School of Computing Queen's University

October 2021
Volume 1, Issue 1

NSERC CREATE Cybersecurity

Inside this issue:

The Impact of CREATE Cybersecurity	*1*
GOOGLE sponsored event—2021	*1*
How Our Students are Changing the World	*2-3*
Our CREATE Graduates	*4*
What Our Students are Saying	*5*
Our Internship Hosts	*6*
Our CREATE Partners	*7*
Publications	8
Upcoming Events	8
In closing . . .	8

The Impact of CREATE Cybersecurity

The CREATE Cybersecurity Program is a multi-million dollar project funded by NSERC, Royal Military College of Canada (RMC) and Queen's University. It was developed to address the disturbing shortages of highly skilled and trained cybersecurity experts, a chilling dilemma that is faced today by the majority of countries worldwide.

According to RiskBased: "Data breaches exposed 36 billion records in the first half of 2020" with 86% of breaches being financially motivated and 10% being motivated by espionage. Canadian banks, government, healthcare, critical infrastructure, and businesses are ill prepared to block the thousands of daily cyber attacks and remain vulnerable to the possibility of a future critical event, that will be costly not only financially, but could have significant repercussions on our daily lives. There is also limited capacity to educate the public to safely navigate an online world which represents a frightening scenario considering 95% of cyber breaches are caused by human error. "An estimated 300 billion passwords are used by humans and machines worldwide". (Cybersecurity Media)

The CREATE Cybersecurity program was designed as a comprehensive plan of action that not only trains Masters and Ph.D. students in the areas of cybersecurity, but offers an insightful strategy of incorporating cross-disciplinary graduate courses examining the legal, political, and organizational framework for cybersecurity and the challenges created by rapidly changing technological capabilities.

Dr. David Skillicorn, Principal Investigator, CREATE Cybersecurity Program

The overall impact of the CREATE Cybersecurity program will create cyber barriers for cyber threat actors and eliminate countless data breaches in order to keep Canada and our allies safe from vulnerable attacks.

GOOGLE Explore CSR Sponsored Event—2021

Wendy Powley, Associate Professor, School of Computing

There are only between 13 and 18 NSERC CREATE grants approved each year with currently a total of 95 grants across Canada.

Professors with a VISION – In the fall of 2020, Wendy Powley, Associate Professor at the School of Computing, was able to secure a generous grant from the Google Explore CSR project. Coupled with her grass roots organization CAN-CWiC (Canadian Celebration of Women in Computing), a marketing strategy was implemented to attract more womxn to the field of computing, with a focus on cybersecurity and the NSERC CREATE program. In January 2021, hundreds of womxn from all across Canada and internationally, joined us for a series of events that included 4 workshops presented by our graduate students:

1. Why Cybersecurity Matters— *Maryam Davari*

2. Software & Cybersecurity The Knowledge Gap—*Lama Moukahal*

3. A Hacker, a Detective & a Cop—*Aanvista Chaudhry*

4. Security in Wireless Communication—*Anika Anwar*

Following the workshops, a Careers and Grad School panel hosted by our graduate students and two career women speakers, Angela Anand, RCMP IT and Criminal Intelligence Expert and Colleen Merchant, Director General of National Cyber Security at Public Safety Canada, attracted attendees wanting to further their computer science studies or those looking for a career shift. The overwhelming interest that ensued led to a monthly series of cybersecurity speaker events.

Lastly, a Cybersecurity Case Competition was hosted by Queen's University, Royal Military College & CAN-CWiC, that offered prizes and a $5,000 CREATE Cybersecurity summer internship, attracting over 100 enthusiastic participants.

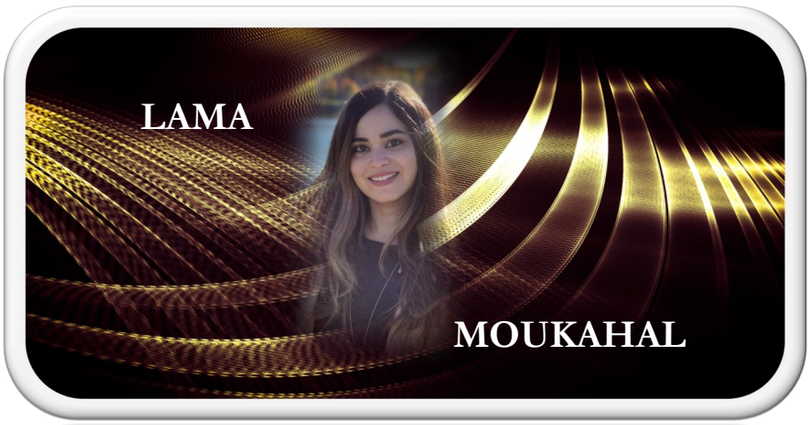
The Google Explore CSR events resulted in attracting numerous CREATE Cybersecurity students to our program this fall, our highest influx to date.

Google recognized the success of this initiative by offering an additional grant for the 2021-22 school year. Our gratitude and thanks go to Wendy Powley, CAN-CWiC, RMC and of course, GOOGLE for their generous support!

If it were measured as a country, then cybercrime — which is predicted to inflict damages totaling $6 trillion USD globally in 2021 — would be the world's third-largest economy after the U.S. and China. – Steve Morgan, Editor-in-Chief, Cybercrime Magazine.

Special Feature: *Our Students' Accomplishments— Making the World a Safer Place*

Dr. Mohammad Zulkernine, CREATE Supervisor



- AVSDA: autonomous vehicle security decay assessment published by SecureComm
- Vulnerability oriented fuzzy testing for connected autonomous vehicle systems published by IEEE Transactions on Reliability
- Vehicle software engineering (VSE): Research and practice published by EEE Internet of Things Journal
- Vulnerability-Oriented Fuzzy Testing for Connected Autonomous Vehicle Systems-2 patents pending. IEEE Internet of Things Journal
- Regression test cases prioritization using clustering and code change relevance. International Journal of Software Engineering and Knowledge Engineering

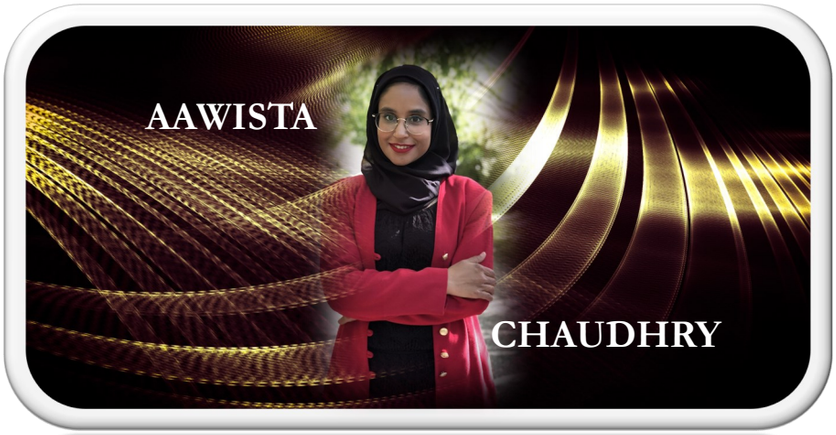
$3.86 million is the global average cost of a data breach (IBM)

In 2020, the average time to identify a breach was 207 days. (IBM)

Dr. David Skillicorn, CREATE Supervisor

- A Bootstrapped Model to Detect Abuse and Intent in White Supremacist Corpora published by IEEE International Conference on Intelligence and Security Informatics

Special Feature: *Our Students' Accomplishments— Making the World a Safer Place*



Dr. Mohammad Zulkernine, CREATE Supervisor

- Csearch Best Presentation Award, Queen's University - inaugural Computing Student Research Conference. Students from across North America shared views, discussed research, and presented their projects

95% of cybersecurity breaches are a result of human error (Cyberint)

~ ~ ~ ~ ~

Over 77% of organizations do not have a cyber security incident response plan (Cyberint)

Dr. Mohammad Zulkernine, CREATE Supervisor

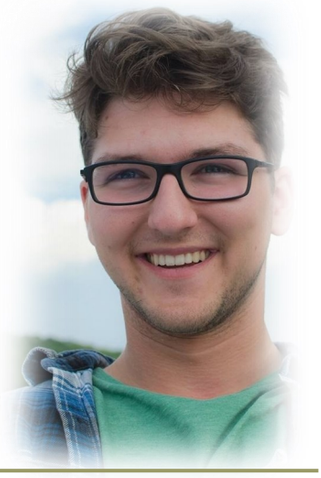
- Trustworthy collaboration of connected and autonomous vehicle published by IEEE Transactions on Reliability

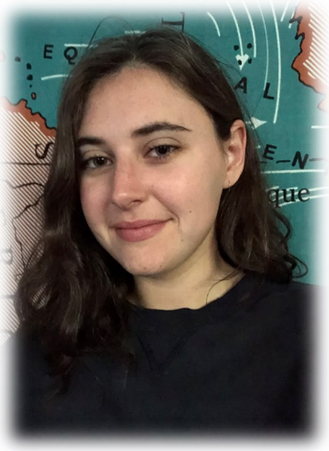
PROUD TO ACKNOWLEDGE OUR GRADUATES

Dr. David Skillicorn, CREATE Supervisor

BENJEMIN SIMONS

Canadian Security Exchange





SCARLETT TAVISS

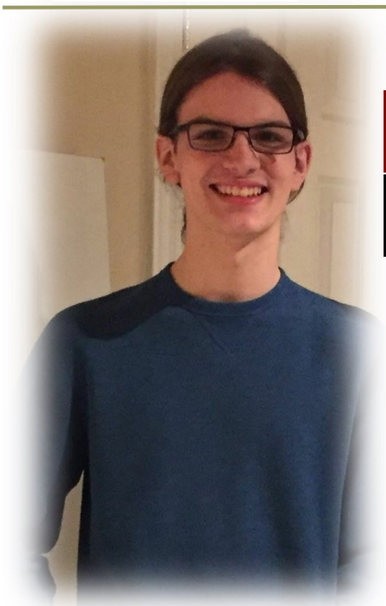
IBM

Dr. Mohammad Zulkernine, CREATE Supervisor

Dr. Christian Leuprecht, CREATE Supervisor

DOMINIC MOTT

Public Safety's National Cyber Security Directorate



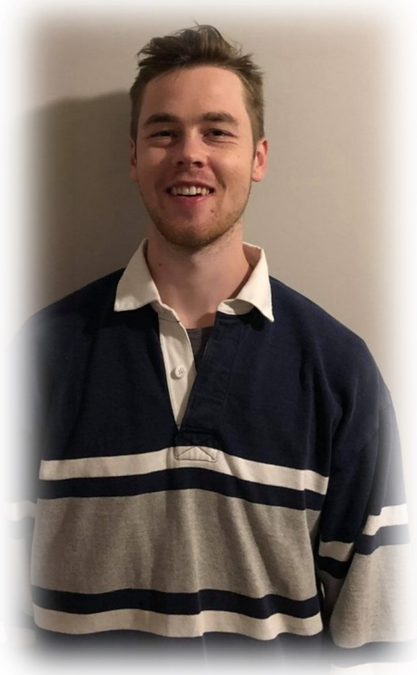
HUNTER ORR

QUEEN'S UNIVERSITY

Dr. David Skillicorn, CREATE Supervisor

DOMINIC MOTT

CREATE Cybersecurity Testimonial



2019-2020 NSERC Cybersecurity CREATE Program Participant, MPA Category

Over the past year and a half, I participated in and recently completed the NSERC Cybersecurity CREATE Program. As a Queen's Master of Public Administration student who was interested in cybersecurity but did not initially have a strong technical or cyber background, I found this certificate program to be an extremely rewarding opportunity that accentuated my master's degree.

The program guided me to participate in a diverse number of areas, including ongoing meetings with the participants on the Computer Science side of the program, attend conferences, and develop my career skillset through the Queen's Learning Hub courses. In partnership with IBM, the program also facilitated a Tabletop exercise, where we participated as cybersecurity officers during a critical infrastructure attack.

Under the guidance of Professor Christian Leuprecht and as part of this program, I was able to write a research paper on cyberespionage, expanding my understanding of the current legislative regime in connection to the changing nature of espionage.

Two central elements that I found to be most interesting and useful in this program were enrolling in the two cyber courses at the Royal Military College, which broadened my understanding of cyber, especially in connection to Government functions, international relations and of the current global cyber environment.

The second part that I found beneficial was the internship with a Government of Canada department. I had a summer internship with the National Cybercrime Coordination Unit and had the opportunity to work on policy with very talented and experienced policy professionals.

Above all, I believe that the Cybersecurity CREATE Program will be beneficial to anyone who has a strong interest in a career in cyber policy development and analysis. I thoroughly enjoyed this certificate, and it provided me with the experience necessary for a career within the cyber ecosystem and encouraged me to continue research in this field.

Please view Dominic's video testimonial at https://cyber.cs.queensu.ca/testimonials.php

The FBI's Most Wanted List for cyber criminals currently contains 30 individuals, and many of those are responsible for consumer losses ranging from $350,000 to $100 million.

OUR STUDENT INTERNSHIP HOSTS

Royal Canadian Mounted Police

amazon

irdeto

COMMUNICATIONS SECURITY ESTABLISHMENT
CENTRE DE LA SÉCURITÉ DES TÉLÉCOMMUNICATIONS

BOMBARDIER

Deloitte.

RBC

NCR

OUR CREATE PROGRAM PARTNERS

NSERC
CRSNG

COMMUNICATIONS
SECURITY ESTABLISHMENT
CENTRE DE LA SÉCURITÉ
DES TÉLÉCOMMUNICATIONS

COLLÈGE MILITAIRE
ROYAL DU CANADA
ROYAL MILITARY
COLLEGE OF CANADA

Royal Canadian
Mounted Police

IBM

irdeto

National Défense
Defence nationale

Public Safety Canada
publicsafety.gc.ca

Treasury Board of Canada
Secretariat

EXPERIENTIAL
LEARNING HUB

Publications—Cybersecurity for Everyone by David B. Skillicorn

Cyberspace is a critical part of our lives. Although we all use cyberspace for work, entertainment, and social life, much of its infrastructure and operation is invisible to us. We spend a big part of our lives in an environment that is almost an essential service but is full of potential dangers: a place where criminals can commit new kinds of crimes, where governments can exert political pressure, and where we can be hurt by the unthinking actions of the bored and careless.

Making cyberspace more secure is one of the challenges of our times. This is not only (or perhaps even primarily) a technical challenge. It requires actions by governments and businesses to encourage security whenever possible, and to make sure that their own actions do not undermine it. Unfortunately, many of those in a position to do something about cybersecurity do not have the background to understand the issues fully. Cybersecurity for Everyone will help by describing the issues in a way that is accessible to anyone, but especially those from non-technical backgrounds.

UPCOMING EVENTS—2021

Women in AI Dinner October 18th, 2021 Toronto Canada Artificial Intelligence, Women In Cybersecurity	AI in Finance Summit Toronto 2021 October 19th, 2021 Toronto Canada Artificial Intelligence, Blockchain, FinSec
BSides Calgary 2021 October 21st, 2021 Calgary Canada BSides, Hacker Conference	IANS Toronto Virtual Information Security Forum 2021 October 21st, 2021 Toronto Canada CXO Level
Forum on Canadian Cyber Security 2021 November 3rd, 2021 Ontario Canada	BSides Toronto 2021 November 6th, 2021 Toronto Canada BSides, Hacker Conference
HackFest 2021: Nightmare Edition November 19th, 2021 Quebec Canada Hacker Conference	Canada West Virtual Cybersecurity Summit November 23rd, 2021 Montreal Canada CXO Level

In Closing—by Dr. David Skillicorn

Our first two years have been challenging. We had barely begun the program when Covid hit, impacting our students' opportunities for internships and disrupting courses and research, as well as the personal lives of both students and faculty. However, we have managed to find ways to implement almost all of the value added activities; we have had out first graduates; and we have a substantial group of new students beginning in Fall 2021.

Thanks to everyone who has had to work extra hard though this difficult time, especially our government and industry partners, and our Advisory Board.

Queen's University
School of Computing

CREATE Cybersecurity

Goodwin Hall
25 Union Street

Phone: 613-533-6050
Fax: 613-533-6513
Email: cyber-info@cs.queensu.ca

cyber.cs.queensu.ca

A program offered by Queen's University and the Royal Military College of Canada