Xplore/dynhome.jsp

You will need your IEEE Web account credentials: user name and password. In case you don't have a web account, now is your opportunity to maximize your benefits by signing up for one using your membership number. Once you enter the XPLORE WEB site you can look at the right hand side welcome panel to check what your membership entitles to access. On the left hand side panel you can browse various categories including books. The neat thing is that each book is divided into downloadable chapters so, you can save time and focus on your needs.

All IEEE Press Books published three years or earlier are available for IEEE members free of charge. Also included are book chapters.

As an example of how easy it is to find a relevant book or book chapter using Xplore, I chose "Advanced Search" near the top of the page, and then selected "Book" as my content type and "IEEE" as the publisher. As a sample topic I chose Reed-Solomon codes, used to provide error control in digital communication systems. With 135 results shown in order of relevance, it was quite gratifying that a book chapter by IEEE Canada's own Vijay Bhargava came up first!

For those looking for career advice, head to the IEEE USA Web site for free Webinars:

http:/ /www.ieeeusa.org/careers/gpa/

There you will find a treasure trove of Webinars such as: Mentoring; Your Career's Competitive Advantage; Discovering and Using Your Innovation Style; Career Management: Maximizing Your Employability; and, Enhance Your Career With Online Networking. This is part of IEEE's response to Section Congress Recommendations as well.

While you are at this web site do not forget to check out the free E-Books such as: Engineering the Art of Negotiation: Part I: How to Handle Your Boss, and Part 2: How to Handle Your Colleagues

IEEE, as part of its globalization efforts, has opened up access to these resources to all members throughout the world. IEEE has also created a group of representatives from all over the world to:

I) inventory and assess the current state of professional activities within IEEE,

2) compile data on member interests and preferences related to professional activities, their management and financing, and

3) develop a strategic plan to assist all regions in developing professional activities tailored to their specific needs and interests for their local members. This group is working to fulfill the IEEE Constitutional obligations to address the professional needs of all members, regardless of geographic location.
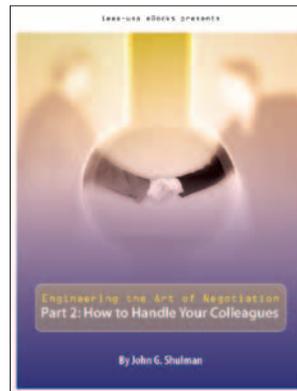
Two of many E-books free to IEEE members through http://www.ieeeusa.org/careers/gpa/

I hope that you will take advantage of these opportunities and maximize the benefits of being part of the wonderful IEEE Network.
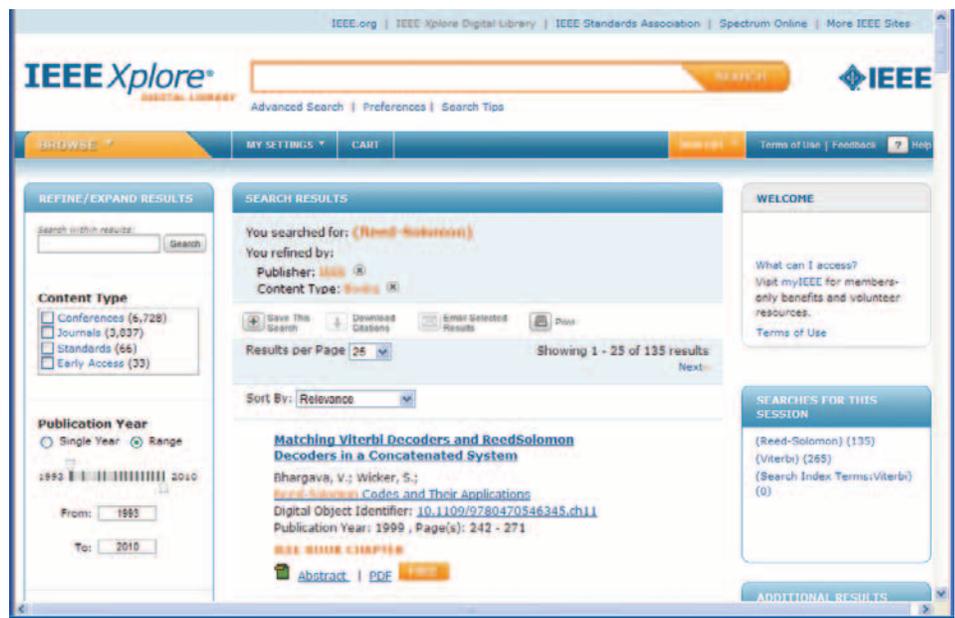
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IEEE Life Fellows author book on optimal control theory

Many physical, economic, biomedical, manufacturing, and engineering processes can be optimized for some desired property or behavior by changing parameters in a specific way. This can be done by guesswork, trial and error, or the systematic application of optimal control theory.

Two IEEE Life Fellows, Dr. David H. Jacobson and Dr. Jason L. Speyer, have co-authored a primer on Optimal Control Theory towards removing at least some of the guesswork.

This book aims to help scientists, engineers, economists and managers to implement optimal control theory in most practical purposes, and provide a basis for more advanced applications. Sections of the book focus on finite-dimensional optimization, systems with general performance criteria, terminal equality constraints, linear-quadratic control problems and linear-quadratic differential games.

Dr. Jacobson is Director of Emerging Technologies at PricewaterhouseCoopers

Advisory Services, Toronto. Dr. Speyer is Distinguished Professor in the Mechanical and Aerospace Engineering Department and the Electrical Engineering Department at the Univ. of California, LA.

Ref: http://www.ec-securehost.com/SIAM/DC20.html

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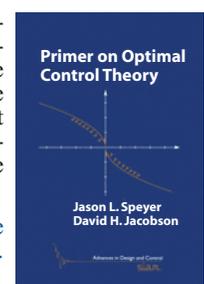
2009 Honour Roll of Donors

From the President:

I wish to acknowledge and thank those of you who have generously given to the IEEE Canadian Foundation in 2009. Your gifts have enabled our foundation to continue to enhance the learning experience of engineering students through our programs of McNaughton Centres, Scholarships, Special Grants including humanitarian applications of technology, and to endow several IEEE Canada Medals.

Our General Fund is crucial to our ability to operate each and every year, so please continue with your undirected donations and keep our base strong. If there are special circumstances, please consider an additional significant gift to endow an IEEE Canada award or create a new award of your choosing. IEEE Canada major awards such as the Electric Power, Computer, and Outstanding Engineer awards are available for endowment —these require a $20,000 one-time directed donation and are ideal for corporate sponsorships. The IEEE has identified the general area of using technology for the benefit of humanity as the one that resonates most closely with IEEE members. We would like to expand our special grants program in this area beyond IEEE Student Branch projects that tend to be limited in scope, so we welcome additional gifts for this purpose.

I am proud of the work the IEEE Canadian Foundation does to support IEEE in Canada, and very appreciative of your past support and earnestly urge you to continue to do so and increase your contributions where possible. If you have not yet made a donation, I urge you to please do so—we could do so much more with your financial support. If there are ways you feel we can do better, please contact me—I welcome your suggestions.

Yours sincerely,

Robert T.H. (Bob) Alden

President, IEEE Canadian Foundation

2009 Year in Review—The two charts provide a graphic overview on two aspects of 2009 donations—how and who. For the first, the use of our online donations portal (Canada Helps) has increased from 3% in 2008 to 13% in 2009, perhaps due to the convenient and immediate issuing of tax receipts. For the second, the breakdown continues to show the generosity of our life members (all grades) and I am pleased to see that our Member contributions are up by 4% from last year. In total, 252 individual donors gave a total of $16,124. In addition, the foundation received two $20,000 gifts from the Canadian Heads of Electrical and Computer Engineering and TELUS to endow two IEEE Canada medals (Outstanding Engineering Educator and Telecommunications), and the IEEE Toronto Section continued its partial co-sponsorship of the IEEE Canadian Foundation Scholarship. We sincerely thank every one of you for your generosity. In reviewing our balance sheets, I am pleased to report that while our year-end total assets dropped significantly in 2008, they have rebounded in 2009 to slightly above the 2006 and 2007 levels.

1995–2009: Giving over 15 years—We are putting together a database of all donations received since 1995—just after we received our charitable foundation status from Revenue Canada. Here are some preliminary overview statistics. Individuals have contributed a total of about $240,000 or $16,000 per year. Twelve have donated $1,000 or more, of which six have given $2,000 or more, three have given $5,000 or more and one has given over $10,000. The average donation is about $50.

Looking Ahead—We are aware that our universities and industries are suffering financially. We can all help our students and fellow engineers, the IEEE way, by continuing and hopefully improving our philanthropic programs to provide grants for exciting and worthwhile projects, and scholarships, prizes and awards to recognize achievement. Please help us do more by raising your contribution level (or making your first contribution). I pledge to you that I will double my 2009 donation for 2010. All our programs and details about how to donate can be found on our website or you can simply send your cheque to the address below (please include your IEEE membership number). I invite you to visit our website, and please give generously.

IEEE Canadian Foundation

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Luc Matteau, Treasurer; Phone: 705-743-7712
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Life Senior 13%
Life Member 39%
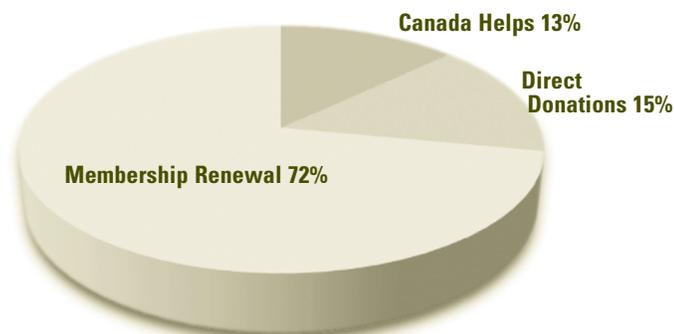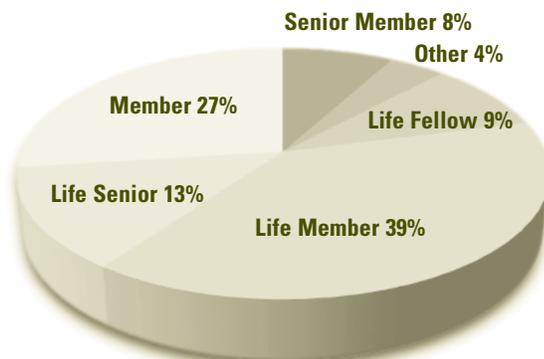
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Engineering Management: *What's New in the Literature?*

On Profitable Research, Innovation and Entrepreneurship in Emerging Markets, IT and Innovation, Future Education, Workplace Ethics, Geek Power, Impact of Internet Tools, Achieving Success and Avoiding Poor Decisions, Happy Jobs, Future Transportation, Terry Fox.

by Terrance Malkinson
School of Health and Public Safety
SAIT Polytechnic, Calgary, Alberta

◆ Nathan Myhrvold describes an approach to make applied research a profitable activity, thereby attracting more private investment, in "Funding Eureka" (*Harvard Business Review*, 88(2):40-50, March 2010). The author, a former chief technology officer at Microsoft, believes that this approach would increase invention and change the world for the better, and details how this might happen.

◆ *The Economist* published a 14-page report on innovation in emerging markets ("The New Masters of Management", 395(#8678). April 17, 2010. This series of six articles provides information on how emerging countries are becoming hotbeds of business innovation; developing inexpensive products and services, reinventing systems of production and distribution, and experimenting with new business models. In "How to Start an Entrepreneurial Revolution" (*Harvard Business Review*, 88(6):40-50. June 2010) Daniel Isenberg opens the article with a discussion on the change that entrepreneurship has had on the country of Rwanda; catapulting it from 143rd place on the "World Bank's Ranking of Ease of Doing Business" to 67th place. The author describes nine best practices that governments should use to create an environment that sustains entrepreneurs.

◆ Advances in technology are facilitating new processes for innovation, allowing companies to access business analytics resulting in faster cycle and processing times and more flexibility in the processing of information. Erik Brynjolvsson, a MIT Sloan School of Management economist, provides his thoughts on how new tools for analyzing data are changing the ways that innovation is done ("The Four Ways IT is Revolutionizing Innovation," *MIT Sloan Management Review*. 51(3):51-56, Spring 2010).

◆ Janna Anderson, a communications scholar, describes a new path for education in "Remaking Education for a New Century" (*The Futurist*, 44(1):22-24, January-February 2010). Topics discussed include self-directed learning, the role of hyperconnectivity, digitization of information, and global technology capacity. In the subsequent issue of *The Futurist* ("Global, Mobile, Virtual, and Social: The College Campus of Tomorrow". 44(2):46-50, March-April 2010) John Drew, an educator and strategic planner, provides a futuristic view for colleges and universities. Forecasts of where, when, and how learning might take place are discussed, including globalized learning, international harmonization of educational standards, increasing use of technology, diversity in enrolment, and new roles for educators.

◆ Tips that may help you speak out when you encounter ethical conflicts in the workplace are discussed by Mary Gentile in her article "Keeping Your Colleagues Honest" (*Harvard Business Review*, 88(2):114-117, March 2010). The author spent four years studying the moments when people decide whether to speak up about an ethical issue and what to say when they do. She first discusses four rationalizations people use for keeping silent and then discusses strategies for confronting the dilemma. An interesting inset provides you with a checklist for action.

◆ Stephen Levy revisits some of the industries, titans and idealists that set the stage for today, and then goes on to the current and next generation of visionaries of our increasingly digital world in "Geek Power: How Hacker Culture Conquered the World" (*Wired*, 18(5):81-86, May 2010).

◆ Facebook is the subject of the cover story of the July 19, 2010 issue of *Canadian Business* ("Why We'll Never Escape Facebook," 83(10):28-32). James Cowan discusses many of the current issues and pros and cons of this popular internet tool. Joe Robinson in his introduction to "E-Mail is Making You Stupid" (*Entrepreneur*, 38(3):61-63, March 2010) states that the average desk worker loses 2.1 hours of productivity every day to technology interruptions and distractions. He goes on to discuss how communication's technology interruptions undermine workers attention, increase stress and decrease job satisfaction and creativity. The author goes on to provide strategies for reducing these distractions.

◆ *Canadian Business* provides a "how-to" guide to assist in your daily activities so that you may achieve business and career success ("The Ultimate Guide to High Performance", 83(9):55-72, June 14, 2010). A team of authors provide informative strategies on how to improve the impression you make on others. Michael Mauboussin, an investment strategist, believes that faulty decision-making is avoidable if we have a better understanding of the reasons why poor decisions are made. In "Smart People, Dumb Decisions" (*The Futurist*, 44(2): 24-30, March-April 2010), he describes factors resulting in poor decisions and provide strategies to assist you in making better ones.

◆ Today, employment opportunities are at a premium. *Harvard Business Review* provides an interesting article of importance to you ("Turn the Job You Have Into the Job You Want." 88(6):114-117. June 2010). Amy Wrzesniewski, Justin Berg and Jane Dutton provide a case study and strategies for tailoring your current responsibilities into a position that incorporates your motives, strengths, and passions; allowing you to achieve a sense of control and satisfaction. Positive organizational scholarship is discussed by Ann Pace in "Unleashing Posi+ivi+ty in +he Workplace" (*Training & Development*. 64(1):40-44. January 2010). Virtue, compassion and positivity are believed by the author to be crucial for success.

◆ 2010 marks the 30th anniversary of Terry Fox's Marathon of Hope run across Canada. Diagnosed with bone cancer at the age of 18 years resulting in the amputation of his right leg, he decided to run across Canada to raise money for cancer research. Regrettably, on September 2, 1980, after 143 days and running 5,373 kilometres, he was forced to stop near Thunder Bay Ontario because cancer had appeared in his lungs. Terry Fox passed away less than a year later at the age of 22. The Marathon of Hope did not die with this Canadian hero; the remarkable legacy was just beginning. Through the non-profit Terry Fox Foundation (www.terryfox.org), nearly $500 million has been raised for cancer research in his name. As Terry proved our legacy is not measured in years of life; but in the quality of the years that we live. The address to the graduating class of Harvard Business School was provided by Clayton Christensen and focused on guidelines for finding meaning and satisfaction in your life (*Harvard Business Review* (88(7/8):46-51, July–August 2010). Mr. Christensen was diagnosed with cancer this past year.

About the Author

Terrance Malkinson is a communications specialist, business analyst and futurist. He is Vice-Chair of the IEEE-USA Communications Committee, an international correspondent for *IEEE-USA Today's Engineer Online*, editor-in-chief of *IEEE-USA Today's Engineer Digest*, and an associate editor for *IEEE Canadian Review*. He was an elected Senator of the University of Calgary and an elected Governor of the IEEE Engineering Management Society as well as an elected Administrative Commitee member of the IEEE Professional Communication Society. He has been the editor of several IEEE conference proceedings, and past editor of *IEEE Engineering Management*. Currently, he is with the School of Health and Public Safety/Applied Research and Innovation Services at SAIT Polytechnic in Calgary, Canada.
malkinst@telus.net

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2011-06-13...17, Toronto, ON
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9th Conference on Communication Networks and Services Research (CNSR)
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http://ofs21.org/

ACM/IEEE-CS Joint Conference on Digital Libraries (JCDL)
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http://www.jcdl.org/

IEEE Photonics Society Summer Topical Meeting Series
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http://photonicssociety.org/

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http://www.unb.ca/pstnet/

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http://conference.ieee-ims.org/

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The 2011 IEEE Canadian Conference on Electrical and Computer Engineering (CCECE 2011) will be held in Niagara Falls, Ontario, Canada, May 8-11, 2011. CCECE 2011 provides a forum for the presentation of electrical and computer engineering research and development from Canada and around the world. Papers are invited, in French or English, for the following symposia.

- **Circuits, Devices and Systems**
  Chairs: Dr. Karim Karim (University of Waterloo) and Dr. Shahab Ardalan (Gennum Corp.)

- **Control and Robotics**
  Chairs: Dr. Lacra Pavel (University of Toronto), and Javad Lavaei (California Institute of Technology)

- **Communications and Networking**
  Chairs: Dr. Mark Coates (McGill University), Dr. Alagan Anpalagan (Ryerson University) and Dr. Min Dong (UOIT)

- **Computers, Software and Applications**
  Chairs: Dr. Andreas Moshovos (University of Toronto) and Dr. Adnan Kabbani (Ryerson University)

- **Biomedical and Health Informatics**
  Chairs: Dr. Karthi Umapathy (Ryerson University), Dr. Syed Sibte Raza Abidi (Dalhousie University) and Dr. James Smith (Ryerson University)

- **Power Electronics and Energy Systems**
  Chairs: Dr. Gerry Moschopoulos (University of Western Ontario) and Dr. Bala Venkatesh (Ryerson University)

- **Signal and Multimedia Processing**
  Chairs: Dr. Xianbin Wang (University of Western Ontario) and Dr. Saeed Gazor (Queen's University)

Authors wishing to submit papers that do not fit within any of the above topics are encouraged to do so to the "general interest" symposium.

Regular Paper Submission

Please submit original full length paper(s) to the Technical Program Committee using the on-line submission process on our web site at http://www.ccece2011.org before January 7, 2011. Click on "Call For Papers" and follow the instructions provided.

Tutorial and Workshop Proposals Submission

Proposals for half-day tutorials and workshops should be submitted before December 3, 2010 to the Tutorials Chair at tutorials@ccece2011.org .

Important Dates

Tutorial or workshop proposals must be received by:	Friday, December 3, 2010
Full length papers must be received by:	Friday, January 7, 2011
Notification of acceptance will be sent out by:	Friday, February 4, 2011
Author's Registration ends by:	Friday, March 4, 2011
Advance Registration ends by:	Friday, April 1, 2011

Industrial Exhibits and Sponsorships

For industrial exhibits please contact the Industrial Exhibits Chair at exhibits@ccece2011.org.
For sponsorships please contact the Sponsorships Chair at sponsorship@ccece2011.org.

Call for Reviewers, Questions or Comments

To volunteer as a reviewer, please contact Technical Program Co-Chairs: Scott Yam (scott.yam@queensu.ca) or Andy Ye (aye@ee.ryerson.ca).

For any other questions or comments, please contact the Conference Chair:
Wai Tung Ng, Tel: 416 946-5086 Fax: 416 971-2286 Email: ngwt@vrg.utoronto.ca

http://www.ccece2011.org

IEEE Canada

CCGÉI 2011

24ème Congrès canadien de génie électrique et informatique

8-11 mai 2011, Niagara Falls, Ontario, Canada

«Électrifier un avenir vert»

Appel de communications et propositions

Le Congrès canadienne de génie électrique et informatique édition 2011 (CCGÉI 2011) aura lieu à Niagara Falls (Ontario), Canada du 8 au 11 mai. Le CCGÉI 2011 constitue un forum où les recherches et développements en génie électrique et informatique effectués au Canada et dans le reste du monde sont présentés. Nous vous invitons à présenter des communications, en français ou en anglais, pour les symposiums suivants :

- **Circuits, dispositifs et systèmes**
  Prés. : Karim Karim (University of Waterloo) et Shahab Ardalan (Gennum Corp.)

- **Commande et robotique**
  Prés. : Lacra Pavel (University of Toronto), et Javad Lavaei (California Institute of Technology)

- **Communications et réseaux**
  Prés. : Mark Coates (McGill University), Alagan Anpalagan (Ryerson University) et Min Dong (UOIT)

- **Ordinateurs, logiciels et applications**
  Prés. : Andreas Moshovos (University of Toronto) et Adnan Kabbani (Ryerson University)

- **Informatique santé et biomédicale**
  Prés. : Dr. Karthi Umapathy (Ryerson University), Dr. Syed Sibte Raza Abidi (Dalhousie University) et Dr. James Smith (Ryerson University)

- **Électronique de puissance et systèmes énergétiques**
  Prés. : Gerry Moschopoulos (University of Western Ontario) et Bala Venkatesh (Ryerson University)

- **Traitement du signal et multimédia**
  Prés. : Xianbin Wang (University of Western Ontario) et Saeed Gazor (Queen's University)

Les personnes qui souhaitent soumettre des communications sur un thème autre que ceux indiqués ci-dessus sont encouragés à le faire dans le cadre d'un symposium « général ».

Soumission d'une communication régulière

Veuillez soumettre votre (vos) communication(s) originale(s) complète(s) au Comité du programme technique en utilisant le processus de soumission en ligne sur notre site web à http://www.ccece2011.org avant le 7 janvier 2011. Cliquer sur « Appel de communications » et suivre les instructions fournies.

Soumission d'une proposition de séance didactique et d'atelier

Les propositions de séance didactique et d'atelier d'une demi-journée devraient être soumises avant le 3 décembre 2010 au président en charge des séances didactiques à tutorials@ccece2011.org.

Dates importantes

Date limite des propositions de séance didactique ou d'atelier:	vendredi 3 décembre 2010
Date limite d'envoi de communication complète:	vendredi 7 janvier 2011
Date de notification d'acceptation :	vendredi 4 février 2011
Date limite d'inscription des auteurs :	vendredi 4 mars 2011
Date limite d'inscription anticipée :	vendredi 1er avril 2011

Expositions industrielles et parrainages

Pour les expositions industrielles, veuillez contacter le président en charge des expositions industrielles à exhibits@ccece2011.org. Pour les commandites, veuillez contacter le président en charge du parrainage à sponsorship@ccece2011.org.

Appel pour vérificateurs, questions ou commentaires

Pour agir bénévolement comme vérificateur, svp contactez les co-présidents du programme technique: Scott Yam (scott.yam@queensu.ca) ou Andy Ye (aye@ee.ryerson.ca).

Pour toutes autres questions ou commentaires, svp contactez le président de la conférence: Wai Tung Ng, Tel: 416 946-5086 Télécopieur: 416 971-2286 Courriel: ngwt@vrg.utoronto.ca

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