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Du 8 au 11 mai 2011

MESSAGE DU PREMIER MINISTRE DE L’ONTARIO

Au nom du gouvernement de l’Ontario, j’aimerais transmettre mes plus chaleureuses salutations aux participants et participantes à la 24e Conférence canadienne de génie électrique et génie informatique, parrainée par l’Institut des ingénieurs électriciens et électroniciens.

Le talent et la créativité des ingénieurs électriciens, électroniciens et informaticiens ont grandement contribué à la construction, à l’entretien et à l’amélioration des infrastructures qui enrichissent la qualité de vie des Canadiens et des Canadiennes. Cette année, la conférence invite les participantes et participantes à approfondir le thème suivant : « Électrifier un avenir vert ». Je suis certain que ce thème sera pour eux l’occasion idéale de discuter des enjeux les plus récents relatifs à leur secteur d’activité et de partager les éléments clés de leur expertise professionnelle en matière de recherche et développement.

Aux participants et aux participantes : « Bienvenue à Niagara Falls! » Ville empreinte d’histoire et d’une grande beauté naturelle, Niagara Falls offre aux visiteurs et aux visiteuses des activités touristiques extraordinaires dont ils se souviendront à jamais. Que vous connaissiez peut-être déjà cette ville pittoresque ou que vous la visitez pour la toute première fois, soyez assurés que vous serez accueillis chaleureusement partout où vous irez.

Je vous souhaite une conférence instructive et couronnée de succès.

Le premier ministre de l’Ontario,

Dalton McGuinty
May 8 – 11, 2011

A PERSONAL MESSAGE FROM THE PREMIER

On behalf of the Government of Ontario, I am delighted to extend warm greetings to everyone attending the 24th Canadian Conference on Electrical and Computer Engineering, sponsored by the Institute of Electrical and Electronics Engineers.

The talent and creativity of electrical, electronics and computer engineers have aided greatly in building, maintaining and improving the infrastructure that supports the quality of life we enjoy as Canadians. This year’s convention invites participants to explore the theme Electrifying a Green Future. I am confident that this topic will provide an ideal forum for the discussion of the latest issues affecting the industry and for sharing vital research and development expertise.

To all attendees: Welcome to Niagara Falls! Steeped in history and rich in natural beauty, Niagara Falls offers visitors many wonderful experiences to take home with them. Whether a first-time or frequent visitor to this picturesque city, I assure you that a warm welcome awaits you wherever you go.

Please accept my best wishes for a memorable and informative conference.

Dalton McGuinty
Premier
Welcome message from IEEE Canada President

It is a pleasure to welcome all attendees to the 2011 Canadian Conference on Electrical and Computer Engineering (CCECE) being held in the scenic location of Niagara Falls, Ontario. CCECE is the flagship conference of IEEE Canada (IEEE Region 7) and is held under its sponsorship. The origins of CCECE can be traced back to 1988 when the first conference was held in Vancouver. It has been held annually since then in various parts of Canada with the 2011 CCECE being the twenty fourth in the series.

The objectives of starting this conference were to foster interaction and networking among the electrical and computer engineering R&D community within Canada. Its continued success has now led to a significant component of the presentations and attendees coming from all parts of the world. However, the original objectives of the conference have not changed. This is quite evident from the program that includes variety of plenary talks on topics of current interest by leaders in their own technical areas from the industry and academia.

The Technical Program Committee of CCECE has done a very good job with its Call for Papers, review of papers and putting together an excellent technical program that will be interesting and relevant to all attendees. Original technical papers and tutorials by experts on state-of-the-art topics cover the entire spectrum of electrical and computer engineering. The Technical Program Committee works hard to ensure that the presentations at the conference meet a high technical standard. One important part of CCECE is the Awards Ceremony where IEEE Canada recognizes the achievements and special contributions of its members. Attending the awards ceremony will make you aware of the great work being done within Canada and give you the opportunity to congratulate the winners. The organization of 2011 CCECE is a joint effort between all six Sections of the Central Canada Area of IEEE Canada. I would like to take this opportunity to congratulate the Central Canada Area and all six Sections for coming together in this joint effort, and also members of the Local Organizing Committee for their efforts in organizing the conference. I would also like to thank the plenary speakers, tutorial presenters and all authors who submitted their work for presentation at 2011 CCECE as without their contributions there will be no CCECE. Niagara Falls is known around the world for its beauty. I welcome all attendees to Niagara Falls and hope that you all will have a wonderful time both at the conference and in exploring Niagara Falls, also known as the honeymoon capital.

Dr. O. P. Malik, LFIEEE, FEIT, FCAE, FEIC, FEC, FWIF
Professor Emeritus, ECE, University of Calgary Ph: +1-403-220-6178
President IEEE Canada, 2010-2011 Fax: +1-403-282-6855
Director/Delegate IEEE Region 7 2010-2011 e-mail: maliko@ucalgary.ca
Welcome message from CCECE General Chair

On behalf of the organizing committee, I would like to extend to you a warm welcome to CCECE 2011, to be held in scenic Niagara Falls, Canada - one of the seven natural wonders of the world. The 24th Canadian Conference on Electrical and Computer Engineering is the flagship event for IEEE Canada. This year, the IEEE Canada Central Region, along with the Hamilton, Kingston, Kitchener/Waterloo, London, Peterborough and Toronto Sections, have the pleasure of hosting this important conference. CCECE is Canada's premier networking forum for leading researchers in the broad area of Electrical and Computer Engineering.

This year's theme is "Electrifying a Green Future". Each day will be opened by a plenary session. This year, we are honored to have three excellent speakers. Prof. Peter Frise, University of Windsor, Scientific Director & CEO - Auto21, Canada's Network Centers of Excellence, will address current status and future opportunities in "Automotive Research in Canada". Prof. Richard J. Marceau, Provost, University of Ontario Institute of Technology, will introduce the "PEEC: The Power Engineering Education Consortium". Finally, Chris Ouslis, Vice President and Founder, Fresco Microchip, Markham, ON will provide a motivational talk on "Why don't we have more high-tech entrepreneurs in Canada?"

CCECE 2011 will include 40 oral sessions, 1 poster session, and 5 tutorials and 3 workshops. Papers are organized into 8 technical tracks: "Circuits, Devices and Systems", "Computers, Software and Applications", "Control and Robotics", "Power Electronics and Energy Systems", "Communications and Networking", "Signal and Multimedia Processing", "Biomedical and Health Informatics", and "Engineered & Natural Complex Systems: Modeling, Simulation & Analysis". The diversity of the technical program ensures that the conference will be interesting and relevant to our attendees.

I would like to express our deepest gratitude to the large number of volunteers who helped shape CCECE-2011. In particular I like to personally acknowledge Prof. Scott Yam (Queens University) and Prof. Andy Ye for going far beyond their duties to help us to organize an excellent and rich technical program. Special thanks also go to Prof. Xavier Fernando for his dedication on the tutorial and workshops. Whether this is your first or returning visit to the Niagara Falls, I strongly recommend you to extend your stay and visit some of the countless attractions in the region.

I look forward to personally meeting you at CCECE 2011.

Prof. Wai Tung Ng
CCECE-2011 General Chair

IEEE CCECE 2011 - 000005
GREETINGS

On behalf of the Niagara Falls City Council, I am excited to extend my best wishes to all those attending the 24th Canadian Conference on Electrical and Computer Engineering (CCECE) from May 8 - 11, 2011. It is a pleasure to be the host city and we wish you an event filled with success.

I would like to thank the organizers for all their hard work planning this conference, and I hope everyone who is attending has the opportunity to check out the wide variety of experiences, sights and activities that our city and region have to offer.

Sincerely,

James M. Diodati
Mayor
Plenary Sessions

Congrès Canadien en Génie Électrique et Informatique

IEEE

IEEE CCECE 2011 - 000007
Plenary 1:

“Canada’s Transportation Sector and Collaborative Automotive Research & Education in Canada”

Date: Monday, May 9, 2011 at 8:15am in Oakes Ballroom

Presented by Prof. Peter R. Frise, Scientific Director and CEO – AUTO21 Network of Centers of Excellence and Professor of Automotive Engineering and Executive Director of Automotive Research & Studies at the University of Windsor

Abstract: The automotive industry is Canada’s largest single business sector providing high value employment to over 400,000 people across the country including over 135,000 direct jobs mainly in Ontario and Quebec. In addition, this $110B business provides nearly a quarter of Ontario’s trade and is the largest source of exports in our economy as well as being a key component of Canada’s transportation sector. Automotive manufacturing is one of the largest consumers of materials in our economy and present and future automobiles are extremely high technology articles which represent one of the largest purchases for most Canadians. The North American automotive sector is presently under significant competitive pressures and so we must innovate to continue to provide these benefits to Canada. The presentation will describe the present status of automotive-related research globally and in Canada and will illustrate with examples in vehicle safety, advanced materials and manufacturing and cleaner power trains and will highlight the opportunities for electrical and electronics engineers in the future automobile.
Speaker’s Biography: For many years, Peter R. Frise, Ph.D., P.Eng., FCAE, has selflessly used his expertise as an engineering educator and researcher to serve PEO’s governance and the country’s future engineers. He served on PEO Council as Lieutenant Governor Appointee for two three-year terms and one year-long term, beginning in 1997. For the past 11 years he has also played a strong role on the Complaints Committee, where he has provided the benefit of his background in engineering practice and governance as well as his specialty in mechanical engineering. He also chaired PEO’s Fundamental Review Implementation Task Group charged with investigating emerging areas and multidisciplinary groups in the profession. At the national level, Peter chaired a then Canadian Council of Professional Engineers’ (now Engineers Canada) Vision Task Force Working Group’s Environmental Scan on the Engineering Profession in Canada. He also served on the Founding Council of the Association of Professional Geoscientists of Ontario as a Lay Member. In addition to service on PEO Council, Peter worked to improve engineering education and research through his initiatives at the University of Windsor. A devoted and respected educator, he established Canada’s first university-level program in Automotive Engineering in 1998 at the University of Windsor, providing students with the skills needed for the highly competitive automotive industry, while satisfying accreditation requirements. “Every student is their family’s pride and joy,” he says, “and it is essential that educators join with those families in helping our young people to achieve at their highest potential.” As a result of his knowledge and connections in the automotive industry, Peter was elected by nearly 30 universities to lead the AUTO21 Network of Centres of Excellence in 2000.
Plenary 2:

“PEEC The Power Engineering Education Consortium”

Date: Tuesday, May 10, 2011 at 8:15am in Oakes Ballroom

Presented by Prof. Richard J. Marceau
Provost, University of Ontario Institute of Technology

Abstract: To address Ontario’s shortage of electric Power Engineers, seven universities (McMaster University, Queen’s University, Ryerson University, University of Toronto, University of Waterloo, University of Western Ontario and University of Ontario Institute of Technology (UOIT)) have resolved to create the “Power Engineering Education Consortium (PEEC)”.

In partnership with these universities are key representatives from industry and labor in the electricity sector and beyond: the Canadian District Energy Association, CANDU Owners’ Group, Electricity Distributors’ Association, Hydro One Networks (Hydro One), Ontario Power Authority (OPA), Ontario Power Generation (OPG), Power Workers’ Union, and the Society of Energy Professionals. PEEC aspires to increase the number of highly qualified personnel at the Bachelor and Graduate levels in electric Power Engineering in Ontario and thereby provide needed talent for Ontario’s electricity sector. The presentation will provide an overview of the gap between the supply and demand of electric power engineers for Ontario. The presentation will also describe the PEEC partnership and how it aims to address this gap.
Speaker’s Biography: Richard J. Marceau obtained his B.Eng. from McGill University in December 1977. In January 1978, he began his career with MONENCO Inc., a consulting engineering firm. In 1982, he joined Hydro-Québec as an operations engineer. In June 1983, he obtained his Master’s in Electrical Engineering while studying part time at École Polytechnique de Montréal. In 1984, he became a researcher at the Hydro-Quebec Research Institute (IREQ) in electromagnetic induction heating. Between September 1990 and June 1993, he pursued full-time doctoral studies, and obtained his Ph.D. in electrical energy transmission and security. The same year, he began a university career at École Polytechnique de Montréal. In 1998, he was elected Chair of the Department of Electrical and Computer Engineering, and led the Department through transformational change. In June 2001, he became Dean of the Faculty of Engineering of the Université de Sherbrooke where he again led the Faculty through paradigm-shifting change. In January 2005, he became Provost and VP Academic of the University of Ontario Institute of Technology (UOIT) where he has overseen the successful academic start-up of this new university. He is currently Chair of the Board of Parkwood National Historic Site, Fellow of the Canadian Academy of Engineering, member of the Board of Directors of the Canadian Academy of Engineering and Chair of its New Directions and Public Policy Committee, and senior member of the IEEE.
Plenary 3:

“Why don't we have more high-tech entrepreneurs in Canada?”

Date: Wednesday, May 11, 2011 at 8:15am in Oakes Ballroom

Presented by: Chris Ouslis, Vice President and Co-founder, Fresco Microchip, Markham, ON

Abstract: Why aren’t there more successful Canadian high-tech startups?! Find out why. Hear about characteristics that can improve chances of entrepreneurial success. Learn what is being done to change Canada’s high-tech entrepreneurial philosophy.

Speaker’s Biography: Chris Ouslis is a co-founder of Fresco Microchip Inc. which supplies demodulator and tuner components or the television industry. Television sets from LG, Panasonic, Sanyo, and Samsung include Fresco components. In 2010, Fresco shipped almost 30 million units from virtually no sales in 2009. Fresco Microchip is funded by Celtic House Venture Partners, Ventures West Capital, and private capital. Chris also co-founded Xentec, a supplier of silicon intellectual property and provider of integrated circuit design contracting. Xentec was acquired by InSilicon after having grown to 16 staff with no external capital over 3 years. Over the next 2 years, the business unit’s success continued and staff doubled until Synopsys acquired Insilicon. The silicon intellectual property group continued its growth, in Canada and worldwide through products from firms including AMD, Apple, Toshiba, and Samsung. Chris received his B.A.Sc. degree in Engineering Science and M.A.Sc. degree in Electrical Engineering from the University of Toronto. He was a Research Associate and Lecturer at the University of Toronto.
IEEE

Canadian Conference on Electrical and Computer Engineering

McNaughton Lecture
Tuesday May 10, 12:30 Oakes Room

Congrès Canadien en Génie Électrique et Informarique

IEEE
2011 IEEE Canada A.G.L. McNaughton Gold Medal
For outstanding contributions to the development of design methods for communication protocols and services

Gregor v. Bochmann (FIEEE) is professor at the School of Information Technology and Engineering at the University of Ottawa since 1998, after 25 years at the University of Montreal. He is a Fellow of IEEE, ACM and the Royal Society of Canada. After initial research work on programming languages and compiler design, he started work on communication protocols around 1974 and developed the field of “protocol engineering,” applying software engineering principles to communication protocols.

In the early eighties, he participated in standardization committees of ISO and ITU and took a leading role in the standardization of Formal Description Techniques for communication protocols and services at the Canadian and international levels. He is internationally well recognized for his innovative work on modeling the behavior of distributed systems by extended finite state machines, and on their verification and testing. He has had many research collaborations with industry and, from 1989 to 1997, held the Hewlett-Packard - NSERC - CITI Industrial Research Chair on communication protocols at the University of Montreal.

Dr. Bochmann has received many prizes for his work, including the Thomas W. Eadie Medal of the Royal Society, the Award for Excellence in Research of the University of Ottawa, and in 2005 was recognized as a “Pioneer of Computing in Canada” at the CASCON conference organized by IBM and NRC. His recent work has been in the areas of software engineering for distributed applications, peer-to-peer systems, quality of service and security management for Web applications, and control procedures for optical networks.
Awards Presentation

24th Canadian Conference on Electrical and Computer Engineering

IEEE Canada

May 9—9 Mai, 2011; Niagara Falls, ON
http://www.ieee.ca/awards
Call for Papers and Proposals

The 2012 IEEE Canadian Conference on Electrical and Computer Engineering (CCECE 2012) will be held in Montreal, Quebec, Canada April 29 to May 2. CCECE 2012 provides a forum for the presentation of electrical and computer engineering research and development from Canada and around the world. Plenary speakers include Vahid Tarokh from Harvard University and Peter Caines from McGill University.

Papers are invited, in French or English, for the following symposia:

- Circuits, Devices and Systems
  Chairs: Drs. Karim Karim (University of Waterloo), Shahriar Mirabbasi (University of British Columbia)
- Control and Robotics
  Chairs: Drs. Stephen Smith (University of Waterloo), Joshua Marshal (Queen’s University)
- Computers, Software & Applications
  Chair: Dr. Jagath Samarabandu (University of Western Ontario)
- Biomedical and Health Informatics
  Chair: Dr. Carolyn McInerney (University of Ontario Institute of Technology)
- Communications and Networking
  Chairs: Drs. Anader Benyamin-Seeyar (Concordia University), Shahram Yousefi (Queen’s University), Mark Coates (McGill University)
- Power Electronics and Energy Systems
  Chairs: Drs. Bala Venkatakrishnan (Ryerson University), Olivier Trescases (University of Toronto)
- Signal and Multimedia Processing
  Chairs: Dr. Fabrice Labbeau (McGill University), Xianbin Wang (University of Western Ontario)

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.

NOTE: Selected papers accepted in this conference would be proposed for publication in IEEE Systems Journal and IEEE Canadian Journal of Electrical and Computer Engineering, after another round of review.

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.ccece2012.org before January 7, 2012. 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 2, 2011 to the Tutorials Chair at tutorials@ccece2012.org.

Important Dates

- Tutorial or workshop proposals must be received by: Friday, December 2, 2011
- Full length papers must be received by: Friday, January 7, 2012
- Notification of acceptance will be sent out by: Friday, February 24, 2012
- Author’s Registration ends by: Friday, March 9, 2012
- Advance Registration ends by: Friday, March 30, 2012

Industrial Exhibits and Sponsors

For industrial exhibits please contact the Industrial Exhibits Chair at exhibits@ccece2012.org.

Questions or Comments

To volunteer as a reviewer, please contact Tech. Program Co-Chairs: Scott Yam (scott.yam@queensu.ca), Lacra Pavel (pavel@control.toronto.edu) and Gerry Moschopoulos (gmoschopoulos@eng.uwo.ca).

For any questions or comments, please contact the Conference Chair: Amir G. Aghdam. Ph: 514 848-2424 Ext. 4137, Fax: 514 848-2802 Email: aghdam@ece.concordia.ca

http://www.ccece2012.org
IEEE EPEC 2011
Electrical Power and Energy Conference
Advanced Technologies for Emerging Power Systems
October 3-5, 2011, Winnipeg, MB, Canada

Call for Papers

The annual Electrical Power and Energy Conference (EPEC 2011) will take place in Winnipeg, MB, Canada from October 3 to 5, 2011. Located in the center of Canada, Winnipeg is a culturally diverse, creative and cosmopolitan city with a warm, welcoming spirit that will make a unique and unforgettable meeting and conference destination. The objective of EPEC 2011 is to provide a forum for experts in Electrical Power and Energy to disseminate their recent research outcomes and exchange views on the future research directions of these fields. This year we are working with The Energy Services Alliance of Manitoba to bring in renowned experts to give keynote speeches related to the Smart Grid. Bring your family with your research findings to EPEC2011, enjoy our programs and appreciate the history of Winnipeg.

Topics: Papers are invited on all topics of interest related to electric power and energy and especially papers with the following focus:

1. HVDC & FACTS
   - Project developments, including voltage source converter (VSC) dc transmission
   - Application for renewable energy systems
   - Advances in study and analysis tools
   - Power quality issues and solutions
   - HVdc supergrids
2. Smart Grid
   - Smart Grid concepts and pilot projects
   - Electric vehicles (grid impacts, standards)
   - Advanced metering infrastructure
   - On-line dynamic security assessment
   - Smart sensors including dynamic equipment rating and condition assessment methods
   - Applications of phasor measurement units
3. Renewable Energy
   - Energy Storage
   - Energy conservation and efficiency
4. Computational Methods
   - Challenges with integration of variable generation
   - New technology development
5. Advanced Technology Developments
   - Energy storage systems
   - Distribution system automation and control
   - New technology development
   - Computational methods in power system planning, operation and control
   - Probabilistic planning and risk analysis
   - Reliability centered maintenance and asset management

Paper Submission: The format of the paper should follow the IEEE conference papers style. EPEC 2011 will only accept the electronic submission of a full paper in English with maximum six pages (submission website address to be announced shortly). Detailed information on paper format and submission procedure can be found on the conference web. EPEC 2011 proceedings are included in EI Compendex, IEEExplore and ISI.

Important Dates:

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tbody>
<tr>
<td>April 30 2011</td>
<td>Submission of full papers in PDF and organized session proposals</td>
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<tr>
<td>May 10 2011</td>
<td>Submission of tutorial and workshop proposals</td>
</tr>
<tr>
<td>May 15 2011</td>
<td>Notification of paper and tutorial/workshop acceptance</td>
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<tr>
<td>June 10 2011</td>
<td>Submission of final camera-ready papers</td>
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Exhibitions: There will be an exhibition site at the conference. Companies and institutions who are interested are encouraged to contact the exhibition chair for further information.

For more information on EPEC 2011, please contact:

Prof. Ani Gole, General Chair
Dept of Electrical and Computer Engineering
University of Manitoba
Winnipeg, MB, Canada R3T 5V6
Tel: +1(204) 474-9959
Fax: +1(204) 474-7522
E-mail: gole@ee.umanitoba.ca

Dr. David Jacobson, Technical Committee Chair
System Planning Department
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Winnipeg, MB, Canada R3C 0J1
Tel: +1(204) 360-3765
Fax: +1(204) 360-6177
E-mail: dajacobson@hydro.mb.ca

Conference Website
http://www.ieee.ca/epec11/
Welcome to London Hydro

For almost a century, London Hydro has enjoyed a history charged with challenges and opportunities. With a mandate to provide safe, affordable electricity to the general public, we began to power homes and businesses in November of 1910, and have continued to improve the way people live and work ever since.

Even in the early days, our forward-thinking approach brought new technology to London homes first. Our retail division was an instant success, supplying the public with the latest electric appliances to help save time and money.

Later, when we focused our energies on replacing the clutter of overhead wires in our cityscape with underground cable, London's Bellwood Park became the first underground-serviced subdivision in postwar Canada.

Our active role in the community includes developing a school curriculum that teaches grades five and six students here - and across Ontario - about electric power, conservation, and its proper use.

Both our fleet and electric meter departments have earned ISO 9001 registration, the most accepted quality management systems standards in the world. These accomplishments assure our customers of our commitment to providing a level of service in keeping with global standards.

The electric meter department has also achieved accreditation by Measurement Canada, which allows London Hydro to inspect, verify and seal electric meters.
IEEE

Canadian Conference on Electrical and Computer Engineering

Technical Program Committee

Congrès Canadien en Génie Électrique et Informarique

IEEE
Technical Program Committee

Technical Program Committee Co-Chairs:
S. Yam, Queen's University
A. Ye, Ryerson University
G. Moschopoulos, University of Western Ontario

Symposia Chairs

Symposium on Biomedical Engineering and Health Informatics
Chair: James Smith, Ryerson University
Chair: Karthi Umapathy, Ryerson University
Chair: Syed Sibt-e Raza Abidi, Dalhousie University

Symposium on Circuits, Devices and Systems
Chair: Karim Karim, University of Waterloo
Chair: Shahab Ardalan, Gennum Corp.

Symposium on Communications and Networking
Chair: Mark Coates, McGill University
Chair: Alagan Anpalagan, Ryerson University
Chair: Min Dong, University of Ontario, Institute of Technology

Symposium on Computers, Software and Applications
Chair: Andreas Moshovos, University of Toronto
Chair: Natalie Enright-Jerger, University of Toronto

Symposium on Control and Robotics
Chair: Lacra Pavel, University of Toronto
Chair: Javad Lavaei, California Institute of Technology

Symposium on Power Electronics and Systems
Chair: Gerry Moschopoulos, University of Western Ontario
Chair: Bala Venkatesh, Ryerson University

Symposium on Signal and Multimedia Processing
Chair: Xianbin Wang, University of Western Ontario
Chair: Saeed Gazor, Queen's University

Symposium on Engineered & Natural Complex Systems: Modeling, Simulation & Analysis
Chair: Dr. Anna T. Lawniczak, University of Guelph
Technical Program Chairs' Overview

On behalf of the Technical Program Committee (TPC), we would like to welcome the delegates and their guests to the 24th annual Canadian Conference on Electrical and Computer Engineering (CCECE).

In a sustained effort to create the best forum for the Canadian ECE community, the CCECE 2011 inherited from previous years’ the vigorous review process for all its technical track submissions. The conference consists of a symposium structure. Each of the seven symposia provides a technical focus for papers in related fields. Significant energy has been devoted to a thorough and diligent review process by experts in matching technical areas, averaging 2.6 reviews per article. We hope this structure will continue to provide a sense of community for the various research areas within the conference as a whole.

CCECE 2011 drew 434 full-paper submissions from 35 different countries around the world. The submissions were sent to the members of the TPC and to the over 100 additional reviewers for review. The chairs would like to thank the symposium chairs, TPC members and the reviewers for their hard work and dedication. Time and space limitations did not allow us to include many fine technical submissions to the program. The CCECE 2011 Technical Program includes 287 oral and 48 poster presentations, totalling an acceptance rate of 77%.

Accepted papers can be broken down among the seven symposia as follows: Biomedical and Health Informatics (16), Circuits, Devices & Systems (48), Communications & Networks (63), Computer Systems & Applications (37), Control & Robotics (25), Engineered and Natural Complex Systems (11), Power Electronics and Systems (72) Signal & Multimedia Processing (40), all to be presented in oral sessions. 6 parallel oral sessions span the morning, afternoon and evening slots, with about five or more presentations in each session. The oral sessions follow the symposium structure where each symposium has a designated room where possible. The poster session coincides with the job fair and sponsorship exhibits to maximize interaction between different sectors of the Canadian engineer community.

Workshops are an integral part of CCECE and Xavier Fernando, the Tutorials and Workshops Chair, has prepared an excellent program for CCECE 2011. Six tutorials have been selected for presentation on Sunday, May 8, 2011. Three workshops have been organized to take place on Sunday, May 8, 2011, and Monday, May 9, 2011.

Finally, we would like to express our deep appreciation for the support received from Wai Tung Ng, the CCECE 2011 Conference Chair, the IEEE Canada Conference Advisory Committee (CONAC), and IEEE Canada.

We look forward to welcoming you in the Niagara Falls. We hope that you will enjoy the conference and find the Technical Program exciting.

Scott Yam, Andy Ye, and Gerry Moschopoulos
IEEE CCECE 2011, TPC Chairs
CCECE 2011 Organizing Committee

Conference Chair
Wai Tung Ng
University of Toronto

Technical Program
Scott Yam, Co-chair
Queens University

Andy Ye, Co-chair
Ryerson University

Gerry Moschopoulos, Co-chair,
University of Western Ontario

Tutorial Workshop
Xavier Fernando
Ryerson University

Publication
Amir Khatibzadeh
University of Waterloo

Amin Mobasher
Research In Motion

Sean Dunne
Canadian Instrumentation Services

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Shahab Ardala
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IEEE Canada Award Chair
Hussein Moutah
University of Ottawa

Conference Advisory Chair
Sri Krishnan
Ryerson University

Central Canada Area Chair
Kash Husain
Dillon Consulting Ltd.

Registration
Pearl Cao
University of Toronto

Student Activities
Olivier Trescase
University of Toronto

Publicity
Alex Bot
GS Research & Consulting

Secretary
Cathie Lowell
IEEE Canada

Translation
Christian Pepin
Université du Québec à Trois-Rivières
IEEE Canadian Conference on Electrical and Computer Engineering

General Information

Congrès Canadien en Génie Électrique et Informaticque

IEEE
General Information

Registration
Registration will be located in the Oakes Foyer on the Mezzanine Level of the Marriott Gateway.

Sunday     May 8     15:00 - 21:00
Monday     May 9     07:00 - 16:00
Tuesday    May 10    07:00 - 16:00
Wednesday May 11    07:00 - 12:00

Meals
Each registration fee, except for Partners, includes the following meals:
Sunday    May 8    Welcome Receptions
Monday    May 9    Breakfast, Lunch, Banquet
Tuesday    May 10    Breakfast, Lunch
Wednesday    May 11    Breakfast, Lunch

Additional tickets for the lunches and the banquet can be purchased at the Registration Desk during the Conference.

All meals will be held in the Oakes Ballroom, located on the second floor of the of the Marriott Gateway hotel.

Dietary Needs
Any Conference delegate or partner with special dietary needs etc. is invited to indicate these needs to the organizing committee - please forward your requirements to admin@ieee.ca or inform the Registration Desk.

Sunday Night Reception
This year's Sunday Night Reception highlights the international flare of the CCECE. You won’t want to miss this opportunity to meet friends and colleagues in this relaxed and entertaining setting. The Social will be held from 19:00 to 21:00, in the Oakes North of the Marriott Gateway Hotel.
Authors' Breakfasts
Each morning of the conference, a complimentary breakfast will be held for all authors presenting that day from 08:15 to 09:15 in the Oakes North/Ballroom of the Marriott Gateway Hotel. A table will be reserved for each session scheduled for that day. It is mandatory for all authors to attend on the day that they are presenting in order to meet their session chair and to review the technical session logistics.

Additional Equipment
Authors are reminded that each session room will be equipped with a LCD projector, screen, pointer device and microphone. Laptop and or desktop computers will not be provided. You are required to bring your own computer with your own software presentation package preinstalled. Please let the Conference organizers know (admin@ieee.ca) if you require an overhead projector. Please include your paper # in all correspondence,

Conference Proceedings
Conference Registration fee includes a copy of the Conference Proceedings. Additional copies are available. Please enquire at the Registration Desk.

After the Conference, additional copies of the Conference Proceedings, on printed formats, will be available from IEEE Publications.

Exhibits
The Conference Organizing Committee has arranged for a number of exhibitors to be present during the Conference. They will be set up on the second floor of the Marriott Gateway Hotel, in the Oakes Foyer. The exhibits will be open from 09:00 to 16:00 on Tuesday May 10th.
Conference Secretariat:

Cathie Lowell  
CCECE 2011 Secretariat  
IEEE Canada  
PO Box 63005, University Plaza Postal Outlet  
Shoppers Drug Mart #742, 102 Plaza Drive  
Dundas, ON, L9H 4H0, CANADA  
Tel/Fax: (905) 628-9554  
Email: c.lowell@ieee.org  
Conference website: www.ieee.ca/ccece11

Wireless Internet Access:
Will be provided for the convenience of all delegates in the Oakes Foyer on Monday, Tuesday and Wednesday. Note that you must have your own computer and that internet access will not be provided in the presentation rooms.

Sponsors

Premium Sponsor: London Hydro

Sponsors: GE Energy Services  
IEEE Canada  
IEEE Canadian Foundation

CCECE 2011 is organized by:

IEEE Canada Central Canada Area Sections:  
RECEPTIONS AND BANQUETS:

**Conference Welcome Reception**
Sunday, May 8, 19:00-21:00, **Oakes North** (with cash bar).

All delegates are welcomed to Niagara Falls and CCECE 2011 by IEEE Canada and the Conference Organizing Committee. This is your opportunity to network with colleagues, renew old friendships, and forge new ones over light refreshments and cocktails.

**IEEE Canada Awards Reception and Banquet**
MONDAY, May 9, 18:30-22:00, **Oakes North**

OPEN TO ALL DELEGATES TICKET REQUIRED
(included with full registration)

Additional tickets may be purchased at the Registration booth. The Conference Awards Banquet will honor recipients of IEEE Canada awards.

Awards Banquet - sponsored by IEEE Canada
Session & Meeting
Room Locations
FLOOR PLANS

Lobby Level

Key
Room 1: Hennepin North
Room 2: Hennepin South
Room 3: Auditorium
Room 4: Chippawa
Room 5: Business Centre/Registration Desk

Mezzanine Level

Key
Room 6: Oakes Foyer
Room 7: Oakes North West
Room 8: Oakes North East
Room 9: Oakes South
Room 10: Stage
Room 11: Milestones Grill + Bar
Room 12: Private Dining Room

Third Floor Level

Key
Room 13: Salon A
Room 14: Salon B
Room 15: Ontario
Room 16: Niagara
Room 17: Canadiana
Room 18: Executive Boardroom
Room 19: Oneida
Room 20: Maple
Room 21: Fallsview Parlour
Room 22: Fallsview Parlour
Room 23: Fallsview Parlour
Room 24: Fallsview Parlour
Room 25: Fallsview Terrace
Room 26: Mount Carmel
Tutorials

Detailed information at:
www.ieee.ca/ccece11/tutorials.php

Sunday May 8, 2011 - 9 a.m. - 12 p.m.

Tutorial A: Routing in Opportunistic Networks
Location: Hennepin North
Presenter: Prof. Isaac Woungang

Tutorial B: Bit Interleaved Coded Modulation
Location: Niagara
Presenters: Prof. Leszek Szczecinski and Alex Alvarado

Sunday May 8, 2011 - 1 p.m. - 4 p.m.

Tutorial C: Saving Miners and Energy: Innovations in Underground Communication Systems
Location: Hennepin North
Presenters: Wisam Farjow and Prof. Xavier Fernando

Tutorial D: Getting Your Point Across
Location: Ontario
Presenter: Celia Desmond

Tutorial F: Solar Electric Systems and Humanitarian Projects
Location: Niagara
Presenter: Pritpal Singh and Alfredo Herrera

Sunday May 8, 2011 - 9 a.m. - 4 p.m.

Tutorial E: Everything You Wanted to Ask about Power System Fault Studies but were Afraid to Ask
Location: Hennepin South
Presenter: Charlie Henville
Workshops

Detailed information at: www.ieee.ca/ccece11/workshops.php

Sunday, May 8 and Monday, May 9, 2011.

Sunday May 8, 2011 - 9 a.m. - 12 p.m.

Workshop A: Sensor Networks for Intelligence Gathering and Monitoring
Room: Ontario
Chairs: Janet Light and Stefano Abbate

Monday May 9, 2011 - 9 a.m. - 12 p.m.

Workshop B: Commercialization of Wireless Technology
Room: Salon B
Chair: Dave Michelson

Monday May 9, 2011 - 9 a.m. - 4 p.m.

Workshop C: Connecting Engineering Applications and Disaster Management
Room: Niagara
Chair: Americo Cunha
## CCECE 2011 Conference Schedule at a Glance
### Sunday and Monday

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<thead>
<tr>
<th>Time</th>
<th>Sunday May 8, 2011</th>
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<tbody>
<tr>
<td>9:00 - 12:00</td>
<td>Tutorial A &amp; B, Workshop A</td>
</tr>
<tr>
<td>9:00 - 16:00</td>
<td>Tutorial E</td>
</tr>
<tr>
<td>13:00 - 16:00</td>
<td>Tutorials C, D &amp; F</td>
</tr>
<tr>
<td>19:00 - 21:00</td>
<td>Welcome Reception</td>
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### Monday May 9, 2011

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>7:00 - 16:00</td>
<td>Registration</td>
</tr>
<tr>
<td>9:00 - 16:00</td>
<td>Exhibits</td>
</tr>
<tr>
<td>8:15 - 9:15</td>
<td>Breakfast, Plenary Talk “Automotive Research in Canada”</td>
</tr>
<tr>
<td>9:00 – 12:00</td>
<td>Workshop B</td>
</tr>
<tr>
<td>9:00 – 16:00</td>
<td>Workshop C</td>
</tr>
<tr>
<td>9:15 - 9:45</td>
<td>Break</td>
</tr>
<tr>
<td>9:45 - 11:30</td>
<td>Morning Oral Session</td>
</tr>
<tr>
<td>11:45 - 13:30</td>
<td>Lunch</td>
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<tr>
<td>13:30 - 15:15</td>
<td>Afternoon Oral Session</td>
</tr>
<tr>
<td>15:15 - 15:30</td>
<td>Break</td>
</tr>
<tr>
<td>3:30 - 5:15</td>
<td>Evening Oral Session</td>
</tr>
<tr>
<td>6:30 - 10:00</td>
<td>IEEE Canada Awards Ceremony and Banquet</td>
</tr>
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# CCECE 2011 Conference Schedule at a Glance

## Tuesday and Wednesday

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>7:00 - 16:00</td>
<td>Registration</td>
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<tr>
<td>9:00 - 16:00</td>
<td>Exhibits</td>
</tr>
<tr>
<td>8:15 - 9:15</td>
<td>Breakfast and <strong>Plenary Talk “PEEC The Power Engineering Education Consortium”</strong></td>
</tr>
<tr>
<td>9:15 - 9:45</td>
<td>Break</td>
</tr>
<tr>
<td>9:45 - 11:30</td>
<td><strong>Morning Oral Session</strong></td>
</tr>
<tr>
<td>11:45 - 13:30</td>
<td>Lunch, <strong>McNaughton Lecture</strong></td>
</tr>
<tr>
<td>13:30 - 15:15</td>
<td><strong>Afternoon Oral Session</strong></td>
</tr>
<tr>
<td>15:15 - 15:30</td>
<td>Break</td>
</tr>
<tr>
<td>15:30 - 17:15</td>
<td><strong>Poster Session</strong></td>
</tr>
</tbody>
</table>

**Tuesday May 10, 2011**

| 7:00 - 16:00  | Registration                                                          |
| 9:00 - 16:00  | Career Fair and Exhibits                                              |
| 8:15 - 9:15   | Breakfast and **Plenary Talk “Why don't we have more high-tech entrepreneurs in Canada?”** |
| 9:15 - 9:45   | Break                                                                |
| 9:45 - 11:30  | **Morning Oral Session**                                             |
| 11:45 - 13:30 | Lunch and **Best Paper Awards**                                      |
| 13:30 - 15:15 | **Afternoon Oral Session**                                           |
| 15:15 - 15:30 | Break                                                                |
| 15:30 - 17:15 | **Evening Oral Session**                                             |

**Wednesday May 11, 2011**
IEEE

Canadian Conference on Electrical and Computer Engineering

Technical Program Summary

Congrès Canadien en Génie Électrique et Informatique

IEEE
# Monday Program at a glance

### IEEE CCECE'11 Technical Program Schedule

**Monday, May 9, 2011**

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<tr>
<th>Session Identifier</th>
<th>Symposium Name</th>
<th>Session Names (ORAL sessions)</th>
<th>Paper Numbers (last 6 digits of EDAS 1569xxxxxx paper number)</th>
<th>Rooms</th>
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<tbody>
<tr>
<td><strong>Morning Sessions: 9:45 a.m. - 11:30 a.m.</strong></td>
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<tr>
<td>MM01</td>
<td>Power Electronics and Systems</td>
<td>Renewable Energy</td>
<td>397909 398173 399047 ~</td>
<td>Hennepin South</td>
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<tr>
<td>MM02</td>
<td>Power Electronics and Systems</td>
<td>Distributed Generation (DG) Systems</td>
<td>397889 397943 400947</td>
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<tr>
<td>MM03</td>
<td>Biomedical Engineering and Health Informatics</td>
<td>Biomedical Applications</td>
<td>394871 398503 399021 401899 402793 403111</td>
<td>Salon A</td>
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<tr>
<td>MM04</td>
<td>Communication Systems and Networking</td>
<td>Cooperative Communications I</td>
<td>399101 399397 401051 402809 402781 399145</td>
<td>Oakes NE</td>
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<tr>
<td>MM05</td>
<td>Signal and Multimedia Processing - 1</td>
<td>Image Processing I</td>
<td>393211 396745 397915 ~</td>
<td>Oakes NW</td>
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<tr>
<td>MM06</td>
<td>Signal and Multimedia Processing - 2</td>
<td>Radar &amp; Array Processing</td>
<td>376759 398639</td>
<td>Oakes NW</td>
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<tr>
<td>MM07</td>
<td>Controls and Robotics</td>
<td>Adaptive Control</td>
<td>398147 398921 399399 402821 403267</td>
<td>Ontario</td>
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<tr>
<td>MM08</td>
<td>Circuits, Devices and Systems</td>
<td>Analog Circuits II</td>
<td>385553 398301 398429 400651 401259 397895</td>
<td>Hennepin North</td>
</tr>
<tr>
<td><strong>Afternoon Sessions: 1:30 p.m. - 3:15 p.m.</strong></td>
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<tr>
<td>MA01</td>
<td>Power Electronics and Systems</td>
<td>Power Systems I</td>
<td>398165 400777 400799 400965 385159 397229</td>
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<tr>
<td>MA02</td>
<td>Biomedical Engineering and Health Informatics</td>
<td>Biomedical Instrumentation</td>
<td>398355 399165 400653 402075 402179 403099</td>
<td>Salon A</td>
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<tr>
<td>MA03</td>
<td>Communication Systems and Networking</td>
<td>Resource Allocation and Scheduling in Wired &amp; Wireless Networks</td>
<td>398661 400919 403197 403295 398367 402953</td>
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<tr>
<td>MA04</td>
<td>Signal and Multimedia Processing</td>
<td>Image &amp; Video Processing I</td>
<td>392847 401943 402379 ~</td>
<td>Oakes NW</td>
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<tr>
<td>MA05</td>
<td>Signal and Multimedia Processing</td>
<td>Speech &amp; Audio Processing I</td>
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<td>MA06</td>
<td>Controls and Robotics</td>
<td>Robotic Applications</td>
<td>399245 402655 402875 403025 403201 403645</td>
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<td>MA07</td>
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<td>Analog Integrated Circuits</td>
<td>403057 401089 401093 403237 399257 403697</td>
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<td><strong>Evening Sessions: 3:30 p.m. - 5:15 p.m.</strong></td>
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<tr>
<td>ME01</td>
<td>Power Electronics and Systems</td>
<td>Power Converters and Drives I</td>
<td>374157 397417 398141 398163 401253</td>
<td>Hennepin South</td>
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<td>ME02</td>
<td>Communication Systems and Networking</td>
<td>System Design and Implementation</td>
<td>403593 390067 393467 403221 403187 373463</td>
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<td>Signal and Multimedia Processing</td>
<td>Signal Processing I</td>
<td>396999 401347 399873 403155 397957 399219</td>
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<td>ME04</td>
<td>Signal and Multimedia Processing</td>
<td>Speech &amp; Audio Processing II</td>
<td>399407 401761 401827 401987 393531 397005</td>
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<tr>
<td>ME05</td>
<td>Controls and Robotics</td>
<td>Optimal and Optimization-based Control</td>
<td>398533 400011 402797 402879 398525 402131</td>
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<tr>
<td>ME06</td>
<td>Circuits, Devices and Systems</td>
<td>Micro-systems</td>
<td>399075 399347 398949 402081 400661</td>
<td>Hennepin North</td>
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</tbody>
</table>
### Tuesday Program at a Glance

**IEEE CCECE’11 Technical Program Schedule**

**Tuesday, May 10, 2011**

#### Morning Sessions: 9:45 a.m. - 11:30 a.m.

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<th>Session identifier</th>
<th>Symposium Name</th>
<th>Session Names (ORAL sessions)</th>
<th>Paper Numbers (last 6 digits from EDAS 15690xxxxx paper number)</th>
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<tbody>
<tr>
<td>TM01</td>
<td>Power Electronics and Systems</td>
<td>Renewable Energy II</td>
<td>402573 402655 402921</td>
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<td>TM02</td>
<td>Power Electronics and Systems</td>
<td>Power Converters and Drives II</td>
<td>398541 402137 399415</td>
<td>Hennepin South</td>
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<tr>
<td>TM03</td>
<td>Communications and Networking</td>
<td>Multi-carrier/OFDM &amp; CDMA-based Wireless Access</td>
<td>398775 398967 401469 401853 403043 402665</td>
<td>Salon A</td>
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<td>TM04</td>
<td>Communications and Networking</td>
<td>MIMO/Cognitive Systems</td>
<td>403173 399117 401953 390849 403143</td>
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<td>TM05</td>
<td>Computer Systems and Applications</td>
<td>Computer Systems</td>
<td>398035 397567 399211 403283 403017 381637</td>
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<td>Computer Systems and Applications</td>
<td>Computer Applications</td>
<td>399309 401273 400333 402703 398841 403159</td>
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<td>TM07</td>
<td>Controls and Robotics</td>
<td>Control Applications</td>
<td>402985 399355 401381 401777 403309 400139</td>
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#### Afternoon Sessions: 1:30 p.m. - 3:15 p.m.

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<td>Power Converters and Drives III</td>
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<tr>
<td>TA02</td>
<td>Communications and Networking</td>
<td>Channel/Source Coding and Modulation</td>
<td>398417 398771 399375 401999 399349</td>
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<tr>
<td>TA03</td>
<td>Communications and Networking</td>
<td>WiFi and Wireless Mesh Networks</td>
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<td>TA04</td>
<td>Computer Systems and Applications</td>
<td>NoC/SoC and Embedded Systems</td>
<td>397861 403259 401715 402161 403219 402865</td>
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<td>Signal and Multimedia Processing</td>
<td>Image &amp; Video Processing II</td>
<td>400569 401699 402093</td>
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<tr>
<td>TA06</td>
<td>Signal and Multimedia Processing</td>
<td>Signal Processing Algorithms &amp; Architectures I</td>
<td>399079 401343 400681</td>
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<td>TA07</td>
<td>Circuits, Devices and Systems</td>
<td>Digital Integrated Circuits</td>
<td>397979 403073 403141 398529</td>
<td>Hennepin North</td>
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#### Evening Sessions: 3:30 p.m. - 5:15 p.m.

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<td>364493 390613 391679 394041 398581 398969</td>
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<td>Power Electronics and Systems</td>
<td>Poster Session</td>
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<td>Power Electronics and Systems</td>
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<td>Biomedical Engineering and Health Informatics</td>
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<td>Circuits, Devices and Systems</td>
<td>Poster Session</td>
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<td>Controls and Robotics</td>
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<td>359477 402783 402943 403039</td>
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<td>TE11</td>
<td>Engineered &amp; Natural Complex Systems: Modeling, Simulation &amp; Analysis</td>
<td>Poster Session</td>
<td>398415 400447 401229</td>
<td>Oakes South</td>
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</table>
### IEEE CCECE’11 Technical Program Schedule

#### Wednesday, May 11, 2011

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<td>Power Electronics and Systems</td>
<td>Power Engineering II - Protection</td>
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<td>Image Processing II</td>
<td>402827 403277 397887</td>
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<td>Signal and Multimedia Processing</td>
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<td>Communications and Networking</td>
<td>Wireless and Wired Networks</td>
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<td>WM06</td>
<td>Computer Systems and Applications</td>
<td>Software - Testing and Debugging</td>
<td>401919 401831 400811</td>
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<td>WM08</td>
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<td>Nano and Optoelectronic Devices</td>
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<tr>
<td><strong>Afternoon Sessions: 1:30 p.m. - 3:15 p.m.</strong></td>
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