Computer Science as a catalyst for change

INCREASING GENDER DIVERSITY IN OUR PROGRAMS
1,254 STUDENTS  
2,544 LIVING ALUMNI  

2 UNDERGRADUATE DEGREES  
5 GRADUATE PROGRAMS  
27% GROWTH IN STUDENT NUMBERS 2016/17 - 2017/18  

980+ ACTIVE PARTICIPANTS IN SHIFTKEY LABS  
17 STUDENT-LED INNOVATION TEAMS SUPPORTED  

6 IMPACT AWARD WINNERS  
500+ STUDENT PLACEMENTS  
4 CANADA RESEARCH CHAIRS  
3 FACULTY REGIONAL/ NATIONAL AWARD WINNERS  

2017/18 BY THE NUMBERS  

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With the Faculty of Computer Science turning 20 this year, as well as Dalhousie’s 200th anniversary approaching in 2018, this is a great time to reflect on our successes and growing aspirations. In this year’s issue of Computer Science magazine, we share stories from across our community of students, faculty, staff and alumni. Highlighting our academic programs, research efforts, and outreach initiatives.

Our Faculty continues to grow and is now home to over 1250 students in undergraduate and graduate degree programs. We continue to focus on academic excellence, curriculum innovation, pure and applied research, and service to the ICT industry, Nova Scotia, and our community. This year, I was delighted to witness six Computer Science students honored for their accomplishments outside the classroom at the Dalhousie Impact Awards. The Impact Awards recognize outstanding individuals and student groups that are making positive contributions to our society.

In the last year, we have hired six truly excellent new faculty members with teaching and research interests in machine learning, networking and security, and human-computer interaction. We are gearing up to launch a major new ocean analytics research platform, DeepSense, in collaboration with the Ocean Frontier Institute, COVE, IBM, and a range of other industry partners. This platform will bring together natural scientists, data and computational scientists, and industry partners to explore how sensors, automatous vehicles, machine learning, and data analytics can accelerate safe and sustainable ocean industries.

Collaboration remains a priority with initiatives including the launch of the Certificate in Computing in Arts and Social Sciences, a joint effort of the Faculties of Arts and Social Sciences, Management, and Computer Science. Increasingly, we see our role as providing students, regardless of their degree choice, with the technology skills and understanding that they need to thrive in an increasingly digital world.

Within the Faculty, we continue to work on developing a diverse and vibrant culture in which every student interested in software feels like they belong. A key priority is to increase the number of females within our student population. With support from industry partners, a proactive recruitment and outreach program, an improved first-year curriculum, mentoring programs, and new scholarships, our goal is to double the number of female students entering our undergraduate programs in 2018.

We have big dreams. With your help, there is so much we can accomplish for our students, industry, and province. I want to invite you personally to join us – to give your time, experience, and resources. We continue to look to you for engagement and support. Let’s talk in 2018!

Best Regards,

Andrew Rau-Chaplin,
Dean of the Faculty of Computer Science
When it comes to studying and working in computer science, women are still in the minority. With around half of the world’s population being female, the makeup of the technology sector needs to reflect this to develop solutions that are truly customer and society centered. As we enter Dalhousie’s 200th year, the Faculty of Computer Science is tackling this challenge head on.

Despite huge developments in the production and use of technology, traditional stereotypes of what computer science is, and who it’s for as a discipline, still exist. With currently between 16 per cent and 25 per cent of students in the Faculty of Computer Science identifying as female, depending on the program in question, the impact of these assumptions is clear to see.

Technology to reflect society

“When we see such a large gap in gender, we know there’s an underlying culture and there are reasons why we get this disparity,” says Christian Blouin, associate dean, academic in the Faculty of Computer Science. That lack of gender diversity not only creates a self-perpetuating loop, making it more difficult for those women who do choose the field to succeed and less appealing for other women to enter it, it’s also bad for the profession and those who rely on it (which these days, is most of
us). Why? Because the solutions developed in a field tend to reflect the experiences of those creating them. Dr. Blouin says promoting equality and inclusion, in addition to being a moral imperative, will improve the Faculty’s ability to serve our educational mission. “When there is a lack of diversity, things don’t work as well and decisions can be made that are exclusionary.”

Andrew Rau-Chaplin, dean of the Faculty of Computer Science, echoes the importance that diversity in technology plays. “Technology is not neutral, especially software technology which is almost a pure product of the mind. Systems and algorithms reflect the values of their makers, values that increasingly impact the wider world,” Dr. Rau-Chaplin explains. “Today, no matter what industry you are in, software is likely to underpin almost everything you do and quite literally define what your organization can aspire to. So, it is critical that Computer Scientists, the people who are quite literally designing our future, reflect the diversity of our society in terms of values and perspectives, history, socioeconomics, and gender.”

Changing stereotypes

“There’s still this idea that it’s a very solitary career choice, but it’s not like that at all anymore,” says Bonnie MacKay, an instructor in the Faculty. “It’s probably
students like fourth-year student, Mimi Cahill, agree that computer science as they’ve experienced it hasn’t been properly communicated in society. “You have the technical side but you also have business and marketing and communications, especially in the Applied Computer Science degree,” says Cahill.

The plan for change

In 2018, the year of Dalhousie’s 200th anniversary, the Faculty aims to double the number of female students entering undergraduate programs – leaving an academic legacy through celebrating and increasing diversity in technology.

To make this happen, the Faculty is launching a number of initiatives to help in creating a more robust offering to potential female students, including a number of industry funded Women in Technology Scholarships and developments to the undergraduate curriculum.

Dr. Rau-Chaplin, hopes the efforts being made make an impact in our own corner of the world. “We are just part of the process - education (at all levels), government and industry need to work together to encourage more females into technology and develop the leaders of tomorrow,” says Dr. Rau-Chaplin. “In many cases, industry is facing similar challenges to us so we are partnering with them to offer Women in Technology Scholarships, which will not only provide financial backing but mentorship from female tech leaders and enhanced co-op opportunities. We are hoping the scholarships will bridge the gap between education and industry by encouraging more females into the discipline and gearing them up for the workplace, developing valuable employees and a set of role models for our future female students.”

Dr. Blouin notes that another instrumental aspect of tackling diversity within the Faculty lies within the Computer Science curriculum. “We have worked hard at developing our curriculum to better prepare students for the working world and support them with crucial skills development,” he says. “Our curriculum has shifted to focus on more hands-on learning, deeper problem solving and team work. We are also very keen to demonstrate the meaningful connection between computer science and society through teaching the history of science and technology.”

As this shift happens, the Faculty hope to shelve traditional stereotypes and act as a catalyst for meaningful change, not only in education and industry, but for society as a whole.

HOW CAN YOU HELP?

As a member of our community, you can support our mission to bring more female talent and perspective into technology.

• Be a voice to the movement and help us share our message with prospective female students.
• Consider directly influencing gender diversity through funding and giving your name to a Women in Technology Scholarship.
• Inspire students to become your future leaders through mentorship and guidance.
• Hire workplace ready students for co-op.

CONTACT adrienne.power@dal.ca to get involved.
EQUALITY IN THE DIGITAL WORLD?

WE THINK IT’S POSSIBLE.

The Faculty of Computer Science is working to double the number of women entering our undergraduate programs for 2018. But we can't do it alone. From funds for scholarships to meaningful internship opportunities to volunteering as a mentor, this is your opportunity to support the future you'd like to see. Contact adrienne.power@dal.ca to get involved.

Learn more at. CS.DAL.CA/WeAreAllCS
Supporting the next generation of tech leaders

Since launching three years ago, sandbox ShiftKey Labs has come a long way in supporting the next generation of entrepreneurs and innovators. “Halifax has become a real hub for start-up activity in the east coast of Canada, particularly in the technology sector where we are seeing huge advances,” explains Grant Wells, manager of ShiftKey Labs. “We have been working hard to develop initiatives to bridge the gap between students, industry and other provincial partners to create opportunities for emerging start-up talent.”

Launched in 2014 as part of a provincial initiative, the sandbox is a collaborative space hosted by the Faculty of Computer Science at Dalhousie in partnership with Saint Mary’s University, the Nova Scotia College of Art and Design, the Nova Scotia Community College and Volta Labs.

As well as hosting and mentoring resident start-ups, Wells coordinates a diverse program of sessions and initiatives to encourage, develop and promote the entrepreneurial and innovative talents and ambitions of students, many of which include industry and alumni partners.

“Students get real value from hearing from, and working with, industry and members of our alumni community who can share their experiences and offer a real-world insight into being an entrepreneur or working in the tech industry,” says Wells. “The sandbox not only aims to nurture start-up talent but also prepare students for the workplace, whichever path they decide to go down.”

“Halifax has become a real hub for start-up activity in the east coast of Canada,”
Grant Wells, manager of ShiftKey Labs.

Tackling real business problems

Hackathons have become a popular feature of the ShiftKey Labs events calendar, for students and industry. Taking place over a number of days, students tackle real industry-led business problems, during Hackathons which take place throughout the year. Wells champions this type of session for benefitting all parties.

“For our industry partners sponsoring Hackathons, they have the opportunity to gain insight into realistic solutions for issues they are facing in their business. For students, the sessions act as a chance for teams and individuals to develop their skills, access industry expertise and gain recognition for their ideas. Hackathons really are a win-win for students and industry.”

A recent Hackathon saw Halifax-based social media analytics company Leadsift benefit from students tackling issues that affect their clients on a day-to-day basis. Founded by Dalhousie Computer Science alumni, Leadsift presented some of the common problems they are seeing in industry including corporate Twitter account mapping, B2B/B2C classification of online profiles and social media post classifiers, and asked student teams to use their skills to present feasible solutions.

Inspiring students to succeed

“The other side of the coin in preparing students for life as an innovator is mentorship and inspiration from the people who are living it,” says Wells. “Students respond really well to hearing from those who have been in the same position as them and made their dream a reality. It adds a more human element to the journey, stepping away from the technical and focusing on personal development and the traits needed to succeed.”

Nova Scotia Sandboxes Introduction to Innovation Bootcamp teams and judges
A focus for the year ahead for ShiftKey Labs is to develop the opportunities for students to take advantage of this insight through a series of panel and fireside chat style sessions with alumni and industry partners. “Alumni are an invaluable asset to us, they have been where students are currently, maybe even on the same program, they have the benefit of hindsight and students can really learn from them.”

“I would love to see more alumni, from all stages of the career ladder and a variety of roles and sectors, getting involved with ShiftKey Labs. We are always looking for new ways to engage students and support them with developing their skills. There is a world of opportunities opening up in the east coast tech sector and we are dedicated to giving students the best start in finding their place after graduation.”
This year, the world’s premier interdisciplinary conference on data science, data mining, knowledge discovery, large-scale data analytics, and big data, KDD2017, came to Halifax. The international conference was chaired by Dr. Stan Matwin, Director of the Institute for Big Data Analytics in collaboration with Shipeng Yu of LinkedIn and a team of organizers including Local Chair Dr. Evangelos Milios from the Faculty of Computer Science.

This was no small accomplishment, the conference has typically been hosted in some of the biggest cities in the world, including Beijing, Sydney, New York and Paris. Being invited to host this year’s conference was a significant recognition of the strength of our team in this field and the strength of the proposal they had put forward. It was also a big event for the city of Halifax and the Province of Nova Scotia. In his opening remarks Mayor Mike Savage conferred upon Dr. Matwin and Dr. Milios the honorary title of Ambassadors for the City of Halifax. As the conference progressed researchers in both academia and industry benefited from access to the latest research and leading practitioners in the field.

For 5 days, over 1600 participants from 51 countries met for a wide range of activities and networking opportunities. This was the largest KDD conference held outside of the United States and the third largest overall, after KDD2016 in San Francisco and KDD2014 in New York. It was held at the World Trade and Convention Centre, with the largest events taking place in the Scotiabank Centre and the Cunard Centre.

The conference continued its tradition of a strong tutorial and workshop program on leading issues of data mining during the first two days, including some hands-on tutorials on practical data science tools. The last three days were devoted to contributed technical papers, describing both novel, important research contributions and deployed, innovative solutions. An outstanding lineup of industry speakers shared their expertise in deploying industrial data mining solutions. Three keynote talks, by Cynthia Dwork, Bin Yu and Renée J. Miller touched on some of the hard, emerging issues before the field of data mining. A KDD panel brought together industry experts to discuss the future of artificially intelligent assistants. There was also a “Meet the Editors” Panel – to make KDD researchers aware of the academic journal opportunities for publishing. A new feature this year was the series of “Meet the Experts” sessions – informal roundtable meetings where graduate students and early career researchers could discuss research programs and career development plans with established experts.

KDD 2017: An international success for both experts and students
Recognizing the importance of student participation, KDD2017 awarded a record amount of $145,000 to support student travel. Students were also offered the opportunity to work at the conference, doing a range of essential tasks such as working at the registration desk, putting swag bags together, helping with events, or helping delegates to find their way around. In exchange for 8 hours of work, free access to all conference activities was provided. Some 40 graduate students from at least three Nova Scotia universities took this opportunity to participate in the conference. Many students also benefitted from the Broadening Participation in Data Mining (BPDM) workshop, receiving mentoring in how to more effectively pursue their ambitions in the field. Zahraalsadat Alavizadeh, currently doing a Masters in Electrical Engineering at Dalhousie, spoke to industry representatives about trends, job requirements and how to become more eligible to employers. The Google mentor helped her to format and optimize her CV. She left with a fresh idea about changing her field of study to Computer Science for her PhD. Another Dalhousie student, Sara Khanchi, currently working on her PhD in Computer Science was given helpful advice on how to present a pitch to others and gained some valuable insight into the issue of whether to pursue a career in academia or industry.

Some of the research presented at KDD2017 has already begun to receive attention in the media. IT World Canada mentioned a research paper on embedding based online local event detection in geo-tagged Tweet streams. Business Insider published a feature on the presentation from Amazon Labs researchers on their work on an algorithm that can learn about styles from images and recreate similarly styled garments from scratch. The Daily California and Berkeley News highlighted the presentation by UC Berkeley student Rebecca Portnoff on her creation of two algorithms aimed to scan through online sex advertisements and identify human trafficking circles. ZDNet profiled the analogy gap research conducted by Carnegie Mellon University researchers and presented at the conference.

Halifax has proven itself to be ready to host premier international events in the high tech area; it is hoped that more world-class events will follow. KDD2018 will be held in London, England, in August, 2018.
BACHELOR OF COMPUTER SCIENCE

Our intensive Bachelor of Computer Science program graduates exceptional designers and builders of new software technologies. Students, many of whom have never coded before, not only develop great programming skills, but also master core software design concepts that allow them to flourish in an ever-changing technological landscape.

Our Computer Science program allows students to customize their degree to their interests and personality with 5 specialization options in Data Science; Graphics, Gaming and Media; Artificial Intelligence and Intelligent Systems; Communications Technologies and Cyber Security; and Bioinformatics.

KEY FACTS 2017

765 STUDENTS  962 ALUMNI
4 YEARS PROGRAM LENGTH
97% GROWTH 2016/17 – 2017/18
EXPERIENTIAL & WORK INTEGRATED LEARNING: CO-OP OPTION

Left: Madison Campbell (front row centre) and Mariam Ragab (front row, far right) and other UTC participants
It’s one thing to read about life in Canada’s North. It’s another to experience it first-hand.

“We get so much coverage about the North and the issues the North is facing, but all the coverage is negative,” says Mariam Ragab, a Haligonian who despite being only 16 years old recently completed her first year of the Bachelor of Computer Science. “I thought it would be really interesting to go up there and actually meet youth and see what they really like about being there and what they don’t like.”

Mariam and fellow Dalhousie student Madison Campbell spent time in Iqaluit, Nunavut in March 2017 as part of Global Vision’s Arctic Youth Ambassador Caucus, a gathering that brings together dozens of youth from across Canada (North and South) to share ideas on how to approach some of the challenges facing Northern communities.

Like Mariam, Madison was there to get a glimpse of life behind the typical narratives that so often seem to shape southern Canadians’ views of the North.

“You don’t hear about all the young leaders up there who are trying to make a difference in their community,” says the second-year Kinesiology student from Cole Harbour.

Madison and Mariam brought their own unique perspective to the four-day event, which included history lessons from community Elders, traditional cultural activities, and roundtables with local leaders and government officials on issues such as food security, health care, the environment and education.

Madison, a varsity soccer player, saw a connection between her studies in Kinesiology and the challenge of physical inactivity among children in some northern communities. So, before she left for Iqaluit, she reached out to middle school and high school soccer teams in the community to organize some practices. She also booked meetings with coaches and the children so that she could learn more about why more kids aren’t signing up for sports.

“I talked to the kids playing soccer and asked them, ‘Why aren’t your friends playing soccer?’ They said they don’t have a field to play on, that they play on a parking lot made of dirt, rocks and roots.” These insights helped illuminate for Madison some of the challenges these communities face in engaging in physical activity.

Madison came prepared to offer those kids some extra support: while raising money to attend the caucus earlier in the year, she collected extra contributions to put toward soccer gear. She ended up being able to bring along two soccer nets, more than 100 jerseys and 50 soccer balls to leave behind in Iqaluit, thanks in part to funding from Cole Harbour Soccer as well as the Career and Leadership Development Centre and the President’s Office.

Mariam went seeking insights into how mental illness impacts people in the North, given that she is developing her own charity focused on how technology can help end stigmas around mental health.

“Some of the best ways we can help the North or get the North to help itself is through computer programming literacy,” she says. “There are currently some programs being established by volunteers and by indigenous communities to do that.”

“I think technology plays a huge role in the way we move forward with things, and I think that goes back to all aspects of life including mental health and education,” she says.

Mariam and Madison say they heard a lot about the educational limitations, including one girl who said she wasn’t able to take Grade 12 math because there is no teacher at her school to teach it and because the Internet is too slow to do it through a distance course.

“It’s those little things that we don’t think about,” says Mariam. “people are dropping out of high school, but what are the reasons behind this?”

It was exactly the kind of personal insight they went to Iqaluit seeking — and one of many they’ll share with peers and others in Halifax and in the future when talking about Canada’s North.
Students awarded for their contributions to our community

Six Faculty of Computer Science students, including individuals from the Bachelor of Applied Computer Science program, were honoured for their accomplishments outside of the classroom at the 6th Annual Impact Awards.

Aisha Abawajy, Mariam Ragab, Hasmeet Singh Chandok, Yaser Alkayale, Gabriella Mosquera and Salman Sajid celebrated their achievements at the awards ceremony earlier this year.

“Our Impact Award winners represent the spirit, academic excellence and diversity of Computer Science at Dalhousie and demonstrate the impact students can have on the university and wider community”, said Andrew Rau-Chaplin, Dean of the Faculty of Computer Science.

2017 IMPACT AWARD
FACULTY OF COMPUTER SCIENCE WINNERS

RISING STAR AWARDS
Awarded to first, second and third-year students who have demonstrated an outstanding level of commitment, leadership, creativity and initiative to the Dalhousie Student Union, as well as the community and campus at large.

Aisha Abawajy for her contribution to student life through her numerous society and committee positions for the Computer Science Society, the Dalhousie Student Union Elections Committee, the Dalhousie African Students Association to name a few.

Mariam Ragab for her enthusiasm on and off campus including her establishment of RESULTs Canada-Dalhousie Chapter, dedicated to raising awareness and funds for developing countries.

INTERNATIONAL STUDENT OF THE YEAR
Awarded to the student who has demonstrated the highest level of excellence in leadership, engagement in the community, inspires others, and is a respected voice for international students at Dalhousie.

Hasmeet Singh Chandok has demonstrated his leadership and community engagement skills after launching the Maritime Bhangra Group and Sikh Student Association at Dalhousie, amongst other accolades.

FACULTY LEADERSHIP AWARDS
Awarded to a student in good academic standing in each Dalhousie faculty. These students exemplify the highest level of passion for their discipline, take initiative in creating new opportunities, and encourage their peers to engage in faculty events. Faculty Leadership Award winners positively impact other students in their faculty and the reputation of their faculty outside of the classroom.

Yaser Alkayale for his entrepreneurial passion and dedication to supporting the Syrian community in Canada and international students, including the introduction of a Syrian Student Coding Camp.

Gabriella Mosquera for co-finding the Computer Science Graduate Society, dedication to diversity in the faculty and support of external humanitarian projects.

BOARD OF GOVERNORS’ AWARDS
The Governors’ Awards are the top student awards at Dalhousie University. They recognize students who contribute to the quality and vitality of the university and the achievement of its mission, through both their academic accomplishments and their involvement in campus life. They are awarded each year for exceptional contributions or leadership in such areas as university governance, development of a sense of community on campus, community service, internationalizing the campus, visual or performing arts, minority access, or athletics, while maintaining a GPA of 3.0 or above.

Salman Sajid was presented with this top student award in recognition of his outstanding contributions to student life, chiefly his work to support international students and his commitment to bringing groups together to help the community.
BACHELOR OF APPLIED COMPUTER SCIENCE
The Bachelor of Applied Computer Science cultivates leaders with a deep understanding of how to develop, manage and deploy technology so that organizations can achieve their goals. Students not only develop programming skills, but also essential problem solving, applied computing, communication and management abilities, ready for the workplace. The program emerged in 2016 following developments and a name change for the Bachelor of Informatics.

KEY FACTS 2017
114 STUDENTS  62 ALUMNI
4 YEARS PROGRAM LENGTH
200% GROWTH 2016/17 – 2017/18
 EXPERIENTIAL & WORK INTEGRATED LEARNING: CO-OP OPTION

L-R, top to bottom: Aisha Abawajy, Mariam Ragab, Hasmeet Singh Chandok, Yaser Alkayale, Gabriella Mosquera, Salman Sajid
A Siri-like app, developed by current and former Dalhousie students, to assist older people and those with dementia to recall information easily and independently using artificial intelligence has recently been awarded $50,000 investment after success at national and regional competitions.

In November, Volta Labs in partnership with Innovacorp and BDC Capital, launched the Volta Cohort – a new $125,000 micro fund for Atlantic Canadian early-stage companies. The Dalhousie-based team, MyMem were one of five Halifax companies to be awarded a $25,000 funding and mentorship package at the November 14th launch event, following a competitive pitching process. This follows similar success at a national ideathon competition. Back in October, AGE-WELL Network of Centres of Excellence and HACKING HEALTH hosted the culmination of a Canada-wide competition to identify and invest in new technologies and services to support healthy aging. MyMem placed second in the national initiative and took home $25,000 investment.

MyMem is the creation of alumnus Eric Fisher (PhD Biochemistry & Molecular Biology ’13) and current Master of Applied Computer Science program students Harish Gopinath, Arun Athisamy, and Aishwarya Ravichandran.

“We wanted to develop a solution for dementia sufferers and their families to make things easier for those suffering from memory loss, their caregivers and families,” said Ravichandran. “Through AI based personalized voice command, MyMem helps people living with dementia recall information quickly and independently, and hold onto memories and experiences. It will enable users to access important information and photos by voice command, requiring very little proficiency with technology. We hope the app will be fun to use as well as helpful and believe this could change the way disorders such as dementia are approached.”

MyMem’s recent accomplishment follows first-place success earlier this year at HACKING HEALTH HALIFAX in March, and Nova Scotia Sandboxes Introduction to Innovation Bootcamp in May.

The team is based out of innovation sandbox ShiftKey Labs in the Goldberg Computer Science Building, where they have benefitted from the expertise of lab manager, Grant Wells.

“MyMem have shown real potential since the idea was first conceptualized earlier this year,” says Wells. “The app could have a huge impact on people’s lives and the way in which health professionals deal with dementia, related disorders and those living with them.”

Following their recent wins, MyMem are looking ahead and moving forward with tailoring the app to better serve customers.

“The investment from both competitions will make a huge difference in how we can continue to innovate and develop the best product possible for users,” Harish Gopinath says. “We are hoping to go public with the app in 2018 and the investment of support and money we have received so far will really help to make this happen.”
PhD student hacks the beach

A tropical beach isn’t exactly the first working environment that comes to mind when thinking about computer science and cyber security. However, this became a reality for Computer Science PhD student Trishla Shah.

Earlier this year, Trishla returned from a month-long Hackathon in Goa, India after becoming the only student outside of Germany to be named as a finalist in Berlin-based Security Research Labs annual “Hack the Beach” competition.

“It was a great honour to be selected from over a hundred students from across the globe to take part in the Hackathon, it was a bonus that being shortlisted meant an escape from the Canadian winter to a much warmer climate.”

Trishla’s winning project proposal focused on identifying flaws, and potential hacking opportunities, in cell phone communications security when making payments.

Originally from India herself, Trishla relished the opportunity to be back on home soil whilst working on a real-time, industry driven security research project alongside sector experts and fellow researchers.

“We spent 24 hours a day in a beachside villa devising a solution to credit card forgeries through the tap and pay system. It was the first time I have worked on a real-time, real-life business problem in this way.”

“The environment, collective learning and industry input really helped us to harness our creativity and get the best out of each other. One of the most rewarding aspects of the experience were the opportunities we had to give our insight to industry and help them to develop a blueprint for a quality solution to their security issues. It isn’t often you get to give real value back to a company.”

Alongside the 24/7 Hackathon, participants had the chance to attend international security conference Nullcon, network with global organizations and indulge in watersports, yoga and meditation.

“I am so used to research-based work and operating in an academic setting. I gained a lot through a change of scenery, working with industry to devise realistic solutions where costs, production factors and feasibility had to be taken into account. The confidence and self-discipline I have developed through working with individuals from different backgrounds and working cultures will support me in my day-to-day research here at Dalhousie and into the future.”
Contributing to Nova Scotia’s technology agenda

“I’ve lived in various places around the world but there’s something about Halifax that has made me want to be here for the foreseeable future, it’s friendly, safe and thriving.” Since leaving his birthplace of Saint Kitts, Jay Harris has lived in cities including New York and New Delhi but his experience of residing in Halifax during his graduate studies have left him wanting more.

Harris is coming to the end of the Master of Electronic Commerce program but has managed to secure a job in Halifax before graduating. “My class is only small but we are all international students, and to my knowledge, have all found work while studying. Most of us have opted to stay in Halifax, I think this really shows how the city is growing as a technology hub and is also credit to how the program prepares students for success.”

After forging a career as an IT Manager, Harris decided a move away from “fixing” was in order and developed an interest in how technology and business work together, resulting in his application to Dalhousie. “The Master of Electronic Commerce at Dalhousie really stood out to me as it gives you the opportunity to combine computer science with business and even law,” says Harris. “This rounded experience is the perfect stepping stone to make a positive shift in your career.”

The opportunity to work in different fields, build a network and develop a real understanding of the sector in Nova Scotia, helped Harris to move into his current role as a project coordinator for the Collaboration for Analytics Research Education & Technology or CARET. “I refer to myself as a “CARET Evangelist”, acting as a catalyst for the collaboration and inclusion of new technology across Nova Scotia.”

CARET is a collaboration between seven post-secondary institutes in Nova Scotia, including Dalhousie, and IBM Canada with the aim of addressing shortages and gaps in the technology sector within the province. Initiatives include creating career opportunities for new graduates, attracting more technology companies to Nova Scotia and connecting applied researchers with industry partners.

Having studied, and now enjoying employment, in the province, Harris is passionate about contributing to Nova Scotia’s technology agenda and supporting regional economic growth through his work.

“I feel fortunate to have found a home in a city where the technology sector is thriving but we need to continue working hard to ensure a bright future for students, graduates and industry,” Harris says. “I’m excited to see what the future brings and hope that our efforts support in retaining and attracting more talent to Nova Scotia.”

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**MASTER OF ELECTRONIC COMMERCE**

The Master of Electronic Commerce program is a collaboration between Dalhousie’s Faculty of Computer Science, Rowe School of Business, and the Schulich School of Law. The program is the first of its kind in Canada, equipping students to tackle the challenges of change by looking deeper into the forces that shape technology markets through an understanding of web technologies, e-business and internet law.

**KEY FACTS 2017**

- 40 STUDENTS
- 108 ALUMNI
- 24 MONTHS PROGRAM LENGTH
- 29% GROWTH 2016/17 - 2017/18
- EXPERIENTIAL & WORK INTEGRATED LEARNING: INTERNSHIP OPTION
Using Digital Health technology to improve the Canadian healthcare system

For 20 years, Raza Abidi has been involved in health informatics in Canada, from academics and innovation to advocacy and policy-making. He has understood the health care delivery needs within Canada and has worked hard as an educator in this field to develop a high-quality workforce.

“Cutting-edge research coming out of Dalhousie is supporting the development of health informatics technologies and specialized solutions for complex health issues,” says the director of health informatics. “We aim to answer some difficult questions in healthcare through turning data into knowledge.”

Dr. Abidi’s research is advancing knowledge technologies to address complex challenges in healthcare. His research program has led to real-life innovative solutions in terms of point-of-care clinical decision support systems incorporating computerized clinical guidelines, Health data analytics enabling precision medicine and health resource utilization insights, patient empowerment services to assist chronic disease self-management, behaviour modification and ambient assisted living, and personalized lifetime health programs to raise awareness of chronic disease risks.

He has also developed several innovative and real-life digital health systems, such as the Pathology Lab Utilization System (PLUS) that employs health data analytics and visualization to optimize pathology laboratory utilization through a physician’s scorecard and a lab manager’s dashboard providing intelligence about laboratory utilization; the Personalized Risk Investigation, Stratification and Mitigation (PRISM) framework to empower citizens to perform personalized risk assessment, risk monitoring and behaviour modification activities to mitigate chronic disease risks; IMPACT-AF based on Canadian guidelines for atrial fibrillation to assist physicians manage atrial fibrillations and patients to self-manage their condition; and D-WISE framework that empowers primary care physicians to deliver patient-specific behaviour change interventions; and engage patients with diabetes to adhere to their personalized behaviour change strategy.

Dr. Abidi’s vision and efforts have influenced the promotion of health informatics education and systems in countries around the world. In late-2016, his efforts were rewarded with the Leadership in the Field of Health Informatics award from COACH, Canada’s Health Informatics Association. This award recognizes an individual’s outstanding and ongoing contributions as a thought leader, both nationally and internationally, to advance Canadian health informatics.

As an academic in health informatics, Dr. Abidi has trained over 700 health informaticians many of which have been through the Master of Health Informatics program at Dalhousie. “Our alumni are now influencing healthcare in Canada and globally,” Dr. Abidi notes. “The impact of the research and development taking place in the field is having a critical impact on the way many aspects of healthcare is approached, including in developing countries.”
Most of us will be aware that modern technologies like social media and gaming can sometimes take up too much of our time. We can feel compelled to play to one more level, to check our messages one more time or to post one more update. We can find ourselves wondering why we spend so much time on this activity at the expense of other priorities.

It is of course no accident that such technologies are so persuasive and attractive; keeping your attention and influencing your choices are central to the business interests of the large social media and gaming companies. And they are pervasive. The literature tells us that 99% of adolescent boys and 94% of adolescent girls play games, a figure which includes people of all ethnic groups. In North America, this adds up to 2 billion hours a week spent playing games.

Dr. Rita Orji, a researcher in Human-Computer Interaction, joined the Faculty of Computer Science in July 2017. She sees an opportunity in exploring the use of these persuasive technologies in applications to help people to achieve constructive changes in their behavior, such as the improvement of diet or the control of binge drinking. She hopes to build on the wide adoption and motivational platform of games in order to empower people in their decision making.

“One of the reasons why people can get stuck in an unhealthy habit is that the consequences of unhealthy behaviors are in the future, far enough away that they do not make a significant impact on the decisions of today,” Dr. Orji explains. “Gaming, however can simulate real life choices and consequences in ways that make more of an impression on the immediate decision making process.”

In a recent project, Dr. Orji and her colleagues demonstrated that this can be an effective tool, but that techniques of gameplay motivation need to be specifically tailored to the personality of each user.

“A technique that motivates one user might actually be demotivating to another,” says Dr. Orji. “Working with over 1000 subjects, divided in to 7 personality types, we tested 10 different persuasive technology strategies to create an optimal list of strategies for each personality type.”

“We compared this model of game design to the more common “one-size-fits-all” model and found that it could overcome some of the weaknesses of the monolithic model and achieve significant change in motivation and behaviours in users.”

The project was written up in a paper that won the Best Journal Paper of the Year Award from User Modeling and
User-Adapted Interaction (UMUAi), a top Human-Computer Interaction Journal. Further research has applied the model in designing and personalizing behavior change systems and showing their efficacy. It has been accepted and will be appearing in the ACM Transactions on Computer-Human Interaction (TOCHI), a premier journal in Human-Computer Interaction.

Dr. Orji considered a number of other offers before coming to Dalhousie, and her interview here was the last one she attended. “At that interview, I discovered a supportive environment and was pleased to experience good interactions with the faculty and the students on the selection committee,” Dr. Orji says. “Halifax is an attractive city and I am looking forward to continuing my work here, and connecting further with the research that is going on in the Faculty of Computer Science.”

She has recently been named as one of the top 150 Canadian Women in STEM by non-profit hErVOLUTION.
Systems, Networks and Security

TAKING A CLOSER LOOK AT VIDEO SURVEILLANCE
Digital networks enable many of our personal and professional activities these days, but few of us look very closely into how they work or how they might be improved.

For Dr. Israat Haque, however, the topic is both fascinating and essential. “The growing importance of networks in our lives means that anything we can learn about how to improve their design and efficiency can have positive impacts in a wide range of applications,” says Dr. Haque.

A recent project of Dr. Haque’s focused on the problems of video surveillance systems in applications, such as border security or traffic monitoring. “Increasing numbers of cameras in a system can create a data flow that surpasses the bandwidth of the network, causing issues for those doing the monitoring,” Dr. Haque explains. “In systems such as this it is usually not necessary to transport the entire set of raw data generated by all of the cameras to the observation centre, especially where multiple cameras are set up with overlapping views.”

Dr. Haque and her colleagues from Cisco and the University of California Riverside were interested in the challenge of efficiently transporting the relevant data to the observation centre, given a limited bandwidth.

Their solution involved two major steps. Firstly, they removed the redundancy from multiple camera views, stitching two images into one, cutting the amount of data to be transported. In the second step, they moved away from a fixed allocation of bandwidth per camera to a more dynamic distribution. Bandwidth would be allocated unevenly in response to the demands of the system.

As Dr. Haque explains, “By observing the network state and allocating more bandwidth to cameras where changes were occurring, the system could allow the transport of significant data at the expense of insignificant data. This optimization introduced a certain overhead, but if only applied on demand that overhead would be minimized for an organization.”

The paper was presented at The IEEE International Conference on Network Protocols (ICNP) last November and won the Best Paper award. It has since been cited by researchers at the University of Calgary Auroral Imaging Group who are applying these methods to their own network of sensors looking at the near-Earth space environment.

Dr. Haque joined the Faculty of Computer Science this summer. “I’m looking forward to continuing my research here through collaborations with colleagues, industry and government,” Dr. Haque says. “I am interested in how Software Defined Networking can be applied to a range of network challenges. This technology is relevant to video surveillance systems but also to ideas of smart homes and smart cities.”

“Although opportunities arose to work in the United States, I was attracted by the research excellence here at Dalhousie and in the quality of life available in a smaller Canadian city.”
Big Data and Machine Learning

MAKING LIFE EASIER
Dr. Fernando Paulovich arrived at Dalhousie in April to take up his position as a Tier 2 Canada Research Chair in the Faculty of Computer Science. Previously based at the University of São Paulo in São Carlos, Brazil, he brings with him two students and a lot of research questions.

Although the move meant leaving behind a well-established research lab in a large Faculty, he welcomes the opportunities here in Canada to make closer research collaborations with industry and to be part of a more stable research funding environment.

Dr. Paulovich describes his research as Information Visualization and Visual Analytics. “Much of my work so far has been motivated by problems I encounter in my own life,” he says.

A music lover, he realized he had a personal collection of thousands of MP3s but only currently played a small selection, the remainder becoming forgotten over time. “The pieces of music that gradually slip into this forgotten space are no less valuable than those that are still being played, but it requires too much cognitive effort to retain an active awareness of all of them,” explains Dr. Paulovich.

Applying the tools of Visualization to this collection, Dr. Paulovich used machine learning to classify all of the pieces of music on a number of different parameters: genre, mood, gender, and intensity. He then created a visual interface to plot all of the pieces of music according to these parameters, with similar pieces of music occupying positions close to each other. It is then simple, for example, if you have been enjoying a song by Amy Winehouse, to be reminded of other adjacent songs in your collection that are similar.

“In this way, we can see the whole collection at once and be reminded through a straightforward visualization of other songs that would appeal to us in our current mood,” says Dr. Paulovich. “The visualization also enables the user to rotate the orientation of the parameters used in the multidimensional space so that any combination of parameters line up, grouping certain characteristics more definitely. So essentially, if you want to see all the sad songs by female vocalists you can line up the parameters and cluster them all together.”

Such techniques could apply to many different media collections. Another area with direct personal relevance to Dr. Paulovich is research papers. Conducting a literature review is becoming more and more difficult due to the larger and larger volumes of papers and the increasing production rate of new papers related to any given topic. “Tools to organize such collections are increasingly needed,” he argues.

At Dalhousie, Dr. Paulovich is interested in investigating collections of data which evolve over time. He will be building up his research lab, recruiting new graduate students and making connections with other researchers and industry partners. In the long term, he is interested in such problems as how to extract answers to common sense questions from the massive amounts of data available through search engines such as Google.

“If you want to decide whether or not to move from Brazil to Halifax there should be a simpler way to access the whole knowledge base and get a reliable answer based on the parameters that are important to you,” Dr. Paulovich says. “However, that might take some time!”
Alumni Stories

SUZANNE HODGKINSON  
Class of 2005

“I’ve always had the travel itch and working in health informatics has given me ample opportunities to live and work across the globe.” Since graduating from Dalhousie’s Master in Health Informatics program in 2005, Suzanne Hodgkinson’s career has taken her to Paris, Abu Dhabi, Geneva and now London, UK where she is a senior project manager for US-owned Cleveland Clinic.

“Working with different cultures and nationalities has really opened my eyes to how we need to carefully consider our approach to implementing effective healthcare systems based on the needs of local populations,” Hodgkinson explains. “I have seen various sides of the spectrum, from working in developing countries to now working in the UK where the healthcare system is very well established, therefore offering different challenges when considering how we use technology.”

It was a personal experience of shortcomings in the Canadian healthcare system that inspired Hodgkinson to go down the path which led her to the Master in Health Informatics program at Dalhousie. “I had originally planned on pursuing a career in media but an encounter with healthcare inefficiencies really impacted me and left me wondering how technology wasn’t solving some of these issues,” she says. “The program at Dalhousie was instrumental in preparing me for a career as a technology project manager. I left my studies realizing that technology is all about communication and connecting people, something which has really set me up for working in such a diverse industry.”

Prior to moving to the UK, Hodgkinson worked with the United Nations in Geneva on a project implementing mobile technology and mHealth strategies in partnership with the World Health Organization, a role which has left an impression. “It’s really powerful to see what a huge difference a seemingly small technology change, such as a basic SMS system, can make to healthcare systems in developing countries. We sometimes take technology for granted but working in my field, and having exposure to so many different walks of life, highlights that we all still have a long way to go.”

Hodgkinson’s passion for moving healthcare forward to address the challenges of the modern world can be seen in her pursuits outside of the day job, with her studying as a nutritional therapist at the College of Naturopathic Medicine. “I’m very interested in the impact functional medicine has on addressing the needs of the changing healthcare landscape - one that is more personalised and patient-focused, rather than disease-focused,” explains Hodgkinson. “Preventing illness and disease is becoming a necessity for saturated health services around the world, so I feel methods such as nutrition and eastern medicine will start to receive more attention in the future.” Ultimately, it is about keeping people healthy in the first place.

As for the next adventure? “I’m a big fan of continually reinventing myself through learning and travel so who knows what or where the future holds. There are definitely a few more adventures on the horizon!”
Ashwin Kutty could be best described as a consummate explorer. “I’m fascinated by the various facets that impact on our day-to-day lives. I started my career working in roles in Education, Healthcare and Municipal Services to gain a real understanding of this,” says the 1999 BSc. with an Advanced Major in Computer Science alumnus.

The culmination of Kutty’s experience resulted in him founding WeUsThem, with fellow Dalhousie alumna Faten Alshazly. The Halifax-based full-service creative agency is internationally recognized for their work, with accolades including a Gold Davey Award for their Experience by Design web and mobile application, myEXP, for McMaster University – a first of its kind in the healthcare industry.

“It motivates me every day that WeUsThem enables us to help join the dots and make life easier for businesses and individuals through our creative services,” says Kutty. “My experience working in various industries has been of huge benefit in helping me to understand our client’s needs and the everyday challenges faced. I’d like to say we help make life better.”

In addition to the numerous awards WeUsThem has collected over the years, Kutty himself has not gone unrecognized. To name a few, he has been named Business Person of the Year by the Halifax Chamber of Commerce, a Top 50 CEO by the Atlantic Business Magazine, a Next Generation Leader by the Government of Canada and the Peter Brojde Foundation, and has been commended for his Innovation by ITAC & COACH.

What does the business leader attribute to his success? “Any accolades I have received are as much for the entire team at WeUsThem as they are for me, a cliché I know but it really is true,” says Kutty. “I also cannot stress enough how important getting involved in the community is to developing as an individual and as a business, it gives you experience and a different outlook which has huge benefits on how you do your job.”

Kutty dedicates much of his spare time to supporting the development of the business community, advising on strategy, structure and alignment for accelerated growth while also looking to improving the lives of those within the communities he resides in. He has been an advisor for the former Entrepreneurs Forum (e3) and continues to advise businesses and entrepreneurs through Innovacorp, NSBI and ISANS.

He is also an active member of the Dalhousie alumni community, supporting the university and students through volunteering. From judging startup competitions and mentoring young innovators, to connecting talent across the province, Kutty continues to support the learning enterprise through academia to entrepreneurship.

“We have a responsibility to support the next generation of leaders. Starting a business isn’t easy, students need to hear and learn from those who have done it to get the tools and motivation to succeed.”
As a member of our alumni community, there are plenty of ways you can engage with Dalhousie, the Faculty and our students. Don’t be a stranger.

**ATTEND** alumni events on and off campus

**NETWORK** and make valuable contacts through our social media channels

**VOLUNTEER** with our students and share your insight

**HIRE** students to fill your graduate, co-op and internship roles

We’re always keen to hear your success stories, stay in touch
alumni@cs.dal.ca