Welcome to the sixth annual University of Toronto Electrical and Computer Engineering (ECE) Graduate Symposium, Connections 2010.

The objectives of this event are to promote interaction between members of industry and our graduate students and faculty, to learn about current research, to encourage cross-discipline research and to identify future directions and collaboration opportunities. This year we have presenters from 7 ECE groups: biomedical, communications, computer, electromagnetics, electronics, energy systems, and photonics. We have prepared for an eventful program with:

- 34 short graduate student presentations
- 6 industry technical talks
- Keynote speeches by Annette Bergeron, President and Chair of the Ontario Society of Professional Engineers (OSPE) and Alan D. Horn, Chairman of the Board of Rogers Communications Inc.
- A panel session with U of T professors and industry and government representatives

You will find more details about these events in the following pages. We hope that you will enjoy meeting our researchers and hopefully we will see you again next year.

Connections Committee

In alphabetical order:

Foteini Agrafioti

Lei Hua

Jin Jin

Ali Mehrizi-Sani

Dmitri Model

Di Niu

Chunpo Pan

Myrto Papadopoulou

Ben Smith

Danyao Wang

Liang (Leon) Yuan

Advisors

Ali Khanafer, Connections 2009 Chair

Jason Luu, Connections 2008 Chair

Schedule

8:00 – 9:00	Registration & complimentary breakfast	
9:00 – 9:30	Opening address: (BA 1180) **Keynote speech**	
9:30 – 10:30	Session 1A (BA 1180) Next-Gen Circuits	Session 1B (BA1190) Algorithms & Optimization
10:30 – 10:45	Poster session 1	
10:45 – 11:45	Industry technical presentations: (BA1180) Google, Altera, Gennum	
11:55 – 12:55	Session 2A (BA1180) CAD & Verification	Session 2B (BA1190) Computer & Communication Networks
12:55 – 13:35	Poster session 2 & Lunch	
13:35 – 14:35	Industry technical presentations: (BA1180) DRDC, ViXS, AMD	
14:45 – 15:45	Session 3A (BA1180) Processors	Session 3B (BA1190) Biomedical Applications
15:45 – 16:00	Poster session 3	
16:00 – 16:30	**Keynote speech** (BA 1180)	
16:30 – 17:30	**Panel** (BA1180) Awards Presentation for Best Student Speakers	
17:30 – 19:30	**Dinner** (Hart House Music Room)	

ECTI Lab Tours (30 min each)

9:30 am   Electron Beam Nanolithography Facility
11:55 am   Bahen Prototyping Cleanroom
2:45 pm   Pratt Microfabrication Cleanroom

Keynote Speech #1

9:00 am – 9:30 am
BA 1180

Ontario Engineering: the Labour Market and Beyond

Annette Bergeron
P.Eng., MBA, President and Chair of OSPE

Annette Bergeron was reelected to the OSPE Board in 2009, having first joined the Board in 2002, elected Chair in May 2004, and then Secretary in 2007.

A licensed professional engineer since 1990, Ms. Bergeron began her career as a Production Engineer at Dofasco Inc. She is now AMS General Manager at Queen's University and prior to that was a Lecturer for the School of Business and a Director in the Faculty of Applied Science at Queen's. In June 2006, Ms. Bergeron was appointed to the Board of Directors of Kingston General Hospital.

Ms. Bergeron holds an Honours Bachelor of Science (Material and Metallurgical Engineering) from Queen's and a Masters of Business Administration from the Schulich School of Business at York University.

Keynote Speech #2

4:00 pm – 4:30 pm
BA 1180

Future of Communications in Canada

Alan D. Horn
Chairman of the Board of Rogers Communications, Inc (RCI)
President and CEO of Rogers Telecommunications Limited

Alan D. Horn resides in Toronto, Ontario, Canada and has been a director of RCI and Chairman of the Board since March 2006. Mr. Horn was the Acting President and Chief Executive Officer from October 2008 to March 2009. Mr. Horn has been President and CEO of Rogers Telecommunications Limited since March 2006. Mr. Horn served as the President and Chief Operating Officer of Rogers Telecommunications Limited from 1990 to 1996 and was Vice President, Finance and Chief Financial Officer of RCI from September 1996 to March 2006. He is also a director of Fairfax Financial Holdings Limited, CCL Industries Inc. and March Networks Corporation. Previously Mr Horn was a director of Newbridge Networks Corp, ATI Technologies Inc and AT&T Canada Inc.

Mr. Horn is a Chartered Accountant. Mr. Horn received a B.Sc. with First Class Honours in Mathematics from the University of Aberdeen, Scotland.

Session 1A: Next Generation Circuits

9:30 am – 10:30 am
BA 1180

Session Chair: Prof. Joyce Poon

"Squeezing" Electromagnetic Waves: Motivations, Challenges and Potential Solutions
Alex Wong, alex.wong@utoronto.ca

Laser Fabrication of Optical Circuits
Jason R. Grenier, j.grenier@utoronto.ca

Extending the Operating Wavelength of Semiconductor Plasmonics to the Telecommunications Range
Herman Wong, herman.wong@utoronto.ca

Negative Group Delay and Phase Shifter Circuit Using Positive-Index Negative-Index Couplers
Hassan Mirzaei, hasmir@waves.utoronto.ca

All-Optical Wavelength Conversion on a Microchip
Sean Wagner, sean.wagner@utoronto.ca

Phase Mask Holography for Three-Dimensional Microstructure Fabrication
Liang Yuan, leon.yuan@utoronto.ca

Session 1B: Algorithms and Optimization

9:30 am – 10:30 am
BA 1190

Session Chair: Prof. Jason Anderson

UUSee: Large-Scale Operational On-Demand Streaming with Random Network Coding
Zimu Liu, zimu@eecg.toronto.edu

Towards Intelligent Peer-Assisted Video Streaming using Machine Learning
Di Niu, dniu@eecg.toronto.edu

Peer-to-Peer Bargaining in Container-Based Datacentres
Yuan Feng, yfeng@eecg.toronto.edu

Optimizing the Locations of Cables for Current Rating
Wael Moutassem, wael.moutassem@utoronto.ca

Stochastic Unit Commitment with Volatile Wind Power Generation and Uncertain Load
Sahar Pirooz Azad, sahar.piroozazad@utoronto.ca

Session 2A: CAD and Verification

11:55 am – 12:55 pm
BA 1180

Session Chair: Prof. Jonathan Rose

Opportunities and Challenges Toward Next-Generation Power Converters
Keyhan Kobravi, k.kobravi@utoronto.ca

Polynomial Preconditioning of Power System Matrices with massively Parallel Graphics Processing Units
Amirhassan Asgari,
amirhassan.asgarikamiabad@utoronto.ca

Parallelizing Simulated Annealing-based Placement using GPGPU
Alexander Choong, achoong@eecg.toronto.edu

AAPack: A Hierarchical Packing Tool for FPGAs
Jason Luu, jason.luu@utoronto.ca

Scaling VLSI Design Debugging with Interpolation
Brian Keng, briank@eecg.utoronto.ca

Hardware Satisfiability Solver
Xander Chin, xan@eecg.toronto.edu
Bill Teng, bill.teng@eecg.toronto.edu

Session 2B: Computer & Communication Networks

11:55 am – 12:55 pm
BA 1190

Session Chair: Prof. Frank Kschischang

Digital UWB Beamformer Characterization in a Real UWB Radio Channel
Liang (Tony) Liang, tliang@waves.utoronto.ca

Optical Networking in Next Generation Data Centres
Houman Rastegarfar, rastegarfar@gmail.com

Differential Polarization Time Coding for PolDM Systems without PMD Compensator
Chunpo Pan, panc@comm.utoronto.ca

A Multi-Standard LDPC Decoder
Vadim Smolyakov, svadim@eecg.toronto.edu

Variantional EM Algorithm for MIMO Detection
Zhengwei Jiang, colin.jiang@utoronto.ca

Session 3A: Processors

2:45 pm – 3:35 pm
BA 1180

Session Chair: Prof. Natalie Enright Jerger

Cache Architecture for a Share Memory Heterogeneous MPSoC
Vincent Mirian, vince.mirian@utoronto.ca

Heterogeneous Hardware Acceleration of Software
Transactional Memory
Mark Jeffrey, markj@eecg.toronto.edu

A Fully Integrated Transactional Memory Soft Multiprocessor
Martin Labrecque, martin.labrecque@utoronto.ca

Efficient Software-Only Checkpointing Support for Debugging
Chuck Zhao, czhao@eecg.toronto.edu

A Digitally Controlled DC-DC Buck Converter for Powering
Microprocessors
Yue Wen, wenyue@ele.utoronto.ca

Power Grid Integrity Analysis
Ankit Goyal, ankit@eecg.utoronto.ca

Session 3B: Biomedical Applications

2:45 pm – 3:45 pm
BA 1190

Session Chair: Prof. Moshe Eizenman

Bayesian Inference of the Code Governing Alternative Splicing
Hui Yuan Xiong, hui@psi.utoronto.ca

Acceleration of Protein Co-Evolution Detection
Alex Rodionov, arod@eecg.toronto.edu

Using Peripheral Vision for Audiovisual Speech Perception
Astrid Yi, astridyi@gmail.com

RBF Based Responsive Stimulators to Control Epilepsy
Sinisa Colic, challenge12@hotmail.com

Near-Field Technique for High Resolution Optical Microscopy
Yan Wang, yab.wang@gmail.com

Exploration of Femtosecond Laser Micromachining for
Polypyrrole-based Artificial Muscle Actuated Catheters
Kenneth Kuei-Ching Lee, kenethlee@gmail.com

Industry Technical Presentations

BA 1180

Alex Nicolaou, Mobile Engineering Manager
Google
10:45 am

Higher Abstractions for Programming FPGAs
Deshanand Singh, Ph.D., Supervising Principal Engineer
Altera
11:05 am

High-Speed Serial I/O Standards
Angus Mclaren, Senior Project Manager
Gennum
11:25 am

Development of Medical Non-Invasive Diagnostic Ultrasound
Technologies
Ethan Shen, Ph.D., postdoctoral fellow
Defense Research Development of Canada
1:35 pm

Vixs Systems - A Canadian Semiconductor Success Story
Kuldip Sahdra, Director, ASIC Engineering
ViXS
1:55 pm

Silicon, Operating Systems and New Technologies: A Story of
the Software in Between
Mario Filipas, Senior Manager, Software System Engineering
AMD
2:15 pm

Panel Session

4:30 pm – 5:30 pm
BA 1180

Cross-Disciplinary Research and Collaboration Between Academia and Industry

Panelists:

- **Stewart Aitchison**
  Vice Dean of Faculty of Applied Science and
  Engineering, Interim Director of ECTI
  University of Toronto

- **Tony Florio**
  University Relations Manager
  Research In Motion (RIM)

- **John MacRitchie**
  Director, Business Development
  Ontario Centres of Excellence Inc. (OCE), Centre for
  Communications and Information Technologies

- **Martin Snelgrove**
  Ph.D., CEO
  Kapik Integration

Lab Tours

The Emerging Communications Technology Institute (ECTI) is an interdisciplinary research institute based at the University of Toronto. ECTI provides global university-based leadership through access to state-of-the-art research facilities, promotion of collaborative research with strategic partners, and by facilitating advanced educational opportunities and information exchange events.

Session 1: Electron Beam Nanolithography Facility
Location: Wallberg Room 38 (basement)
Time: 9:30 AM

Opened in 2009, the Class 100 cleanroom space houses an Electron Beam Lithography tool, which is one of only two such tools in Canada. With the capability to define features as small as 10 nanometres, this technology offers a broad-based fabrication platform for research in areas ranging from electronic devices and integrated optics to the emerging fields of nanobiotechnology, nanoelectromechanical systems (NEMS), nanophotonics and nanomagnetics.

Session 2: Bahen Prototyping Cleanroom
Location: BA 7180
Time: 11:55 AM

The Bahen Cleanroom provides two large areas in which to fabricate devices in silicon, compound semiconductors, ceramic, glass, and polymer. Resources include a Class 1000 photolithography/wet chemistry space, including three fully exhausted acid wet benches and a Class 10,000 space housing deposition and etching machines. Key research areas in this cleanroom include photonics, biomedical engineering, lab-on-a-chip, MEMS, and microfluidics.

Session 3: Pratt Microfabrication Cleanroom
Location: Pratt 464
Time: 2:45 PM

The Pratt Cleanroom consists of four modules which are configured as a) a dark room, b) a yellow room for lithography, c) an etching room and d) a furnace room. Other facilities within the cleanroom include oxidation furnaces, sputter deposition, PECVD and LPCVD facilities and wet etching. Significant upgrades, including the installation of a deep reactive ion etcher (DRIE), are expected in the next year. The research capacity supports developments in such areas as photovoltaic solar cells, microfluidics, MEMS, and microsensors.

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Notes

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Map
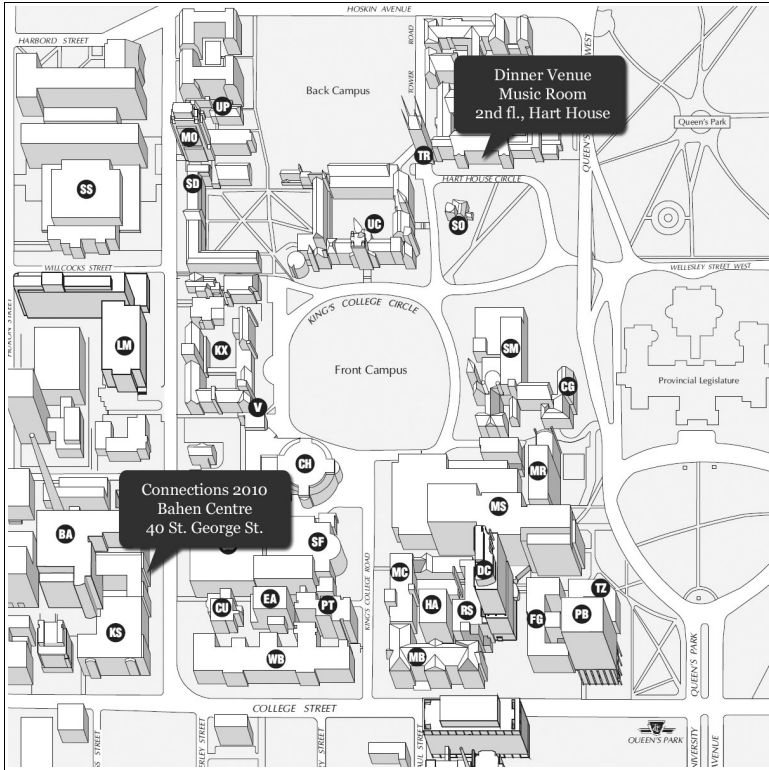
Main Venue   Bahen Centre for Information Technology
40 St. George Street
Toronto, Ontario

Dinner Venue   Music Room
2nd floor, Hart House
7 Hart House Circle
Toronto, Ontario