

# Edward Leung

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## SUMMARY

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A driven master student with solid foundation in software and hardware. I am enthusiastic about research and innovation in applications in the quantum computing space. My goal is to apply my knowledge from previous experiences to drive practical advancements in the field. **I am actively seeking roles that allow me to contribute my knowledge and skills to bring innovative ideas to reality.**

## EDUCATION

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### UNIVERSITY OF BRITISH COLUMBIA

Expected December 2024

#### **Master of Applied Science, Electrical and Computer Engineering**

*NSERC CREATE in Quantum Computing Scholar*

Related Course Work: *Quantum Algorithms and Software Engineering, Intro. To Quantum Information and Computation, Applications of Quantum Mechanics in Chemistry*

### YORK UNIVERSITY

April 2022

#### **Honours Bachelor of Engineering, Computer Engineering**

*Member of the Dean's Honour Roll 2019-20*

*CGPA: 3.44/4.0*

## SCHOLARSHIPS AND AWARDS

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MITACS Accelerate (in Progress)	September 2022
NSERC CREATE in Quantum Computing (in Progress)	September 2022
Rio Tinto Summer Undergraduate in Research in Engineering Award	May 2021
Kenaidan Contracting Award	November 2018
York University Student Life Award	September 2017
York University Automatic Entrance Scholarship	September 2017

## RESEARCH EXPERIENCE

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### GRADUATE RESEARCHER

September 2022 – Current

*University of British Columbia*

- Developed and implemented **Python** scripts to **automate electrical and optical experimental procedures**
- **Tested** and **constructed assemblies** for silicon photonics devices using photonic wire bonds, enabling their utilization, and testing at cryogenic temperatures.

### UNDERGRADUATE RESEARCH ASSISTANT

October 2021 – April 2022

*York University*

### UNDERGRADUATE RESEARCH ASSISTANT

September 2021 – December 2021

*McGill University, Temporary Part-Time*

### UNDERGRADUATE RESEARCHER

May 2021 – August 2021

*McGill University, Internship*

- Part of the Summer Undergraduate Research in Engineering at McGill University, worked with the Photonic DataCom team under the supervision of Dr. Odile Liboiron-Ladouceur
- Worked **collaboratively** with Dr. Hassan Rahbardar Mojaver, focused on **simulating**, and **analyzing** the impact of noise in an Optical Neural Network (ONN) using the **Python** library Neuroptica.
- Resulted in an end of term research poster titled "Mitigating Errors in Optical Neural Networks During Training"
- Innovatively applied **machine learning techniques** to **enhance the accuracy of multi-layered models** on the MNIST

dataset, highlighting the superior effectiveness of the Diamond mesh compared to other configurations.

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## PROFESSIONAL EXPERIENCE

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### APPLICATION DEVELOPER INTERN

May 2020 – December 2020

*Bank of Montreal Financial Group, Internship*

- Worked apart of the Direct Electronic Funds Transfer team, responsible for low value high volume payments of corporate clients
- Interacted with technology stakeholders to define, analyze, and deliver requirements that reflect the needs of both the business and end-customers
- **Actively designed and implemented** new features on a **Java**-based desktop application for managing users and permissions on a mainframe.
- Collaborated with **quality assurance to execute thorough regression testing on upgrades** to the electronic funds system.

### CHANGE AND PROBLEM PROCESS ANALYST INTERN

May 2019 – August 2019

*Bank of Montreal Financial Group, Internship*

- Ensured daily activities are applied and completed as required by the BMO ITIL Process with the use of ServiceNow
- Performed Change and Problem governance on the respective ITIL Processes to ensure performance, compliance, value, and quality
- Identified and detected (Incidents, Configuration Items affected, Changes, Problems and Conflicts) to reduce the impact to customer service
- Participated in team communication ensuring activities are implemented according to ITIL Process Standards

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## POSTER PRESENTATIONS

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**Edward Leung**, Daniel Julien-Neitzert, Mohammad Khalifa, Mukhlasur Tanvir, Becky Lin, Donald Witt, Sudip Shekhar, Joseph Salfi, Jeff Young, and Lukas Chrostowski. *Quantum IO*. Poster presentation delivered at Quantum BC Day, Victoria, BC, May 2023

**Edward K. Leung**, Hassan Rahbardar Mojaver, Simon Geoffroy-Gagnon, and Odile Liboiron-Ladouceur. *Mitigating Errors in Optical Neural Networks During Training*. Poster presentation delivered at the Summer Undergraduate Research in Engineering 2021 Poster Fair (Remote), Montreal, QC, August 2021.

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## PUBLICATIONS

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Mojaver, K. H. R., Zhao, B., **Leung, E.**, Safaee, S. M. R., & Liboiron-Ladouceur, O. (2023). *Addressing the programming challenges of practical interferometric mesh based optical processors*. Optics Express, 31(15), 23851-23866.

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## EXTRACURRICULARS AND RELATED PROJECTS

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### IBM QUANTUM CHALLENGE 2021

May 2021

- Constructing a Toffoli gate using basis gates and rotations while minimizing costs
- The building and simulation of a Shor's algorithm circuit to factorize numbers
- Using Surface Code to minimize the error of a circuit by fitting it to the layout of the Quantum Computer
- Minimizing the gate cost of a simulation of the LiH molecule, receiving a cost of 172

### IBM QISKIT GLOBAL SUMMER SCHOOL

July 2020

- A two-week summer school designed to cover the basics of Quantum Computing with a focus on Superconducting Devices and Quantum Chemistry Applications
- Daily lab sessions included simulations of Grover's Algorithm, Quantum Teleportation, Quantum Fourier Transform, Shor's Algorithm, Error Mitigation using Repetition Codes, as well as a simulation of a LiH molecule

### IBM QUANTUM CHALLENGE

May 2020

- Manipulating Qubits into Bell and GHZ states and interpreting its results on a real noisy quantum computer

- A simulation of the BB84 protocol, an application of a Quantum computer to encrypt and decrypt messages between two parties
- Approximated a unitary using only U3 and CX gates with a focus on cost and accuracy resulting in a total cost of 310
- Solution of unitary resulted in 375<sup>th</sup> place out of the total 1745 participants

#### COKE-PEPSI CLASSIFIER

May 2020

- Using a pre-trained convolution neural network model, ResNet-34, to create a classifier used to determine between Coca-Cola and Pepsi related images taken from Google Images
- Manually cleaning and transforming images to create a deeper and richer dataset to improve classification
- Trained the classifier with varying learning rates to minimizing errors in the validation set whilst maximizing the accuracy of the model, resulting in an accuracy in the testing set of 97.2%

#### MOTION ACTIVATED SOAP DISPENSER

March 2020

- Developed a C program using MCUXpresso for the LPC804 microcontroller, utilizing internal clocks and system interrupts to communicate with a 7-segment display, servo motor, ultrasonic sensor, and push button
- Communication between microcontroller and peripherals use protocols such as GPIO, PWM and internal timers such as System Tick, Multi-rate, and Self-Wake-up
- Designed and created for an embedded systems course, received a final grade of A+

#### TITANIC SURVIVAL PREDICTOR

Kaggle

December 2019

- Applying factors such as age, sex, and fare type of passengers who had survived the disaster to train a logistic regression model using the scikit-learn library
- Using the trained model to predict if a passenger would survive based on the same factors; scored a 77.5% accuracy rating based on Kaggle's scoring system

#### ELECTRICAL ENGINEERING AND COMPUTER SCIENCE TEAM

York University Robotics Society

September 2018 – December 2018

- Communicated with others to manage and design deliverables and due dates
- Worked as part of a large team (20 members) to design the rover's electrical systems and software (i.e. managing circuitry and connecting them to parts of the rover's drive and controller systems)

#### TECHNICAL SKILLS

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**Operating Systems:** Windows, Ubuntu

**Languages/Packages:** Java, C, Python, Octave/MATLAB, PennyLane, Qiskit, NumPy

**Hardware:** General Lab Equipment, Cryogenic Experimentation, Optics, Electrical/Photonic Wire bonding

**Tools:** Jupyter Notebook, Microsoft Office Suite, Unix Terminal, GitHub, G Suite

**Interpersonal:** Time Management, Problem-Solving, Adaptability, Team-oriented, Works well under pressure, Goal-oriented