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1 Contents

1 Education

1998: Doctor of Philosophy (PhD), Systems Design Engineering, University of Waterloo. Machine Learning for Autonomous Navigation in Ground Robots.
1992: Master of Science (MSc), Computing and Information Science, University of Guelph. Artificial Neural Networks and their application to the automatic conversion of text into speech sounds.
1988: Bachelor of Technology (B Tech), Applied Computer Science, Ryerson Polytechnic Institute.

2 Employment-Current

2.1 Academic

2.1.1 Professor, Department of Computer Science

September 1996-Present
Ryerson University
I was hired as a tenure-track, Assistant Professor in the Department of Mathematics, Physics and Computer Science. I was promoted to the academic rank of Professor in 2007. As a faculty member, I am responsible for teaching 1 or 2 undergraduate and/or graduate courses per term. Past courses include Computer Science 1 in Java, Artificial Intelligence, Autonomous Mobile Systems, Human-Robot Interaction, Graphics, Artificial Intelligence and various Computer Science service courses. I also teach several graduate courses including Research Methods, Presence, Methods of Instruction and a Collaborative Workshop (team building).

My research program has evolved into one that deals primarily with Computational Public Safety where Computer Science tools and techniques are used to improve public safety processes. My research is highly interdisciplinary, practical and applied. I work closely with both the Urban Search and Rescue (USAR) and Chemical, Biological, Radiological, Nuclear explosive (CBRNe) Response Team (UCRT) of the Ontario Provincial Police[1] (OPP) and the Heavy Urban Search and Rescue (HUSAR) organization that form part of Canada`s response system to urban disasters.

I serve on (or have served on) many committees at all levels within Ryerson including the Faculty of Science Implementation committee, the Chief Librarian Search committee (3 times), Dean-YSGS Search Committee, the Dean-Faculty of Science Search Committee, Vice President Academic Search Committee, various Provost working groups, faculty promotion and evaluation committees. I am one of the longest continuously serving Senators at Ryerson. I have been an avid supporter of the Science Rendezvous community outreach event (from its inception at Ryerson)--organizing many student volunteers and demonstrations and I have supported several

[1] Ryerson Office of the Vice President-Research and Innovation holds a Memorandum of Understanding (2007) with the OPP that supports collaborative research between the OPP and myself in the area of public safety.

robotics/technology-related clubs in High Schools and one Middle School in the Greater Toronto Area.

2.1.2 Member – Faculty Advisory Committee--Collaboratory

Ryerson Library
May 2016 - Present
The Collaboratory provides faculty and their research teams with space and technology resources to facilitate research and course development. Located on the 3rd floor of the Library building, reconfigurable spaces are provided with state-of-the art technical support providing opportunities for a wide variety of research uses.

2.1.3 Member - Business Technology Management (BTM) Forum Governing Council

Information Technology Association of Canada (ITAC)
September 2016 - Present
Established as an unincorporated professional association, the BTM Forum (BTMF) is the national body for managing the BTM activities. It is a multifaceted organization governed by BTM Forum Governing Council that is comprised of representatives who are responsible for steering the organization' s overall direction on the members' behalf. The BTMF is a ring-fenced entity within ITAC and is recognized as the awarding organization to design, develop and award qualifications, such as certification and accreditation. The BTMF BTM Accreditation Council and the BTMF Certification Council report to the BTM Forum Governing Council. The BTMF Governing Council has responsibility for governing the oversight, overall effectiveness and efficiency of the organization.

2.1.4 Associate Chair and Graduate Program Director (MSc and PhD), Computer Science

Department of Computer Science
July 2019- Present
The Graduate Program Director (GPD) is responsible for all aspects of the Masters and Doctoral Programs in Computer Science. I am the founding GPD and lead the Department's efforts to establish high quality graduate programs. I author all Letters of intent (LoI), briefs, rebuttals and responses to internal and external reviewing and authorizing bodies for both programs. I presented briefs in Senate, answered questions and fostered the introduction of these programs.

2.1.5 Graduate Program Director (GPD)--Master of Digital Media (MDM)

Yeates School of Graduate Studies
July 2016- Present
Master of Digital Media is an intensive 12-month professional graduate program designed to equip graduates with the skills and industry experience they will need as they launch themselves into the digital media world. Whether our students plan to

develop their own startup, work in the corporate world or go on to further studies. The program intersects three key areas of digital media: art & design, technology, and business & entrepreneurship. Gaining perspective in each of these areas helps participants tackle problems from innovative angles.

The MDM is the first academic program embedded within a university-based business incubator[2]. The GPD is the academic leader of a program and manages all aspects of it including managing efforts to launch our graduates' careers[3].

2.1.6 Member, DMZ, Ryerson University

2016-present

The DMZ at Ryerson University is one of Canada's largest business incubators for emerging tech startups. It is the top-ranked university incubator in North America and third in the world. The DMZ helps startups succeed by connecting them with customers, advisors, influencers and other entrepreneurs. It's a space and community that encourages, supports and fosters new technologies that transform lives and businesses.

Working with the Executive Director, my role has been to support MDM and other graduate students in their efforts to learn from and contribute to the DMZ's startup ecosystem. This often takes the form of assisting studetns in finding paid internships within the DMZ's incubated companies.

2.1.7 Faculty Liaison--FoS, FEAS

Office of the Dean, G. Raymond Chang School of Continuing Education
January 2011- Present

The faculty liaison appointment was created to combat stagnation in the growth of enrollments within the Faculty of Science (FoS) and Faculty of Engineering and Architectural Science (FEAS) portfolios. The Liaison forms the nexus between the goals and aspirations of disparate Faculties and the Chang School in order to foster dialogue, find synergies and encourage collaboration for the purposes of creating new curriculum, updating existing offerings and generating new revenue while reducing the costs of program delivery.

During my engagement as faculty liaison, enrollments within my areas of responsibility grew from 7%[4] of all Chang School enrollments to 13%[5] with a coincident and significant rise in total revenue. This increase in enrollments was the result of a close coordination collaboration between the Chang School Director, Dr. Anne-Marie Brinsmead and

[2] The MDM is embedded within Ryerson's Digital Media Zone (DMZ)—ranked the number one university-based incubator in North America.

[3] The MDM program tracks graduate employment success. At the moment all five graduated cohorts enjoy a 92-96% employment rate.

[4] 4781 enrollments for Academic Year 2011-12 in Science and Engineering programs

[5] 8412 enrollments for Academic Year 2018-19 in Science and Engineering programs

myself and our focus on conducting detailed labor market research focusing on academic offerings that would lead to sustainable careers for our students.

My responsibilities include identifying opportunities, preparing business cases for and creating new Certificate programs, workshops and course series (undergraduate and non-graduate) related to curriculum, interests and competencies from the 2 academic Faculties to the Chang School. I work with Faculty Decanal offices to develop strategies for growth. This role includes leading Chang school staff in developing delivery and governance models as well as working with stakeholders to define course offerings that are high-quality, academically sound, labor market focused and popular amongst adult learners. Once a program is running, I am responsible for finding and hiring competent contract instructors to teach the required courses and monitoring their teaching performance through a formal assessment process.

To date, I have substantively[6] contributed to the definition, creation and/or revision of the programs/course series/workshops listed below:

1. Data Analytics, Big Data and Predictive Analytics[7] (Certificate, FEAS and FoS)
2. Computer Security and Digital Forensics (Certificate, FoS)
3. Disaster and Emergency Management (Certificate, FoS)[8]
4. Energy Management and Innovation (Certificate, FEAS)
5. Financial Mathematics Modeling (Certificate, FoS)
6. Infrastructure Asset Management and Renewal (Certificate, FEAS)
7. Project Management for Mid-Level Managers in the Technical Sector (Certificate, FEAS)
8. Program and Portfolio Management (Certificate Renewal, FEAS)
9. Project Management (Certificate Renewal, FEAS)
10. Robotics and Embedded Systems (Certificate, FoS and FEAS)[9]
11. Sustainability Management and Process Excellence (Certificate Renewal, FEAS)
12. Course Series in Computer Applications (FoS)
13. Course Series in Survival in Urban Disasters and Emergencies (FoS)
14. Course Series in The Human Body (FoS)
15. Course Series in Transportation Logistics (FEAS)
16. Course Series in Project Management (FEAS)
17. Course Series in CATIA[10] Engineering Design (FEAS)
18. Course Series in Drone/UAV Ground School (FoS)
19. Course Series in Computer Programming Applications (FoS)
20. Course Series in Computer Applications (FoS)
21. Course Series in Computer Programming for Game Developers (3D Unity & Autodesk Maya)(FoS)
22. Course Series in iPhone and Android Applications Development (FoS)
23. Course Series in The Internet of Things (IoT) (FoS)

[6] Written, revised or collaboratively created

[7] I share the academic coordinator role in this program with Prof. Ayse Bener (Mechanical and Industrial Engineering).

[8] This is the only D&EM program housed within a Department of Computer Science in the World.

[9] This Certificate program is a collaboration across 2 Faculties (FEAS and FoS) and 3 Departments (CS, Mech/Ind Eng and E&CE)

[10] Computer Aided Three-dimensional Interactive Application (CATIA)

24. Course Series in 3D Printing, Visualization and Agile Produce Prototyping
25. Course Series in Hadoop, Python and Tabeau Big Data Tools (FoS, FEAS)
26. Course Series in Virtual Reality (VR) and Augmented Reality (AR) Developer for Smartphones (FoS)
27. Non-Technical Workshops for Technologists and Technicians in the Technical Sector (FEAS)

2.1.8 Academic Co-coordinator--Certificate Program in Data Analytics, Big Data & Predictive Analytics

The G. Raymond Chang School of Continuing Education, Ryerson University
February 2014 - Present

All private and public sector organizations are recognizing the competitive advantage of "Big Data" – the ability to analyze large data sets – and are increasingly demanding professionals who have advanced competencies in data analytics, statistics, and predictive analytics. This certificate focuses on direct, practical application of skills and techniques, while providing sound academic and technical education in data analytics with big data. The certificate provides a strong foundation in analytics, tools, and statistics. The certificate is a collaboration between FEAS, FoS, the departments of Mechanical and Industrial Engineering (academic home of the certificate), Computer Science, Mathematics, and The Chang School. As the co-academic coordinator I am responsible for the quality, delivery and academic management of the program.

The program is extremely successful. There continues to be considerable labor market demand for employees who can use computational tools and techniques to analyze existing corporate and enterprise data and form actionable recommendations. The Certificate follows the strategy of training participants in learning and using commonly accepted technical tools to build their own portfolios—unlike most competing programs that teach only theory. In addition, the Certificate serves as the primary gateway into Ryerson's Graduate degree program (MSc) in Data Science and Analytics.

2.1.9 Academic Coordinator - Robotics and Embedded Systems Certificate Program

The G. Raymond Chang School of Continuing Education, Ryerson University
March 2012 - Present

This certificate program provides adult learners with hands-on opportunities to acquire knowledge and skills that will permit them to contribute and respond effectively to our collective societal need to provide innovation through advances in robotics and embedded systems product and device development. The Certificate is a collaboration between FEAS, FoS, the departments of Computer Science (academic home), Mechanical and Industrial Engineering, Electrical and Computer Engineering, and The Chang School. As the academic coordinator I am responsible for the quality, delivery and academic management of the program.

I developed this Certificate to address the labor market demand for employees who could interact with and create robotic applications and work with embedded systems.

This strategy has paid off as an increasing number of participants are coming from the manufacturing section—especially automotive parts fabrication.

2.1.10 Academic Coordinator, Computer Security and Digital Forensics Certificate Program

The G. Raymond Chang School of Continuing Education, Ryerson University
February 2012 – Present

The Certificate in Computer Security and Digital Forensics will be of interest to individuals just starting their career; career changers seeking to achieve advancement, portability, and longevity goals; managers and end users requiring a more in-depth understanding of computer security and data protection; and long-time practitioners seeking to round out their knowledge and attain a recognized level of academic achievement. The Certificate is a collaboration between the FoS, the Ted Rogers School of Management (TRSM) and the departments of Computer Science (academic home), the Law Practice Program, and The Chang School. As the academic coordinator I am responsible for the quality, delivery and academic management of the program.

The program has been growing in enrollments over the years as the threats to Canadian enterprise security have become more prevalent. With these threats in mind, the Certificate was strategically designed to lead to the entry-level CISSP Certification process--often leading participants to direct entry employment within various industries. More recently, I was instrumental in developing strategy and advocating for the Certificate to be offered at Chang Schools' newest venue—Brampton's City Hall.

2.1.11 Academic Coordinator, Disaster and Emergency Management Certificate Program

The G. Raymond Chang School of Continuing Education, Ryerson University
February 2012 – Present

This program is designed to prepare participants to act as members of a multi-disciplinary team involved in, planning for, and dealing with emergency incidents. The fundamental goal of this certificate is to introduce participants to best practices including risk assessment and risk mitigation, pre- and post-disaster planning, including business contingency planning, effective communication guidelines, pre- and post-disaster mitigation, on-the-ground operations, and follow through in search, rescue, response, and recovery. The curriculum emphasizes the knowledge, processes, tools, and mechanisms necessary to ensure that disaster and emergency management projects are executed using best practices and success-proven procedures. As the academic coordinator I am responsible for the quality, delivery and academic management of the program.

The Certificate's academic home is the departments of Computer Science—perhaps the only disaster and emergency management program associated with such a department. In 2016, the Chang School Director and I developed a deliberate strategy to attract to

and facilitate success for Canadian Forces veterans to enroll in the program. Consequently, the Certificate has become a gateway for demobilized Canadian Forces veterans to receive retraining while taking advantage of their existing skill sets. Several Certificate graduates have gone on to senior leadership roles in various emergency management agencies. In addition, several other graduates now regularly teach in the program.

2.1.12 Academic Coordinator, Computer Science Part-time Degree Program

The G. Raymond Chang School of Continuing Education, Ryerson University
November 2018 – Present

This part-time degree program runs completely in parallel to the full-time (day school) Computer Science undergraduate degree program. As the academic coordinator I am responsible for the quality, delivery and academic management of the program. In addition, I collaborate and coordinate with the Associate Chair of the Department of Computer Science for the full-time undergraduate degree program in Computer Science.

Recently, I have developed a load-balancing strategy which is now followed by both the part-time and full-time programs that allow students to move between programs under circumstances which are favorable to students and benefit both programs.

2.1.13 Academic Coordinator, Computer Programming Applications Certificate Program

The G. Raymond Chang School of Continuing Education, Ryerson University
February 2012 - Present

This program is designed for individuals who wish to work as application programmers in software engineering, database technology, and networking or related user support positions. It provides an overview of systems principles and client/server architecture that will enable individuals to perform system integrations and user help functions. It provides training in the most popular programming languages (Java and C) and the popular operating system (UNIX). This certificate also permits students to focus on several application areas: Software Engineering, Database Technology, Networking, Project Management, GIS, and Landscape Design. As the academic coordinator I am responsible for the quality, delivery and academic management of the program.

2.1.14 Academic Coordinator, Environmental Sciences Certificate Program

The G. Raymond Chang School of Continuing Education, Ryerson University
September 2013 - Present

The Certificate in Environmental Sciences covers air, water, and soil processes, an introduction to environmental legislation, site assessment, waste management, and green technology. This certificate is intended for individuals with an undergraduate

degree and/or experience in engineering, science, environmental studies, or similar. As the academic coordinator I am responsible for the quality, delivery and academic management of the program.

2.1.15 Adjunct Professor-School of Computer Science-University of Guelph

September 2000- Present

I collaborate with regular faculty members within the school and am involved in graduate education in a co-supervisory role.

2.1.16 Adjunct Professor-Department of Computing and Software-McMaster University

November 2012 – Present

I collaborate with regular faculty members within the school and am involved in graduate education.

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3 Employment-Past

3.1 Academic

3.1.1 Vice Chair-Technical Advisory Committee-Groningen & Student Mobility Project

Association of Registrars of the Universities and Colleges of Canada (ARUCC)
January 2019 – July 2019

The Project involves creating a national platform for Canada that facilitates student data exchange between provinces, territories and trusted organizations around the world. It seeks to realize many benefits for student mobility including enhancing service to students and post-secondary institutions.

3.1.2 Vice Chair-Senate

Ryerson University
July 2016- June 2018

Senate is chaired by Ryerson's President. The position of Vice Chair is the second highest academic leadership role in Ryerson's Senate, and is elected from the ranks of Senators. The Vice Chair is prepared to act on behalf of the Chair when the Chair is unable or precluded from doing so. The Vice Chair is involved in every facet of planning the Senate's agenda and runs Senate meetings under circumstances.

3.1.3 Senator - At Large

Ryerson University
July 2010 – June 2018

Senate is the academic policy making body of the University. The Senate has the power to regulate the educational policy of the University and without limiting the generality of the foregoing has the power to make recommendations to the Board with respect to

the establishment, change or termination of programs and courses of study, schools, divisions and departments. The Senate consists of elected representatives of the faculty, librarians, students and alumni, and ex-officio members of the administration, including the Chancellor. I was elected to this role twice and appointed twice. In my various terms I served on various Senate sub-committees including the Priorities Committee for three years. The Senate is an excellent venue from which to learn how the broader university operates. All academic matters eventually come through Senate and I was there for 8 years learning and contributing the whole time.

3.1.4 Member-Provost's Task Force on Continuing Education

Office of the Provost
January 2014-December 2016

The task force committee, chaired by the dean of Ted Rogers School of Management, developed recommendations that addressed matters arising from the external examiner's report. The Task Force recommended actions that were consistent with the objectives of the review. The recommendations were provided to the provost for action. The Task Force examined a full range of areas specific to the delivery of continuing education. Areas of interest included; an examination of key drivers in the continuing education market; an examination of key competitors, both current and emerging; types of education needed in the market (e.g. what duration, degree of flexibility, credential requirements); How to enhance competitiveness; the effectiveness of CE marketing; a reexamination of Ryerson collaborative model were all examined among other issues[11].

3.1.5 Director-Professional Graduate Diploma Programs (D-PGDP)

Office of the Dean, Yeates School of Graduate Studies (YSGS)
January 2013- December 2016

Reporting to the Dean-YSGS and working with all program stakeholders, the D-PGDP lead the team effort in ideation, definition, creation and launch of cost-recovery, graduate programs leading to Ryerson`s newest credential--the Professional Masters Diploma (PDip). As there had never been a PDip before this initiative, my initial responsibilities were to define how credential could be created and--working with the Office of the VP Academic--determining how Ryerson's academic policies would change to support the new credential. I lead or was instrumental completing all processes resulting in the implementation of these programs:

1. Aerospace Design Management
2. Dietetics
3. Enterprise Information Security, Privacy and Protection
4. Energy and Innovation

[11] The final report can be viewed at:
https://www.ryerson.ca/content/dam/provost/AccessiblePDFs/CE%20Taskforce%20Final%20Report_Jan_11_2016.pdf

5. Finance for Social Innovation
6. Accounting
7. Management of Technology and Innovation
8. Canadian Business

My primary responsibilities were to work with faculty members, graduate program directors and Deans to develop strategies to use PDips to support existing, stand-alone graduate programs and support specific Faculty goals. For example, The Dean of the Ted Rogers School of Management used his PDips to drive enrollments in their existing MBA graduate program and support certification for undergraduate accounting degree graduates. The Dean of Community Services used the PDip in Dietetics to ensure that their undergraduates had a venue to become certified as registered Dieticians, and the Chair of Aerospace Engineering used the PDip in Aerospace Design Management as a means of targeting employment opportunities related to aircraft certification for his graduates.

The PDip initiative represented the largest expansion of cost-recovery graduate programming that Ryerson had ever attempted and is the first formal collaboration between YSGS and the G. Raymond Chang School of Continuing Education.

3.1.6 Member-Provost's Faculty of Science Implementation Committee

Office of the Provost
October 2011-January 2012

The role of the committee was threefold: (i) examine and recommend potential Decanal office locations for the new Faculty of Science (FoS); (ii) explore and recommend types of Decanal administrative structures; and, (iii) determine the transitional process from Faculty of Engineering, Architecture and Science (FEAS) Decanal administration to Faculty of Science (FoS) Decanal administration. As there had never been a new Faculty created at Ryerson, this role required considerable tolerance for ambiguous requirements related to insufficient resources and creativity. In this role my primary contribution was that of ensuring FoS received adequate and suitable office space for Decanal operations including a budget that would allow for renovations to be conducted. In addition, I was an advocate for adopting a "strong Dean" model of governance for the Faculty.

3.1.7 Associate Chair and Founding Graduate Program Director (MSc and PhD), Computer Science

Department of Computer Science
July 2007- June 2016

The Graduate Program Director (GPD) is responsible for all aspects of the Masters and Doctoral Programs in Computer Science. I am the founding GPD and lead the Department's efforts to establish high quality graduate programs. I author all Letters of intent (LoI), briefs, rebuttals and responses to internal and external reviewing and

authorizing bodies for both programs. I presented briefs in Senate, answered questions and fostered the introduction of these programs. The programs received permission to run from the Province of Ontario in 2007 and 2011 for the MSc and PhD programs respectively. Both programs were highly successful for the duration of my appointment with an average intake of 17 new Masters students, and 9 new Doctoral students per intake. To put this in perspective, the graduate programs in Computer Science made all graduate enrollment targets for nine years of operation even though graduate enrollment targets were roughly double those of any other FoS graduate program.

3.1.8 Instructor, Continuing Education (now the Chang School)

Ryerson Polytechnic University
September 1992 - June 1996
I presented one or two evening courses for the School of Computer Science each semester. These included, Data Structures, Structured Programming in C and a course in Soft Computing and Artificial Intelligence.

3.2 Non-Academic

3.2.1 Associate Director, Intelligent Network Solutions

Bell Global Solutions (a subsidiary of Bell Canada)
Jan 1996 - August 1996
Reporting to the Vice President of Intelligent Network Solutions, I was responsible for scouting technology, resources and new markets for Bell Global Solutions and Bell Canada's Network-centric solutions. I also provided system integration and development services on a contract basis to other Bell organizations. My primary focus was the development of Bell's Call Centre and interactive voice response (IVR) strategies through the use of an intelligent national network. I was one of several team leader who worked with a diverse set of technical, management and client organizations to "craft" complex services into purchasable packages that addressed client needs.

3.2.2 Technology Consultant, Technology Department

Bell Sygma Inc. (a subsidiary of Bell Canada)
Mar 1995 - Jan 1996
Reporting to the Vice President for technology, my primary responsibilities were the investigation, prototyping and dissemination of leading-edge technology to the rest of Bell Sygma and Bell Canada. I was responsible for Bell Canada winning several contracts deploying its networks to various government organizations. I was also responsible for forging alliances with academic institutions including the Universities of Toronto and Waterloo.

3.2.3 System Analyst, PERMITS project

Bell Sygma Telecom Solutions (a subsidiary of Bell Canada)
April 1992 - Mar 1995

The Project Estimate Resource Management Information Tracking System (PERMITS) was a large Ingres relational database application spanning two provinces and supporting over 2000 users across Bell Canada. I was responsible for the maintenance and validation of all system reference tables, supplying program specifications, code enhancements and bug fixes. I was extensively involved in an effort to reverse engineer the project in order to better document the application's function as well as to look for opportunities to improve its performance.

3.2.4 System Manager - Budgets and Results, Expense District, Residential Sales and Service

Bell Canada
September 1990 - April 1992

I was responsible for the day-to-day operation of a VAX 6000-310 minicomputer running an Ingres application tracking budget and result information for Bell Ontario. One of my primary responsibilities was the rollout of the project to our client communities. The task required a detailed understanding of Bell's internal communication backbone, including its technological foundation, as well as an appreciation for each client's particular needs. The position required a sound knowledge of system management practices, VAX/VMS architecture, and data communications principles.

3.2.5 Office Systems Associate, Systems Technology, Operations Development

Bell Canada
April 1990 - September 1990

This position required me to perform the initial evaluations of graphical user interface standards within Bell Canada. I worked to understand the technology available and the requirements of the Bell user community and make recommendations for technology adoption. Secondary responsibilities included chairing requirements and program walk-through meetings to bring various internally developed VM/CMS applications into production.

3.2.6 Information Services Support Centre Associate, Systems Development, Corporate Systems Organization

Bell Canada
May 1988 - April 1990

Initially I was responsible for the site management of a development laboratory primarily equipped with VAX, PDP, Sun and Tandem computers. The position eventually evolved into one requiring me to develop applications for internal clients--primarily in the FORTRAN and C programming languages. My general responsibilities included providing day-to-day management of the lab, performing hardware and software evaluations and, provisioning an effective disaster recovery plan.

3.3 Part-time:

3.3.1 Police Auxiliary, USAR and CBRNe Response Team

Ontario Provincial Police
October 2008 – October 2010

An Auxiliary member of the Ontario Provincial Police (OPP) is responsible for assisting regular police officers within the OPP in the completion of their duties. The Urban Search and Rescue (USAR) and Chemical, Biological, Radiological, Nuclear explosive (CBRNe) Response Team (UCRT) requested that I become an Auxiliary as there were certain aspects of our research collaboration which required my membership as an official volunteer within the OPP (to achieve standing). I continued to conduct research within the broad areas of USAR and CBRNe and provided technical support for several canine search technologies developed at Ryerson including readying equipment for the UCRT's expected deployment to Haiti in 2010.

3.3.2 Company Commander, Service and Support Company, The Royal Regiment of Canada

Canadian Forces Primary Reserve
June 1980 - November 1994

I was a member of this militia infantry battalion. Having joined as a private soldier and progressing through the ranks, I held every appointment within an infantry Company--retiring with the rank of Captain.

In 1991, I was appointed the Officer Commanding (OC) of the battalion's Service and Support Company. I was a lieutenant at the time and the usual rank of a Company Commander is Major. There are only 4 OCs in an Infantry Battalion with authorized strength of approximately 500 soldiers. In the three years I commanded the Company the Company won three "best Company" Battalion award.

During my career in the Canadian Forces Reserve, I took many courses on leadership, management and instructional technique—much of this training I reuse in my life as a professor. I was provided with many opportunities to apply this knowledge in very practical settings in some interesting situations and parts of the world. In the role of OC, I was responsible for the administration, management and leadership of approximately 120 personnel under operational conditions. I received the Canadian Forces Decoration (CD) in 1992.

4 Consulting Positions

4.1.1 Private Consultant, Scientific Research and Experimental Development

October 2004 – 2009

I acted as a technical advisor to clients who wished to participate in the federal government's Scientific Research and Experimental Development (SR&ED) program providing advice on how applied research, conducted within an organization, can be

formalized and documented to qualify for government rebates (SR&ED) and assistance (IRAP).

4.1.2 Primary Investigator, Research Contract, Multi-point Voice Comms Device

HumCorp Networks Inc.
September 2002 – January 2003
I, and graduate students within the NCART lab, worked with the Chief Technology Officer of this company to introduce a new wireless product to the European market related to multipoint voice communications in the 900 MHz band.

4.1.3 Project Consultant, Congenital Heart Surgeon's Association

Sick Children's Hospital
November 2001 - May 2002
I and several members of N-CART worked with Dr. Bill Williams, the Chief Cardiologist at Sick Children Hospital and the Congenital Heart Surgeon's Society to develop their first on-line survey for collecting information related to surgical conduit implants in infants. The goal of the study was to determine why there is a high rate of failure of implants within two years of the initial procedure in very young children. In the past, such a study would have been conducted by FAX or mail however, this study allowed participating institutions to directly and securely enter patient and surgical data into a central data repository using any web browser and a phone. The technology was new to the hospital and this was a first-of-a-kind demonstration project.

4.1.4 Primary Investigator, Research Contract, Moby Dark Inc.

May 2000 - January 2001
I, and members of the N-CART lab, were engaged to conduct an investigation into the deployment of new wireless devices into the consumer market based around Moby Dark's wireless router technology and the N-CART labs Heating Ventilation and Air Conditioning (HVAC) monitoring prototype.

4.1.5 Chief Strategist and System Architect, Personalization and Reasoning Systems

Personification Inc.
February 1999 - September 2000
I was engaged by this startup as the project manager for a large development effort associated with reasoning and personalization engines being developed for Bell Canada. Within the first year of operations, I became the company's system architect and chief business strategist for the ideation of various Internet-based audio products. In addition, I supported marketing and sales efforts through the creation of compelling demonstrations, presentations and other collaterals. The company received venture capital funding in excess of $3M and was purchased by a numbered corporation shortly thereafter.

4.1.6 External Advisor, Corporate Social Responsibility Funded External Projects

Bell Canada
September - October 1998
As part of their due diligence effort I was engaged by Bell to help architect the relationship that Bell would have with the Universities of Toronto and Waterloo in its effort to create the "Bell Canada University Labs". My task was to bridge the gap between the competitive world of telephony and academia. The project involved the philanthropic transfer of $21M to these universities.

4.1.7 System Architect, Contract, Berkshire Investment Group

October 1997 - July 1998
I was involved in the selection of a new brokerage back-office system for the company as well as helping to devise a consistent and effective Internet strategy. In addition, I developed several utility programs to work around problems associated with their back-office system. The finished product was estimated to save Berkshire almost $1M/year in saved administration and call centre staffing.

4.1.8 System Consultant, Systems Group, AIC Group of Funds

February - October 1997
I was engaged to implement an interactive voice response (IVR) system coupled to the corporate transaction engine (AS400). The intent was to free human resources within the existing call centre from answering simple questions related to AIC's fund prices. The solution was highly successful and resulted in a significant saving in both time and money and improved functionality. In addition, I was involved in training and implementing procedures within the group and advised Mr. Michael Lee-Chin (the owner) on the strategic use of information technology as a competitive tool.

5 Teaching

5.1 Courses Presented (Last 10 years)[12]

Course	Title	Level	Students	Dates
CPS607	Autonomous Mobile Robotics	Undergraduate	24	2018-19
CPS607	Autonomous Mobile Robotics	Undergraduate	17	2017-18
LIFE Institute F60	Where are the Flying cars: An Irreverent Approach to Technology and its Application	Non-credit	40	
CPS813	Human Robot Interaction	Undergraduate	11	2016-17
MDM Milestone	Collaborative Workshop	Graduate	38	
CPS109	Computer Science 1	Undergraduate	85	2015-16
DG8010	Selected Topics in Digital Media	Graduate	6	

[12] Teaching evaluations are available on request. An informal measure of effectiveness can be found at: http://www.ratemyprofessors.com/ShowRatings.jsp?tid=7490 providing an overall quality rating of 4.7/5.0

CPS813	Human Robot Interaction	Undergraduate	15	
CP8101	Research Methods for Computer Science	Graduate	17	2014-15
CPS109	Computer Science 1	Undergraduate	100	2013-14
CP8101	Research Methods for Computer Science	Graduate	21	2012-13
CPS109	Computer Science 1	Undergraduate	99	
CKDM100	Principles and Practices of Emergency Management	Continuing Education	6	
CPS109	Computer Science 1	Undergraduate	105	2011-12
CP9101	Method of Instruction	Graduate	7	
CP8306	Presence	Graduate	3	2010-11
CP8101	Research Methods for Computer Science	Graduate	18	
CPS109	Computer Science 1	Undergraduate	145	2009-10

5.2 Graduate Student Supervisions (Career total)

Name	University	Department/Program	Degree	Start	End
Zahid, Javaid	Ryerson	Comp. Sci.	PhD	2018	TBD
Karimpour, Omid	Ryerson	E&CE	MEng	2017	TBA
Kroma, Assem	Ryerson	Media Production	MA	2017	TBA
Sicat, Shelly	Ryerson	Master of Digital Media	MDM	2017	2018
Yacin, Gus	Ryerson	Master of Digital Media	MDM	2017	2018
Bullon, Anibal	Ryerson	Master of Digital Media	MDM	2016	2018
Chau, Jeremy	Ryerson	Comp. Sci.	MSc	2017	TBD
Demir, Mehmit	Ryerson	Comp. Sci.	PhD	2017	TBD
Menkar, Bezayit	Ryerson	Master of Digital Media	MDM	2016	2018
Hanna, Dalia	Ryerson	Comp. Sci.	PhD	2016	TBD
Hashim, Ahamed Umar	Ryerson	Master of Digital Media	MDM	2016	2017
Tencer, Ashley	Ryerson	Master of Digital Media	MDM	2016	2017
Gonzalez, Nuria	Ryerson	Master of Digital Media	MDM	2016	2017
Fraser, Danielle	Ryerson	Master of Digital Media	MDM	2016	2017
Brennan, Lindsay	Ryerson	Master of Digital Media	MDM	2015	2016
Appleby, Aaron	Ryerson	Master of Digital Media	MDM	2015	2016
Fernando, Alexandra Julia	Ryerson	Master of Digital Media	MDM	2015	2016
Cohen, Matthew	Ryerson	Master of Digital Media	MDM	2015	2016
Blain, Rob	Ryerson	Master of Digital Media	MDM	2015	2016
Tran, Nhan	Ryerson	Comp. Sci.	PhD	2015	TBD
Chan, Christopher	Ryerson	Comp. Sci	PhD	2015	2018
Bains, Gurjit	Ryerson	TRSM	MBA	2014	2014
Waismark, Ben	Ryerson	Comp. Sci.	MSc	2014	2017
Zouri, Muthana	Ryerson	Comp. Sci.	PhD	2013	TBD
Chan, Christopher	Ryerson	Comp. Sci.	MSc	2013	2015

Kong, Christopher	Ryerson	Comp. Sci.	MSc	2012	2014
Herman, Scott	Ryerson	Comp. Sci.	MSc	2011	2013
Ufkes, Alex	Ryerson	Comp. Sci.	MSc	2010	2013
Shah, Waqas	Ryerson	Comp. Sci.	MSc	2010	2012
Brian Pham	Guelph	Comp. and Info Sci.	PhD	2009	2013
D'Souza, Andrew	Ryerson	Comp. Sci.	MSc	2009	2011
Tran, Jimmy	Ryerson	Comp. Sci.	PhD	2009	2018
Gerdzhev, Martin	Ryerson	E&CE	MSc	2008	2010
Sharieh, Salah	Ryerson	Comp. Sci.	MSc	2007	2008
Bokhari, Saadat	Ryerson	Comp. Sci.	MSc	2007	2009
Somers, Vijay	Ryerson	E&CE	MSc	2007	2009
Rahnama, Hossein	Ryerson	E&CE	PhD	2006	2010
Coleshill, Elliott	Guelph	Comp. and Info Sci.	PhD	2004	2010
Ribeiro, Cristina	Guelph	Comp. and Info Sci.	MSc	2006	2008
Sommers, Vijay	Ryerson	Comp. Sci.	MSc	2007	2009
Tran, Nhan	Ryerson	Comp. Sci.	MSc	2009	2011
Tran, Jimmy	Ryerson	Comp. Sci.	MSc	2007	2009
Arora, Ankit	Ryerson	E&CE	MSc	2003	2005
Lac, Hao	Guelph	Comp. and Info Sci.	MSc	2002	2004
Nguyen, Le	Guelph	Comp. and Info Sci.	MSc	2003	2005
Lu, Wei	Guelph	Comp. and Info Sci.	MSc	2001	2003
Pham, Justin	Guelph	Comp. and Info Sci.	MSc	2003	2005
Klotz, Greg	Guelph	Comp. and Info Sci.	MSc	2002	2004
Coleshill, Elliott	Guelph	Comp. and Info Sci.	MSc	2001	2003
Shiu, Wing	Guelph	Comp. and Info Sci.	MSc	2001	2003

5.3 Postdoctoral Supervision (Last 5 years)

Name	Start	End
Dr. Cheryl To	June 2017	November 2018
Dr. Fatima Hussain	Sept 2016	December 2018
Dr. Md Altab Hossain	Sept 2015	December 2017

5.4 Graduate Examination Activity (Last 5 years)

Student	Degree	Program	Event	My Role	Year
Liu, Yugang	PhD	University of Toronto, Mechanical Engineering	Oral Examination	External Examiner	2019
Powell, Jeffery Alexander	PhD	Ryerson, Mech. Eng.	Oral Examination	Chair	2017
Jakubovic, Raphael	PhD	Ryerson, Medical Physics	Oral Examination	Chair	2017
Firdaus, Syeda Nadia	PhD	Ryerson, Comp. Sci.	Comprehensive Exam	Chair	2016
Byagowi, Ahmad	PhD	U. Manitoba, E. & Comp. Eng.	Oral Examination	External Examiner	2016

Murphy, David	PhD	Ryerson, Communication and Culture	Oral Examination	Chair	2016
Chan, Christopher	PhD	Ryerson, Comp. Sci.	Comprehensive Exam	Examiner	2016
Zouri, Muthana	PhD	Ryerson, Comp. Sci.	Comprehensive Exam	Examiner	2016
Khan, Nargis	PhD	Ryerson, Comp. Sci.	Comprehensive Exam	Chair	2015
Habibi, Khashayar	PhD	Ryerson, Comp. Sci.	Comprehensive Exam	Chair	2015
Mohamed, Richard	PhD	Ryerson, Aerospace Eng	Oral Examination	Chair	2015
Rabbou, Mahmoud Abd	PhD	Ryerson Civil Eng.	Oral Examination	Examiner	2015
Almeshary, Meshary	MSc	Ryerson, Comp. Sci.	Oral Examination	Chair	2015
Papanicolau, Naum	PhD	Ryerson, Comp. Sci.	Comprehensive Exam	Chair	2015
Seifzadeh, Alireza	PhD	Ryerson, Mech. & Ind. Eng.	Oral Examination	Chair	2014
Poon, Wilson	PhD	Ryerson, Comp. Sci.	Comprehensive Exam	Chair	2014
Abdullah, Alaa	PhD	Ryerson, E & Comp. Eng.	Oral Examination	Chair	2014
Harishankar, Ssowjanya	MSc	Ryerson, Comp. Sci.	Oral Examination	Chair	2014
Khan, Mohammad	PhD	Ryerson, Comp. Sci.	Comprehensive Exam	Chair	2014

6 Research

6.1 Interests

- Field Robotics (ground, water and air)
- Autonomous Systems
- Teleoperation, telepresence, computer-machine mediation systems
- Mechatronics,
- Human Factors
- Response Robotics
- Non-intrusive technological augmentation of service animals
- Computational Public Safety (Specifically, USAR, EDU and CBRNe response)
- Canine olfaction, behavior and augmentation
- Disaster and Emergency Management

6.2 Experience

6.2.1 Director of Research, The Network-Centric Applied Research Team (N-CART)

School of Computer Science, Ryerson University
September 1997 - Present

As the research director, I provide direction to a mixed team of approximately a dozen Doctoral and Masters students, several Post Docs and a strategic advisor. The lab performs applied research in the area of computational public safety. Our specializations are Urban Search and Rescue (USAR) response and Chemical, Biological, Radiological and Nuclear Explosive (CBRNE) incident response.

Current and past sponsors include, NSERC, Public Safety Canada, The Ontario Provincial Police, Bell Canada, Bell Global Solutions, Bell Sygma, Apple Canada and Moby Dark. In 2007 N-CART was recognized by the Ontario Government for research excellence--receiving both the Gold and Diamond Showcase Awards for Excellence in Project Achievement for the Canine Augmentation Technology (CAT) project.

Primary Investigator - Autonomous Systems--The Natural Selection Research Group

Department of Computing and Information Science
University of Guelph
January 1991 – 2000

The group was established By Dr. Deborah A. Stacey to further research in the areas of machine intelligence in various forms including genetic algorithms, artificial neural network, fuzzy systems and mobile robotics. The group has worked extensively with such organizations as the Department of National Defence, Ontario Hydro, and many others. My research interests have included text-to-speech processing using neural networks, sonar target identification, and speech recognition. I was the group's primary investigator in the area of robust intelligent autonomous systems.

6.2.2 Member-Pattern Analysis and Machine Intelligence Group (PAMI)-Department of Systems Design Engineering,

University of Waterloo
September 1993 - October 1997

The PAMI group was established in 1980 with the objective of providing resources to researchers in the areas of pattern analysis and machine intelligence and to promote technology transfer between the university and industry. My own work as a graduate student centered on the application of simple, robust neural networks to the field of autonomous agents-especially fast learning.

6.2.3 Associate-Human-Computer Interaction Design Lab, Department of Computing and Information Science

University of Guelph

September 1990 - May 1992

Under the direction of Dr. Tom Carey, the goal of the HCI design lab was to further the understanding of how humans interact with computing machinery. Interests in the lab were far ranging, encompassing fields such as computer supported cooperative work, usability testing, and HCI design tools. I contributed to various user and product studies including the IBM Book Manager and Bell Northern Research VISIT usability studies.

6.3 Significant Research Projects (Last 10 years)

Project	Description	Dates	Collaborators
Algorithm-Equipped Unmanned Aerial Systems (UAS) for finding Lost and Wandering Dementia Patients 	The project aims to improve search-and-rescue efforts using UASs. Whereas traditional searches conducted by police officers and volunteers require substantial time and resources, automation and a bird's eye view make UAVs far more efficient. PhD Candidate Dalia Hanna is developing an algorithm that will predict a wanderer's path, using data provided by startup Ubimodo. Last summer, she also partnered with the Ontario Provincial Police to conduct drone search tests in Mississauga and Brampton.	2017-Present	Age-Well Institute, Dr. Lili Liu (Faculty of Rehabilitation Medicine, U of Alberta), Chang School of Continuing Education, (Ryerson), LIFE Institute, OPP, Halton Region Police, Toronto Region Police, Durham Region Police, Peel Region Police, Ubimodo Inc, Locate Motion Inc. Aeryon Labs Inc. NSERC CREATE (ADERSIM)
El Hibeh Digital Archaeology Support Robot (INDY) 	What started out as a class project turned final exam, became a real-life site assessment at el-Hibeh, a 3,000-year-old city in Egypt that has been affected by age, erosion and looting since it was first discovered. Mounted with a GoPro, the robot travelled 27 meters underground to relay information back to Li and her team about what the site looked like. Using a robot to investigate the site proved to be an ideal choice given the narrow spaces of el-Hibeh and the importance of preserving its delicate landscape. It's a good first step in learning more about certain areas of the site.	2017-Present	Prof. Jean Li (Ryerson-History), Carol Redmount, Chair-Near Eastern Studies, UC Berkley, Dr. Michael Carter (Ryerson-RTA), Devin Ostrom (Ryerson-Mech Eng), Prof. Rob Blain (Humber College), Office of the Dean-Faculty of Science (Ryerson), Office of the Dean-Faculty of Arts (Ryerson), Office of the Provost (Ryerson), Library (Ryerson), Chang School of Continuing Education (Ryerson)
Canine Augmentation Technology (CAT)	CAT is a suite of technologies that augment an Urban Search And Rescue (USAR) dog's natural ability as an excellent mobility and sensor platform. By adding cameras, accelerometers, microphones, computing, lights and wireless networking, CAT allows remote humans to	2006-Present	Ontario Provincial Police (OPP), Toronto Police Services (TPS), Toronto Heavy Urban Search and Rescue (HUSAR), Federal Emergency

	track and observe the progress of a searching dog when humans a precluded from following. It was first deployed operationally at a realistic disaster training exercise in Fergus Ontario by the canine teams of the OPP and Toronto HUSAR. The technology has undergone substantial revisions based on feedback from canine handlers and search team managers.		Management Agency (US FEMA) canine subcommittee, Ryerson School of Fashion, Ryerson Mechanical and Industrial Engineering, Natural Sciences and Engineering Research Council (NSERC)
Canine Remote Deployment System (CRDS) 	This patented device is a canine-carried, release mechanism designed to be easily integrated into a canine harness originally intended for use with CAT systems but has been used with CANES and CARD as well. The current version of the CRDS is carried by the USAR canine teams of the OPP and has been deployed to Lebanon by a U.S. non-governmental agency	2008-2016	OPP, Toronto Police Services, Toronto HUSAR, FEMA canine subcommittee, Ryerson School of Fashion, Ryerson Mechanical and Industrial Engineering, Field Innovation Team (FIT)-Utah, USA
Canine Assisted Robot Deployment (CARD) 	CARD is a refined version of CANES, allowing canine teams to drop robots on or near entombed victims of a collapse. The system is capable of releasing many different types of robots including, in one case, an 11 lbs. tethered snake robot developed at Carnegie Melon University (CMU)	2012-2017	OPP UCRT, Dr. Howie Choset (CMU Robot Institute), FEMA Ohio USAR Task Force 1 canine teams, FEMA Texas Taskforce 1 USAR canine teams, Texas A&M University (College Station)-Texas Engineering Extension (TEEX) at the "Disaster City" training facility, US National Institute of Standards and Technology (NIST)
Disaster Scene Reconstruction (DSR) 	The focus of DSR is the creation of data collection, visualization and simulation tools capable of interacting to create virtual models of disaster scenes that can be manipulated to answer "what if" questions before a rescue is attempted in an USAR rubble environment. DSR is a methodology for sensing, recording, modelling and making serious, rule-based games of real disaster scenes.	2013-2017	OPP, Toronto HUSAR, Field Innovation Team (Utah), IMR Systems Inc., Defence Research Development Canada (DRDC)
Explosive Disposal Unit-Simulation Training (EDUST)	The training of EDU personnel is often expensive and complex involving the use of specialized disruption equipment, hours of experimentation and some risk. In this project we use methodology learned from DSR and apply it to the improvised explosive device (IED) neutralization task.	2015-2018	OPP, Toronto Police Services (CBRNe and ETF), Durham Police Services, Halton Police Services

			

6.4 Grants and Gifts (Career total)

Granting Agency	Start	Duration	Amount	Topic	Notes
NSERC Engage	2018	6 mths	$25000	Finding lost individuals with wearable technology	With LocateMotion Inc.
Faculty of Science Dean's Travel Grant (Internal)	2018	1 mth	$1000	Attend and participate in DHS/NIST/ASTM "Response Robot Evaluation" Exercise	National Institute of Standards and Technology (NIST) Headquarters, Gaithersburg, MD, USA
NSERC Discovery	2017	1 yr	$21000	Unmanned Terrestrial Inspection of Bridge Infrastructure Using Image Processing Techniques	
Faculty of Science Interdisciplinary research grant (Internal)	2017	1 yr	$12000	El-Hibeh Archaeological Dig Site, Egypt--looter tunnel exploration robot creation fund	In collaboration with Dr. Jean Lee (Prof. Dept of History, Faculty of Arts, Ryerson U)
Faculty of Science Dean's Travel Grant (Internal)	2017	1 mth	$1000	Attend and participate in DHS/NIST/ASTM "Response Robot Evaluation" Exercise	FEMA VA-TF2 training facility, Virginia Beach, Virginia, USA
Faculty of Arts Interdisciplinary undergraduate research assistant (Internal)	1017	4 mths	$9,888.20	An algorithmic approach to defining search algorithms for unmanned aerial vehicles (UAVs) engaged in the "lost and wandering" external-to-facility-grounds patient search task.	In collaboration with Dr. Janet Lum (Associate Dean, Faculty of Arts, Ryerson U)
eCampus Ontario Research and	2017	1 yr	$95,942[13]	Practical Design Guide for Simulation Game-Based Learning	In collaboration with the G. Raymond Chang

[13] I am 1 of 9 "partners" in the project lead by my Doctoral Student, Naza Djafarova

Innovation Grant					School of Continuing Education and Prof. Ozgur Turetken, Chair, BTM, The Ted Rogers School of Management, Ryerson
G. Raymond Chang Family	2016	NA	$25,000.00	Canine applications for Computational Public Safety	Research Gift
NSERC (Engage)	2016	6 mths	$25,000.00	Inter/Intranet manufacturing machine monitoring (I2M3)	With Ivedha Inc.
NSERC (Engage)	2015	6 mths	$25,000.00	Omni-directional canine camera system	With MAXgear Inc.
NSERC (CREATE)	2015	6 yrs	$1,650,000.00[14]	ADERSIM Project	Held by York University
Microsoft Canada	2014	NA	$25,000.00	Embedded Systems Grant	USD, Research Gift
NSERC (Engage)	2014	6 mths	$25,000.00	Confined Space Flight Software Assist	With DreamQii Inc.
NSERC (Engage)	2013	6 mths	$25,000.00	Sensor mount for UAV for scanning urban disaster scenes.	With the AeroX company.
NSERC (Engage)	2010	6 mths	$25,000.00	An Algorithm for Determining Acceptable Personal Space	With InteraXon Inc.
NSERC (Engage)	2010	6 mths	$25,000.00	Dual Function Pressure Pipe Inspection Sensor Head	With Pressure Pipe Inspection Company
NSERC (Discovery)	2010	5 yrs	$155,000.00	Human Interface for Canine Augmentation Technology Data	
Ontario Centres of Excellence (Photonics)	2008	6 mths	$15,000.00	Untethered near-infrared brain spectroscopy to monitor canine brain function.	
Ontario Centres of Excellence (Communication and Information Technology)	2008	6 mths	$13,703.00	Algorithm for the Automatic Placement of Nodes to extend emergency wireless networks.	

[14] I am 1 of 11 primary investigators in this York University-centred grant. Sub-grants typically provide $30-$40K/year depending on the project undertaken and students supported

OPIC	2008	3	$25,000.00	Canine Remote Deployment System Market Readiness	
OPIC	2007	1	$10,000.00	CAT Demonstration Project at HUSAR exercise with OPP/PERT	
NSERC (EQPEQ program)	2007	1 yr	$44,338.00	Vision-based micro-manipulation system for autonomous inspection and assembly of micro-parts	
Ontario Provincial Police	2005	Ongoing	$20,000.00	Canine Augmentation Technology/ Improved Urban Search and Rescue Robotics/ improve CBRNe response robots	in kind, per year
Dog-Goes	2005	1 yr	$2,000.00	Canine USAR	in kind
Invacare	2003	2 yr	$15,000.00	Network-Enabled Powered Wheel-Chair Adaptor Kit Prototype (3 Powered Wheelchairs donated)	in kind
Microsoft Canada	2003	NA	$25,000.00	Network-Enabled Powered Wheel-Chair Adaptor Kit Prototype	USD
HumCorp Networks Inc.	2002	1 yr	$2,000.00	Network Routing Research	in kind
Moby Dark Inc.	2000	4 mths	$2,000.00	Collaborative Research Grant - Network-centricity	
NSERC (Discovery)	2000	4 yr	$48,000.00	Distributed Network Services for Remote and Teleoperated Systems	
Department of Foreign Affairs and International Trade	1999	4 days	$10,000.00	Sponsored "Team Canada" participant on research mission to Japan to demonstrate the Internet robot project: MAX	
Bell Global Solutions	1998	2 mths	$6,000.00	Competition Study - Fax services	
NSERC (Discovery)	1998	2 yr	$18,000.00	Autonomous Systems	
Active Surplus Annex	1997	1 yr	$500.00	Sumo Robot Design in collaboration with Ontario College of Art and Design artist Norman White	in kind
Bell Canada	1996	2 yr	$1,000.00	Telephone Line	in kind
Bell Sygma Inc.	1996	1 yr	$23,000.00	Equipment Grant	in kind
Apple Canada	1996	1 yr	$4,500.00	Apple Newton PDA Study	
Bell Sygma Inc.	1996	1 yr	$1,000.00	Personal Digital Assistants	

Ryerson Starter Grant	1996	1 yr	$5,000.00	Personal Digital Assistants	

6.5 Dissemination (Career totals unless otherwise stipulated)

6.5.1 Book Chapters

- **S. Sharieh**, F. Franek and A. Ferworn, "Mobile Functional Optical Brain Spectroscopy over Wireless Mobile Networks Using Near-infrared Light Sensors", in *Data Acquisition*, ISBN 979-953-307-817-4, INTECH, 2012
- A. Ferworn, "Canine Augmentation Technology for Urban Search and Rescue" in *Canine Ergonomics – The Science of Working Dogs*, William S. Helton (Ed.), CRC Press Taylor and Francis Group, 2009, Boca Raton, Florida, USA, ISBN: 978-1-4200-7991-3.
- A. Ferworn, K. Plataniotis, "Teleoperation Over the World Wide Web" in *Robotics and Applications*, M.H. Hamza (Ed.), Acta Press Series on Robotics and Manufacturing, 1999, Calgary, Alberta, Canada, ISBN: 0-88986-265-6 (304).

6.5.2 Journal Papers

- **R. Blain**, A. Ferworn, J. Li, **J. Tran**, and M. Carter. "A Multidisciplinary Approach to Learning Human-RobotInteraction (HRI) Through Real-World Problem Solving—The"BUSA Dig", Journal of Human-Robot Interaction, Vol. 6, No. 2, 2017, Pages 70-91, DOI 10.5898/JHRI.6.2.Blain
- M. S. Islam, M. R. Islam, M. A. Hossain, A. Ferworn, M. K. I. Molla. "Subband entropy-based features for clothing invariant human gait recognition", Advanced Robotics, 1-12, http://dx.doi.org/10.1080/01691864.2017.1283249, February (2017)
- **C. Kong**, A. Ferworn, **E. Coleshill**, **J. Tran**, and K.G. Derpanis. "What is a Hole? Discovering Access Holes in Disaster Rubble with Functional and Photometric Attributes." Journal of Field Robotics (2015)
- F. Butt, **S. S. Bokhari**, A. Abhari, and A. Ferworn. "Scalable Resource Discovery through Distributed Search." International Journal of Distributed and Parallel Systems (IJDPS) 2.5 (2011): 1-19
- **C. Ribeiro**, A. Ferworn, M. Denko, and **J. Tran,** "Wireless Mesh Network Performance for Urban Search and Rescue Missions", International Journal of Computer Networks & Communications (IJCNC), 2010, Vol 2, Issue 2, pp. 38-57
- L. Dell'Agnese and A. Ferworn, "Work Apparel for Urban Search and Rescue Dogs", Descant, Volume 40, No. 1, pp. 73-81, 2009
- A. Ferworn, D. Ostrom, K. Barnum, M. Dallaire, D. Harkness, and M. Dolderman, "Canine Remote Deployment System for Urban Search and Rescue", Journal of Homeland Security and Emergency Management: Vol. 5 : Iss. 1, Article 9. 2008
- A. Ferworn, **A. Arora**, and M. Jaseemuddin, IP Mobility Issues for a Mobile Tele-Robotic System - NEPWAK, International Journal of Automation and Computing, Special Issue of Online Robots and E-automation, 2004.

6.5.3 Refereed Conferences, Workshops, etc.

- **M. Demir**, O. Turetken and A. Ferworn, "Blockchain and IoT for Delivery Assurance on Supply Chain (BIDAS)," in IEEE Big Data 2019- IoT Big Data and Blockchain (IoTBB'2019), 9-12 December 2019, Los Angeles, USA
- **F. Hussain**, O. Weiyue, B. Noye, S. Sharieh, A. Ferworn, "Intelligent Service Mesh Framework for API Security and Management", Proceedings of the 10th IEEE Annual Information Technology Electronics & Mobile Communication Conference (IEEE IEMCON 2019), 17-19 October, 2019, University of British Columbia, Vancouver, Canada
- **D. Hanna**, R. Husein, R.J. Koester, A. Ferworn, "Data Analytics to Predict the Survivability of a Lost Person With Dementia Using R", Proceedings of the 10th IEEE Annual Information Technology Electronics & Mobile Communication Conference (IEEE IEMCON 2019), 17-19 October, 2019, University of British Columbia, Vancouver, Canada
- S. Burikova, J. Lee, R. Hussain, I. Sharafitdinova, R. Dzheriev, **F. Hussain**, **S. Sharieh**, A. Ferworn, "A Trust Management Framework for Software Defined Networks-based Internet of Things", Proceedings of the 10th IEEE Annual Information Technology Electronics & Mobile Communication Conference (IEEE IEMCON 2019), 17-19 October, 2019, University of British Columbia, Vancouver, Canada
- **M. Demir**, O. Turetken, A. Ferworn, "Financial Evaluation Framework for Blockchain Implementations", Proceedings of the 10th IEEE Annual Information Technology Electronics & Mobile Communication Conference (IEEE IEMCON 2019), 17-19 October, 2019, University of British Columbia, Vancouver, Canada
- **J.I. Zahid**, **F. Hussain**, A. Ferworn, "A Model of Computing and Communication for Public Safety Integrating FirstNet, Edge Computing and Internet of Things", Proceedings of the 10th IEEE Annual Information Technology Electronics & Mobile Communication Conference (IEEE IEMCON 2019), 17-19 October, 2019, University of British Columbia, Vancouver, Canada
- Z. Zhang, T.T. Chen, K. Vigneswaren, **F. Hussain**, **S. Sharieh**, A. Ferworn, "Automated Generation and Dynamic Rendering of Web-based Data Collection Systems", Proceedings of the 10th IEEE Annual Information Technology Electronics & Mobile Communication Conference (IEEE IEMCON 2019), 17-19 October, 2019, University of British Columbia, Vancouver, Canada
- **M. Demir**, M. Alalfi, O. Turetken and A. Ferworn, " Security Smells in Smart Contracts," in IEEE International Conference IEEE International Conference on Software Security and Reliability (QRS), July 22-26, 2019 Sofia, Bulgaria
- **M. Demir**, O. Turetken and A. Ferworn, "Blockchain-Based Transparent Vehicle Insurance Management," in IEEE International Conference on Software Defined Systems (SDS), 10-18 June 2019, Rome, Italy
- C. Cumpat, **M. Zouri**, N. Zouri, A. Ferworn, "Managerial Decision Support System in Evaluating the Influence of Nosocomial Infections: A System Dynamics Approach", 2nd International Conference on Computers in Management and Business (ICCMB 2019), 24-27 March 2019, Cambridge, United Kingdom.

- **M. Zouri**, N. Zouri, A. Ferworn, (2019). An Ontology Approach for Knowledge Representation of ECG Data. Information Technology and Communications in Health (ITCH 2019), 14-17 February 2019, Victoria, British Columbia, Canada.
- **M. Demir**, A. A. Mashatan, O. Turetken and A. Ferworn, "Utility Blockchain for Transparent Disaster Recovery", October 10-11, 2018 IEEE Electrical Power and Energy Conference (EPEC), Toronto, ON, Canada, 2018, pp. 1-6. doi: 10.1109/EPEC.2018.8598413
- **S. Sicat**, K. Woodcock, and A. Ferworn (2018). "Wearable technology for design and safety evaluation of rider acceleration exposure on aerial adventure attractions". Proceedings of the 30th Annual International Occupational Ergonomics and Safety Conference, Pittsburgh, USA, June 7-8, 2018.
- **D. Hanna.**, A. Ferworn, **M. Lukaczyn**, and A. Abhari, J. "Using Unmanned Aerial Vehicles (UAVs) in Locating Wandering Patients with Dementia". IEEE/ION Position Location and Navigation Symposium. Monterey, CA, April 23-26, 2018
- **N. Tran**, **M. Zouri**, and A. Ferworn, "Computational Public Safety: The Evolution to Public Safety Research", 20th International Conference on Network-Based Information Systems (NBiS-2017), 24-26 August 2017, Toronto, Canada.
- **C. Chan**, A. Ferworn, and D. Tran "A Rudimentary Approach to Unmanned Aerial Vehicle Guided Improvised Explosive Device Shrapnel Dispersal Simulation" International Conference on Intelligent Networking and Collaborative Systems (INCoS), 24-27 August 2017, Toronto, Canada
- **B. Waismark**, A. Ferworn, and **J. Tran**, "Enhancing Autonomous Access Hole Detection", IEEE International Humanitarian Technology Conference (IHTC), 20-21 July 2017, Toronto, Canada
- **C. Chan**, A. Ferworn, and L. Chin, "Towards Determining Relative Densities for Common Unknown Explosives in Improvised Explosive Devices", IEEE International Humanitarian Technology Conference (IHTC), 20-21 July 2017, Toronto, Canada
- F. Hussain , H. Farahneh, X. Fernando and A. Ferworn, "VLC Enabled Foglets Assisted Road Asset Reporting", 2017 IEEE 85th Vehicular Technology Conference (VTC2017-Spring), 4–7 June 2017, Sydney, Australia
- **D. Hanna**, A. Abhari, and A. Ferworn, "Recommending open educational resources based on user comments", Proceedings of the 20th Communications and Networking Simulation Symposium (CNS 2017) of SCS/ACM, April 23-26, Virginia Beach, VA, USA, 2017
- F. Hussain and A. Ferworn, "Distributed Slot Allocation in Capillary Gateways for Internet of Things Networks", The 84th IEEE Vehicular Technology Conference (VTC2016), 18–21 September 2016, Montréal, Canada
- **C. Chan** and A. Ferworn, "Serious Gaming for Improvised Explosive Device Neutralization Training", The 3rd International Conference on Industrial Engineering and Applications (ICIEA 2016), 5-7 June 2016, Hong Kong, MATEC Web of Conferences. Vol. 68. EDP Sciences, 2016

- **B. Waismark**, A. Ferworn, "CAT 360 - Canine Augmented Technology 360-Degree Video System", IEEE International Workshop on Safety, Security & Rescue Robotics (SSRR-2015), Purdue University, West Lafayette, Indiana, USA, October 18-20, 2015
- A. Ferworn, **S. Herman**, **C. Kong**, **A. Ufkes**, **J. Tran,** "Interacting with a Virtual Destroyed Environment Constructed from Real Disaster Data", IEEE International Workshop on Safety, Security & Rescue Robotics (SSRR-2014), Toyako-Cho, Japan, 2014
- **M. Coatsworth**, **J. Tran**, A. Ferworn, "A Hybrid Lossless and Lossy Compression Scheme for Streaming RGB-D Data in Real Time", IEEE International Workshop on Safety, Security & Rescue Robotics (SSRR-2014), Toyako-Cho, Japan, 2014
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- **J. Tran**, A. Ferworn, **C. Ribeiro**, M. Denko, "Enhancing Canine Search", IEEE Systems of Systems Engineering (SoSE'08), June 2-5, 2008, Monterey, CA, USA.
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- **A. Arora**, A. Ferworn, "Pocket PC Beacons: WiFi-Based Human Tracking and Following", ACM Symposium on Applied Computing (SAC2005) Special Track on Handheld Computing, Santa Fe, New Mexico, USA, March 13-17, 2005.
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- **J.E. Coleshill**, A. Ferworn. Spherical Panoramic Video for Micro-Gravity Applications", 55th International Astronautical Congress, Vancouver, Canada, Oct 4-8, 2004.
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- **J.E. Coleshill**, A. Ferworn, "Spherical Panoramic Video – The Space Ball", The 2003 International Conference on Computational Science and its Applications, ICCSA'03, Montreal, Canada, May 18-21, 2003.A. Ferworn, W. Lu, "Optimization For Video and Telebotic Control on Palm OS PDAs", Proc. Of the International Conference on Internet Computing (IC'02), Las Vegas, USA, June 24-27, 2002.
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- A. Ferworn, **B.D. Torres**, **S. Patel**, S. Kanellis, "The Internet-Enabled Furnace", Proc. Of the IASTED International Conference for Intelligent Systems and Control (ISC'01), Clearwater, Florida USA, November 19-22, 2001.
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- A. Ferworn, K. Plataniotis, "Effective Teleoperation Over the World Wide Web", Proc. Of the IASTED International Conference for Robotics and Applications (RA'99), Santa Barbara, USA, October 28-30, 1999.
- A. Ferworn, K. Plataniotis, "Solenodon: Unstable Hexapod Walking", Proc. Of the 5th International Conf. on Information Systems Analysis and Synthesis, Orlando, USA, July 31 – August 4, 1999.

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- A. Ferworn, **R. Roque**, and **I. Vecchia**, "MAX: Wireless Teleoperation via the World Wide Web", Proc. Of the 1999 IEEE Canadian Conference on Electrical and Computer Engineering, Edmonton, Alberta, Canada, May 9-12 1999. (In Print)
- A. Ferworn, and D.A. Stacey, "The Reflexive Instructor with Deliberate Apprentice Architecture", Proc. Of the 1998 World Automation Congress, Anchorage, Alaska, USA, May 10-14 1998.
- A. Ferworn, and D.A. Stacey, "Inchworm Mobility–Stable, Reliable and Inexpensive", Proceedings of the 3rd IASTED International Conference for Robotics and Manufacturing, June 14-16 1995, Cancun, Mexico.

6.5.4 Recent Magazine Articles

- **J.I. Zahid**, F. Hussain and A. Ferworn, "Integrating Internet of Things and Blockchain: Use Cases", IEEE Internet Initiative eNewsletter, November 2017, https://internetinitiative.ieee.org/newsletter/november-2017/integrating-internet-of-things-and-blockchains-use-cases
- I. Coe and A. Ferworn, "The Life and Contributions of Countess Ada Lovelace-Unintended Consequences of Exclusion, Prejudice and Stereotyping", IEEE Technology and Society Magazine, Vol. 35, No. 4, December 2016, Pages 46-49

6.5.5 Patents

Inventors: A. Ferworn, K. Barnum and D. Ostrom inventors, Assignee: Ryerson University, "Remote Parcel Deployment System", U.S. Patent # 7,878,154 B2, Feb. 1, 2011.

6.5.6 Conference Activities (Last 3 years)

- Program committee member, the 16th International Conference on Networks, (ICN 2017), April 23-27, 2017, Venice, Italy, http://www.iaria.org/conferences2017/ICN17.html
- Technical program committee member, the 13th International Conference on Mobile Web Information Systems (MobiWIS 2016), 22-24 August 2016, Vienna, Austria, http://www.mobiwis.org/2016/
- Technical program committee member, 12th Conference on Computer and Robot Vision (CRV 2016), Victoria, BC, Canada, June 1-3, 2016, http://www.computerrobotvision.org
- Reviewer, 2015 International Conference on Advanced Mechatronics, Intelligent Manufacture, and Industrial Automation, 15-17 Oct 2015, Surabaya, Indonesia, http://www.ieee.org/conferences_events/conferences/conferencedetails/index.html?Conf_ID=35599
- Reviewer, The Fourteenth International Conference on Networks (ICN 2015), April 19 - 24, 2015, Barcelona, Spain, http://www.iaria.org/conferences2015/ICN15.html

- Program Committee member, the 12th International Conference on Computer and Robot Vision (CRV 2015), Halifax, NS, Canada, June 3-5, 2015, http://www.computerrobotvision.org
- Program Committee member, the 2014 IEEE International Conference on Systems, Man, and Cybernetics (SMC 2014), San Diego, CA, USA, October 5 -8, 2014, http://smc2014.org/

6.5.7 Journal Activities (Last 3 years)

- Editor, "The International Student Journal of Automation Robotics Mechatronics Manufacturing", Ryerson University, http://www.ryerson.ca/sjarmm/
- Editorial board member, "Digital Communications and Networks" Elsevier, https://www.journals.elsevier.com/digital-communications-and-networks/editorial-board
- Editorial board member, "International Journal of Wireless and Mobile Networks", http://airccse.org/journal/j3editorial.html
- Editorial board member, "International Journal of Mechatronics and Automation (IJMA)", http://ijma.ieee-icma.org/Home/Home.aspx
- Editorial board member, "Journal of Robotics and Mechatronic Systems", http://jorams.co.uk/editorial-board
- Editorial board member, "International Journal of Communications and Computer Networks", https://ijcnc.com/editorial/
- Reviewer, IEEE Transactions on Cybernetics
- Reviewer, IEEE Access
- Reviewer, International Journal of Robotics and Automation (ACTA press)
- Reviewer, Applied Mathematical Modelling (Elsevier)
- Reviewer, The International Journal of Computing and Digital Systems (University Of Bahrain)
- Reviewer, International Journal of Humanoid Robotics (World Scientific)
- Reviewer, Applied Mathematical Modelling (Elsevier)
- Reviewer, Journal of Field Robotics (Wiley)
- Reviewer, IEEE Transactions on Cognitive and Developmental Systems

7 Other matters

7.1 Visiting Scholar

Location	Dates	Purpose
Deakin University, Institute for Intelligent Systems Research and Innovation (IISRI), Geelong Campus, Australia	August 2016	Collaboration with Dr. Shady Mohamed and Prof. Saeid Nahavandi—various IISRI current projects.
University of Otago, Department of Information Science, Dunedin, New Zealand	February-March 2011	Collaborate with Dr. Maryam Purvis and Dr. Martin Purvis—robotics at Otago

7.2 Achievements

- 2017: N-CART visited by Dr. Mark Williamson, Defence Research and Development Canada (DRDC)– Centre for Security Science, Government of Canada
- 2016: Governor Gary Herbert (R-Utah) visits NCART lab Delegates from trade mission to Ontario to discuss research collaboration.
- 2016: Research collaboration with FIT added to "speaking points" of Consul General of Canada in international trade discussion with the Governor of Utah.
- 2016: Canine Remote Deployment System (developed and patented in NCART lab) deployed for disaster relief in Lebanon by Utah-based NGO "Field Innovation Team" (FIT)
- 2015: Invited presenter to the Colorado Innovation Network (COIN) Summit sponsored by the State of Colorado, Office of the Governor
- 2014: Named Partner In Research (PIR) national "Technology Ambassador". The Technology Ambassador Award of PIR recognizes outstanding contributions of a body of work over a period of time to the field of technology and to Canadians and their promotion to the public by a Canadian researcher.
- 2014: Named Privacy by Design Ambassador by the Information Privacy Commissioner of Ontario.
- 2013: Invited TEDx talk at TEDx@RyersonU: "Dogs and Robots"
- 2013:EURAXESS "Science Slam" Canadian champion, ranked 2nd in North America[15].
- 2012: Research recognized by IEEE Spectrum, viewed by over 300000 Scientists and Engineers[16].
- 2011: National Institute of Standards and Technology award for contributions to the Response Robot Evaluation Exercise process. College Station, TX, USA.
- 2009: Nominated as "best lecturer" for TVO's program "Big Ideas" competition.
- 2009: Awarded "Information Technology Hero" by the Information Technology Association of Canada (ITAC) for work research work in Urban Search and Rescue.
- 2007: Winner of the Ontario Government Showcase of Excellence awards (Gold and Diamond awards) for "project achievement" for the research project "Canine Augmentation Technology".
- 2001-05: Recognized as one of the "Popular Profs" at Ryerson University by Maclean's Magazine Guide to Canadian Universities.
- 1995: Received University of Waterloo Graduate Fellowship
- 1994: Recipient of the Maple Leaf Chapter of the Association of Old Crows
- 1994: Recipient of the University of Waterloo graduate scholarship.
- 1992: Awarded the Canadian Forces Decoration for twelve years of service in the Canadian Armed Forces.

[15] http://www.ryerson.ca/science/research/stories/news_ScienceSlam_update.html
[16] http://spectrum.ieee.org/automaton/robotics/industrial-robots/search-and-rescue-dog-deploys-robot-snake-via-bark-control

- 1992: University of Guelph Graduate Fellowship for academic achievement.
- 1988: Royal Regiment of Canada Association scholarships while attending Ryerson.

7.2.1 Memberships and Professional Affiliations

- Member of the Institute of Electrical and Electronic Engineers (IEEE).
- Member of the Association of Computing Machinery (ACM)
- Member of the Business Technology Management (BTM) Governing Council of the Information Technology Association of Canada (ITAC)
- Member of the Royal Regiment of Canada Association
- Member of the advisory committee of the U.S. National Institute of Standards and Technology (NIST) reporting to the Department of Homeland Security (DHS) for the standardization of performance metrics for Search and Rescue (response) Robots
- Member of ASTM Committee E54: “Homeland Security Applications”
- Member of ASTM Sub-Committee E54.09: “Response Robots”
- Member of Ryerson’s Yeates School of Graduate Studies Council.
- Past member of the G. Raymond Chang School of Continuing Education Council
- Past member of the advisory council of the Department of Computer Science at the University of Ontario Institute of Technology.
- Member of the Royal Regiment of Canada Association

7.2.2 References:

Available on request.