

UNIVERSITY OF NEW BRUNSWICK | FACULTY OF COMPUTER SCIENCE

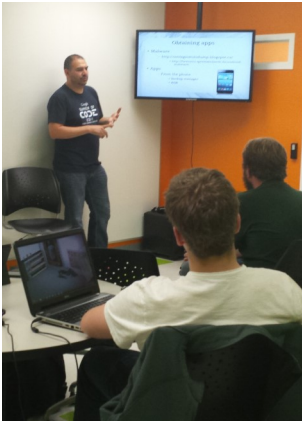
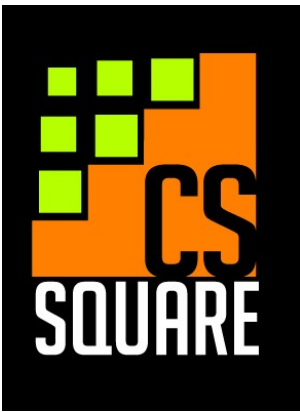
# RESEARCH EXPOSITION

# 2016



Computer  
Science

April 8, 2016 | 8:30am-4:30pm  
Wu Conference Centre  
Fredericton, NB



## Computing Science Creative Space: CS Square

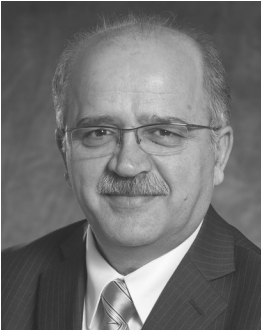
CS Square is a Creative Space for peer learning, knowledge sharing, and extra-curricular technical-creative IT related activities and entrepreneurship.

The facility also functions as an 'open space' entrepreneurship centre in the Faculty of Computer Science where students, faculty and local industry can meet to collaborate and exchange innovative ideas and vision.

As an INCUBATOR CS Square provides:

- Mentoring and networking opportunities
- Matchmaking with CS entrepreneurs and business leaders
- One-on-one support, advice and counselling for new entrepreneurs
- Workshops and seminars
- Customized business development workshops

# Welcome



Welcome to the 2016 Faculty of Computer Science Annual Research Exposition. I hope that you enjoy the exposition's program and find the experience of meeting and sharing thoughts with our students and researchers as well as one another unique and worthwhile!

The 2016 Faculty of Computer Science's Annual Research Exposition showcases the excellent research, new developments, and experience related to the area of information and communication technology. This year we have 46 posters. The coverage of the contributions is very wide, which is one of the features that distinguishes our research expo from other events that focus on more specific areas. The participants in the Exposition will have the opportunity to hear leading experts and IT leaders present keynote talks, participate in a panel discussion on cybersecurity, and view the posters at the poster session.

Many people contributed to the success of this Exposition. I would like to thank all the organizing committee members for their effort and dedication. I am also very pleased to thank all the students and professors for their posters which are the main attraction, the keynote speakers, members of the panel, and to all the participants. You are the ones who make all this effort worthwhile!

Ali A. Ghorbani  
Professor and Dean

# Program

**8:30 - 8:50**

Registration

**8:50 - 8:55**

Ali Ghorbani, Dean, Faculty of Computer Science, UNB

**8:55 - 9:00**

Jane Fritz, Interim VP Academic (Fredericton), UNB

**9:00 - 9:15**

Matt DeCoursey, Member of Parliament for Fredericton

**9:15 - 9:30**

Scott Bateman, Faculty of Computer Science, UNB

**9:30 - 9:45**

Mark Zimmerman, CTO, T4G Ltd.

**9:45 - 10:00**

William McIver, New Brunswick Community College

**10:00 - 11:00**

Break & Poster Session I

**11:00 - 11:15**

Ambassador Rafael Barak, Ambassador from Israel to Canada

**11:15 - 12:00**

Roni Zehavi, CEO, CyberSpark, Israel

**12:00 - 13:00**

Lunch & Poster Session II

# Program

**13:00 - 13:15**

Stephen Lund, CEO, Opportunities NB

**13:15 - 13:30**

Al Carson, Partner, Advisory Services, Ernst & Young

**13:30 - 13:45**

Suprio Ray, Faculty of Computer Science, UNB

**13:45 - 14:00**

Arash Habibi Lashkari, Faculty of Computer Science, UNB

**14:00 - 14:30**

Student Presentations

Panagiotis Patros

Andi Fitriah Abdul Kadir

SoHyun Park

**14:30 - 15:00**

Break & Poster Session III

**15:00 - 16:45**

Panel Discussion

Opening Remarks: Hon. Brian Gallant, Premier of New Brunswick

Topic: Cybersecurity: The New Frontier

Moderator: Ali Ghorbani

Panellists: Roni Zehavi, CEO, CyberSpark

Sandy Bird, CTO, IBM Security

Steve Burns, President, Bulletproof Solutions Inc.

Stephen Lund, CEO, Opportunities NB

# Posters

1. Aaron Tabor, Gerhard Dueck, Kenneth B. Kent. *Assessing the Suitability of Transactional Memory Synchronization in Concurrent GC*
2. Abdullah J. Alzahrani and Ali A. Ghorbani. *SMS Mobile Botnet Detection Framework*
3. Amirhossein Gharib and Ali A. Ghorbani. *Scalable Android Application Repackaging Detection*
4. Amy Seo, Bradford G. Nickerson and Wei Song. *Indoor Localization Supporting Smartphone Advertising*
5. Andi Fitriah A.Kadir, Natalia Stakhanova, Ali A.Ghorbani. *An Empirical Analysis of Android Banking Malware*
6. Andrii Kuch, Kenneth B. Kent, Gerhard W. Dueck. *Reinforcement Learning in Garbage Collection*
7. Bing Yang, Kenneth B. Kent, Eric Aubanel. *Multi-tier Data Synchronization Based on An Optimized Concurrent Linked-list*
8. Chenwei Wang, Eric Aubanel, David Bremner, Michael Dawson. *Characterizing Concurrency of Java Programs*
9. Daniel King and Bradford G. Nickerson. *Real-time Wireless Control via Ultra-Wideband (UWB) Communication*
10. Dave Kell, Andrew McAllister, Steve O'Hara. *Identifying Data Flows Across Multiple Boundaries and Programming Languages*
11. Fan Liang, Weichang Du. *Big Data Analytics Toolkit for Business Data*
12. Fatemeh Razzaghi and Ali A. Ghorbani. *Context Free Frequently Asked Questions (FAQs) Detection using Machine Learning Techniques*

# Posters

13. Federico Sogaro, Kenneth B. Kent, Eric Aubanel, Peter Shipton. *MicroJIT: A Lightweight Just-in-Time Compiler to Improve Startup Times*
14. Gerard D. Gil, Arash H. Lashkari, MSI Mamun, Ali A. Ghorbani. *Characterization of Encrypted and VPN Traffic Using Time-Related Features*
15. Hamed Minaee and Ali A. Ghorbani. *Automatic Sarcasm Detection in Blog Posts*
16. Hossein Hadian Jazi, and Ali A. Ghorbani. *A Dynamic Graph-based Malware Classifier*
17. Hugo Gonzalez, Andi A. Kadir, Natalia Stakhanova, Ali A. Ghorbani. *Exploring Reverse Engineering Symptoms in Android apps*
18. Hugo Gonzalez, Natalia Stakhanova, Ali A. Ghorbani. *Automated Semi-supervised Authorship Attribution of Android Binaries*
19. Jaleh sadat Mahdavi Moghaddam, Patricia A. Evans. *Inferring Political Preferences of Active Content Consumers in Twitter*
20. Johannes Ilisei, Kenneth B. Kent, Gerhard W. Dueck. *Extending Balanced Garbage Collection by Reference Counting*
21. Kamran Morovati, Natalia Stakhanova. *Authorship Attribution of Obfuscated Binaries*
22. Karthikeyan Sugumar, Jay Buckler, Suprio Ray. *Big Data Systems for the Internet of Things (IoT)*
23. Kenneth F. Mbah, Ali A. Ghorbani. *A New Phishing E-Mail Detection Approach*
24. Konstantin Nasartschuk, Aleksander Micic, Kenneth B. Kent. *VM Internal Object Pools*
25. Luke Dillman, James McManus, Scott Bateman. *Comparison of Absolute vs. Relative Position Tracking With and Without a "Bubble Assist" Technique: A Fitts's Law Analysis*

# Posters

26. Mahsa Kiani, Virendrakumar C. Bhavsar, and Harold Boley. *A Fuzzy Graph-Based Retrieval System for Health Research*
27. Mallik I. Hassan, Kenneth B. Kent, Gerhard W. Dueck. *Region-Based Finalization*
28. Maria Patrou, Panagiotis Patros, Kenneth B. Kent, Gerhard Dueck. *NUMA Aware Garbage Collection*
29. Milton King, Paul Cook. *Supervised and Unsupervised Approaches to Word Usage Similarity*
30. Nabil Fannoush, Patricia A. Evans. *Structure Based RNA Sequence Assembly*
31. Panagiotis (Panos) Patros, Dayal Dilli, Stephen A. MacKay, Kenneth B. Kent, Michael Dawson. *Improving PaaS Multitenancy*
32. Prasanna Iyengar, Jenna Tyler, Suprio Ray. *Recipe Recommendation Using Graph Databases: Personalized Nutrition, Ingredient Substitution, and More*
33. Puya Memarzia, Virendra Bhavsar, and Suprio Ray. *Graph Similarity Computations on Large Graph Databases*
34. Raphael Beaulieu, Elliot Coy. *Determining the Effectiveness of Alternate Controller Inputs for Aiming in Video Games*
35. Rizwan Ali and Ali A. Ghorbani. *Bursty Topic Detection with application to Twitter*
36. Shijie Xu, David Bremner. *Method Handle Graph JIT Compilation*
37. SoHyun Park, Joshua Smith, Prasanna Iyengar. *A Comparative Study of Target Assistance For Pointing with a Camera Mouse*



# Posters

38. SoHyun Park, Afsaneh Fazly, Annie Lee, Brandon Seibel, Wenjie Zi, Paul Cook. *Classifying Out-Of-Vocabulary Terms in a Domain-Specific Social Media Corpus*
39. Stuart A. MacGillivray and Bradford G. Nickerson. *Size Limited Bounding Polygons for Planar Point Sets*
40. Taees Eimouri, Kenneth B. Kent, Aleksandar Micic, Karl Taylor. *Using Field Access Frequency to Optimize Layout of Objects in the JVM*
41. Tim Beauchamp, Nathaniel Brewer, Maria Patrou, Suprio Ray. *Dynamic Declustering for Parallel Spatial Databases*
42. Tristan Basa, Gerhard W. Dueck, Kenneth B. Kent. *Thread-based, Region-based Memory Management*
43. Vaibhavi Kalgutkar, Natalia Stakhanova, Paul Cook. *Android authorship attribution through analysis of String n-grams*
44. Waseem Gharbieh, Milton King, SoHyun Park, Paul Cook. *Semantic Textual Similarity: A Unified Framework for Semantic Processing and Evaluation*
45. Yan Li, Natalia Stakhanova. *Android application classification based on meta-data*
46. Yiming Zhao and Wei Song. *Social-Aware Energy-Efficient Data Dissemination with D2D Communications*

# Speakers

## Jane Fritz

Interim VP Academic (Fredericton)  
University of New Brunswick



Dr. Jane Fritz currently serves as Interim Vice-President Academic for UNB's Fredericton campus.

Dr. Fritz has held a wide variety of positions and responsibilities at UNB over three decades, with a record that underscores clear dedication to our university. She has previously served as Associate Vice-President Academic (Learning Environment), Acting Executive Director of UNB's College of Extended Learning and Acting Associate Vice-President for Integrated Technology Services. She has also served on the Fredericton Senate, the Board of Governors and was Dean of Computer Science.

She first joined UNB in 1982 as a lecturer in computer science; by 1996, she was a full professor.

She established the Centre for Enhanced Teaching and Learning and was instrumental in establishing the International Relations Office as well as the creation of the Human Rights Office and the Declaration of Rights and Responsibilities.

Well respected by her colleagues and her students, Jane has received the UNB President's Medal for outstanding contributions over her career as well as the Allan P. Stuart Memorial Award for Excellence in Teaching.

# Speakers

## Matt DeCourcey

Member of Parliament - Fredericton  
Government of Canada



Matt DeCourcey is a community outreach and engagement specialist, and proud New Brunswicker. On October 19, 2015, he was elected as the youngest ever Member of Parliament for Fredericton.

Matt worked as Director of Communications, Education and Outreach with the New Brunswick Child and Youth Advocate. Among his many accomplishments as a progressive champion for caring and inclusive communities, Matt established and directed the International Summer Course on the Rights of the Child and UNICEF Rights Respecting Schools in New Brunswick. He spent months working on health-education projects in The Gambia (West Africa), and established the Wanderers Friendship Cup, a youth soccer tournament and health-education initiative in The Gambia and Fredericton.

Matt's professional experience includes international work as a recruitment officer with St. Thomas University, and as an aide for two Members of Parliament. Matt holds a Master of Public Relations from Mount Saint Vincent University, and a Bachelor of Arts from St. Thomas University (STU). He is a 2012 Action Canada Fellow. Matt has volunteered as a Director of the Fredericton YMCA, President of the STU Alumni Association, Board Member with CISV Fredericton, and Provincial Coordinator of the Canadian Commission for UNESCO Youth Advisory Group.

# Speakers

## Mark Zimmerman

Chief Technology Officer  
T4G Ltd.



Mark Zimmerman has been working in the information and communication technology industry for more than 20 years. He's currently the CTO at T4G Limited. He's worked on innovation at large corporations and in startups as well. Previous corporate roles include CIO (MaRS Discovery District), VP New Ventures (BCE) and Director of Product Management (AT&T Canada). Startup roles include President (ConnectedN), VP Sales & Marketing (Nextair) and Director (Netcom Canada). He's active in the entrepreneurial and innovation communities including as an EIR at the Pierre L. Morrissette Institute for Entrepreneurship at the Ivey School of Business and as an advisor at the MaRS Discovery District. Throughout his career mark has demonstrated an exceptional ability to simplify and bring clarity to complex strategic challenges and to bridge the gaps between business and technology leaders.

## William McIver

NSERC Industrial Research Chair in Mobile First Technology  
New Brunswick Community College (NBCC)



William McIver, Jr., PhD is the NSERC Industrial Research Chair in Mobile First Technology at the New Brunswick Community College (NBCC). He conducts applied research in the practical application of mobile information and communication technologies to a wide range of industrial and social use cases. He also manages the NBCC Mobile Ideospace, a physical and virtual laboratory spanning the NBCC's six campuses to leverage competencies, tools, and infrastructure in support of early-stage innovation across the province. He has patented and licensed technologies.

# Speakers

## Ambassador Rafael Barak

Ambassador from Israel to Canada



Ambassador Rafael “Rafi” Barak is an accomplished diplomat with extensive expertise in promoting Israel’s diplomatic ties around the globe. He is also a proficient linguist who is fluent in Hebrew, Spanish, English and French.

Born in Montevideo, Uruguay, Mr. Barak immigrated to Israel at the age of 18, spending his first year on a kibbutz. He went on to complete his military service and then earn a Bachelor of Arts in History and Political Science at Tel Aviv University in 1973. From 1970 to 1977, he worked as a licenced tour guide showing Israel’s biblical

sites, cultural heritage and natural beauty to tourists from around the world. In 1977, he was accepted into the Cadet Course of the Ministry of Foreign Affairs. He began his career as a diplomat with his first posting from 1979 to 1983 as Second and later First Secretary at the Embassy of Israel in Lima, Peru. In 1983, he received a scholarship from the Rothschild Foundation and completed a Master of Arts degree in Political Science at the Hebrew University of Jerusalem.

From 1985 to 1987, he served as Deputy Director of the Human Resources Department. In 1987, he started a six-year term in Brussels as Counselor and Press Attaché at Israel’s Mission to the European Community and then as Deputy Chief of Mission at the Embassy of Israel in Belgium and Luxembourg. During the Oslo Peace Process, from 1993 to 1996, Mr. Barak worked as the Chief Coordinator for negotiations with the Palestinians. Parallel to this position, he served as Assistant Deputy Minister (ADM) for Coordination and the Director of the Deputy Minister’s Bureau from 1993 to 2000. Then in August of 2000, he was sent to the Embassy in Washington, DC for a five-year term as Minister Plenipotentiary and Deputy Chief of Mission. In 2006, he was posted to the Embassy of Israel in Paris, acting as the Charge d’Affaires, a.i..

He returned to Israel in April 2007 to serve as ADM and Head of the Western European Division. From June 2009 to November 2010, he held the position of Senior ADM at the Ministry of Foreign Affairs. In November 2010, he was appointed Acting Deputy Minister and then in May 2011 he was named Deputy Minister of the Ministry of Foreign Affairs. On November 25, 2013, he officially became the Ambassador of Israel to Canada after presenting his credentials to His Excellency the Right Honourable David Johnston, Governor General of Canada.

He is married to Miriam Barak. Together they have three children and six grandchildren.

# Speaker & Panellist

## Roni Zehavi

Chief Executive Officer  
CyberSpark



Roni is the CEO of CyberSpark, the Industry Initiative, created to advance research and development of cyber solutions in Beer-Sheva. He has more than 10 years of proven success in the entrepreneurial Hi-Tech arena, integrating highly-innovative and multidisciplinary technologies into sellable products. His range of experience includes stewarding ideas through the development process into the marketplace.

His most recent company, "To-Be-Education," is creating a platform upon which teachers and students can upload content that can be transformed into dilemma-based learning games with multiple users, facilitating the development of global learners' communities.

An experienced test engineer and pilot from ETPS UK and an Aeronautical Engineer from the Technion, Roni is a well-known expert in the aviation professions, including their operational, methodological and technological aspects. In 2004 Roni founded Rontal Applications, a leading provider of a 3D based application for simulations and real-time Command & Control systems. Under his leadership, the company has achieved success results before being acquired by an American corporation.

# Speaker & Panellist

## Stephen Lund

Chief Executive Officer  
Opportunities NB



Stephen Lund is a 30-year veteran of the financial industry with leadership roles in banking, venture capital, business development and international finance.

He is the CEO of the newly established Crown Corporation Opportunities NB, the first point of contact for business development in the province.

He is the former President and CEO of Nova Scotia Business Inc. (NSBI). Stephen and his team attracted a number of world-leading companies to Nova Scotia and worked to proactively help local, home-grown businesses reach new markets and become stronger

global competitors through trade initiatives and financing investments. In its most recent five-year reporting period (2007-2012), NSBI achieved over 150% of its key target, generating over \$1.2Billion in new client direct payroll (\$2.1B including indirect) on a target of \$800Million. In 2012, through his leadership, Nova Scotia was named by FDI Intelligence, a division of the Financial Times, the best-performing region in North America in attracting inward investment.

Stephen is a graduate of the Business program at St. Francis Xavier University, holds an MBA from Queen's University and received his designation from the Institute of Corporate Directors. He has also completed a number of executive courses at Queen's University, the University of Chicago, and Harvard. Stephen served as a member of the board of directors at the IWK Health Centre and the QE2 Hospital Foundation and currently serves on several Boards and a number of business associations. He was the inaugural Chair of the Heart & Stroke Hockey Heroes Fundraiser. In 2011, he was inducted into Atlantic Business Magazine's prestigious Top CEO Hall of Fame after being named one of the top CEO's for five consecutive years, and he was recognized by Financial Centers International as one of the top 500 most influential people in financial centers worldwide.

He is active in a number of sports and was a participant in the World Triathlon Championships, the Boston Marathon and the Canadian University Hockey Championships. He is married to Sandy and has 2 sons Connor and Shaun.

# Speakers

## Al Carson

Partner, Advisory Services  
Ernst & Young



Al Carson is a Partner in the Advisory Services practice of Ernst & Young LLP.

Al has worked in the Information Technology field for 29 years and has been involved with both professional services companies and software product companies. In the past 20 years, Al has been involved in starting 3 new IT companies in the Atlantic region. Working with leaders in the IT industry, Al has undertaken a diverse set of roles, challenges, and responsibilities and continues to

see huge opportunities for this region.

Currently, Al is involved in the Smart Province initiative in New Brunswick which brings together the private sector and the Public sector resources in a new creative venture.



# Speakers

## Hon. Brian Gallant

Premier of New Brunswick



Brian Gallant was born in Shediac Bridge, New Brunswick. His father, Pierre, is the youngest of seven children and a proud Acadian. His mother, Marilyn (née Scholten), is one of 17 siblings born to Dutch immigrants, Alex and Maria Scholten, who arrived in New Brunswick from the Netherlands in the 1950s. He has two siblings: a sister, Melissa, and a brother, Pierre.

During his early years, Mr. Gallant received his education at various schools throughout the province and graduated from Polyvalente Louis-J.-Robichaud, in Shediac. Determined to pursue a postsecondary education, he started and operated two small companies, through which he was able to pay for his attendance at university. He received a Bachelor in Business Administration with a concentration in finance and a Bachelor of Law degree from the Université de Moncton. He also received a Masters in Law degree from McGill University.

Mr. Gallant practised law with the firm Stewart McKelvey in the areas of corporate and commercial law. He later joined the Veritas Law firm in Dieppe as a partner.

Mr. Gallant was elected Leader of the New Brunswick Liberal Party on October 27, 2012. He was elected to represent the riding of Kent as a Liberal Member of the Legislative Assembly on April 15, 2013. Mr. Gallant was sworn in on April 30, 2013, and became Leader of the Official Opposition. He was subsequently elected to represent the riding of Shediac Bay-Dieppe on September 22, 2014, and was sworn in as Premier of New Brunswick, President of the Executive Council, Chairman of the New Brunswick Jobs Board, and Minister responsible for Innovation, Intergovernmental Affairs, Women's Equality and Rural Affairs on October 7, 2014.

# Panellists

## Sandy Bird

Chief Technology Officer  
IBM Security



Sandy Bird was the co-founder and CTO of Q1 Labs, now part of IBM. Today, he's the CTO for IBM Security and is responsible for the company's strategic technology direction. Sandy has extensive technology experience specializing in database design and development for web applications. Prior to IBM and Q1 Labs, he held a variety of technical positions at the University of New Brunswick in support, development and administration. Sandy studied Electrical Engineering at

the University of New Brunswick and was named an IBM Fellow in 2014.

# Panellists

## Steven Burns

Chief Executive Officer  
Bulletproof Solutions



Steven Burns is a proud graduate of the Computer Science Faculty of the University of New Brunswick.

In 2001, Mr. Burns founded his passion, Bulletproof Solutions. The company currently employs 90 people across five offices in Atlantic Canada with revenues in excess of 17 million dollars annually. The company has grown consistently with its focus on Security and Managed Services. Mr. Burns has over 22 years of experience in the IT Industry coupled with his entrepreneurial spirit and motivation have given him the tools to succeed in today's challenging information technology sector.

During his entrepreneurial career Mr. Burns owned and operated 5 different companies and has been chosen as one of Atlantic Canada's top 50 CEO's for five consecutive years (Atlantic Business Magazine 2004-2005-2006-2007-2008). Mr. Burns was inducted into the CEO Hall of Fame in 2008. Mr. Burns is currently the past Chair of the New Brunswick IT Council (TechImpact) and the Vice-Chair of Propel ICT.

Mr. Burns is proud that as a local company Bulletproof has been able to give back over \$500,000 in community support throughout its existence but what Mr. Burns is most proud of is his wife of 15 years, Sara and their three children, Duncan, Malcolm and Anderson.



**We at the Faculty of Computer Science pride ourselves on many things.**

We take pride in our history as the first faculty of computer science in Canada and the leader in Atlantic Canada since 1968 with the oldest and most successful co-op program in Atlantic Canada. We take pride in our extraordinary students and in our graduates who have excelled and continue to excel in many different places across Canada and throughout the world. We take pride in our academic excellence, the relevance of our undergraduate programs and our master's and PhD programs to the country and the region, and in the high demand for our graduates regionally, nationally, and internationally. We take pride as well in our faculty and staff who are working hard to ensure the best quality education for our students.

**Congratulations to our students and faculty on their research.**