

PENGCHENG (LOUIS) BU

<https://louisbu.github.io/>

EDUCATION

Dalhousie University

MSc in Mathematics

September 2023 - Ongoing

Halifax, NS

Supervisor: Dr. Robert Milson

Dalhousie University

BSc in mathematics with honours and Minor in Computer Science

September 2019 - June 2023

Halifax, NS

Supervisor: Dr. Robert Milson

Harry Ainlay High School

International Baccalaureate Diploma, Alberta Highschool Diploma

September 2016 - June 2019

Edmonton, AB

EXPERIENCES

Science Atlantic MSCS 2023

Attendee, Presenter

October 2023

Charlottetown, PEI

- Attended Science Atlantic Mathematics, Statistics, and Computer Science Conference 2023 at University of Prince Edward Island.
- Presented 2023 Mitacs Internship results as a graduate student talk.
 - Abstract Title: A Comparative Study on Optimization Methods for Maritime Transport Routing;
 - Supervisors: Dr. Robert Milson, Dr. David Gómez-Ullate.
- Won first place in Graduate Student Presentations.

Canonical Green

Mitacs Internship

June 2023 - September 2023

Madrid, Spain

- Developed and improved the backend that computes and optimizes maritime transportation routes in Python and other scientific computing packages. Utilized Numpy and vectorization tools to preprocess and interpolate data, which is then used for optimization algorithms.
- Integrated optimization algorithms and improved computation pipeline for all three classes of solutions (Hybrid Search w/ Zermelo's Navigation Problem, A* Search, and CMA-ES Genetic Algorithm).
- Worked on a ready-to-publish paper with the results of the internship, collaboration with Dr. Daniel Precioso, Javier Jiménez, Dr. Rafael Ripoll-Ballester, Dr. Robert Milson, Dr. David Gómez-Ullate.
- Attended Wildlife Monitoring Bots: Environmental Monitoring: An Exploratory Workshop at Spanish Royal Academy of Sciences, Madrid.
- Met with Startup companies at the PIER Halifax to discuss potential collaboration of
- Worked At ie University for the duration of the internship.

Atlantic Topological Quantum Field Theory (TQFT) Spring School

Attendee

May 2023

Wolfville, NS

- Attended the Atlantic TQFT Spring School hosted at the Old Orchard's Inn. It was organized by Theo Johnson-Freyd and Geoff Voors. The school provided an introduction to some aspects of TQFT, a powerful organizing framework for many areas of mathematics and physics.

Canadian Mathematics Society (CMS) Winter Meeting 2023

Attendee

December 2023

Montreal, QC

- Attended CMS Winter Meeting 2023 hosted in Montreal, QC.

Nova Scotia Math Circles*Presenter, organizer*

April 2022 - Ongoing

Halifax, NS

- Travelled and presented/taught intriguing math topics to K-12 students around Halifax Region;
- Provided valuable feedback and suggested changes on the presentations; and listened to suggestions to improve as a public speaker.
- Kangaroo Math Contest planning Committee: Help with seating arrangements, room setup, and invigilator scheduling.

IBM Qiskit Halifax Hackathon*Attendee*

Jan 2023

Halifax, NS

- Attended a one-day hackathon, utilizing IBM's `qiskit` development kit with python.
- Improved and extended a pre-existing Julia set fractal generator from a 3 quantum-bit Fourier Transform to 5 quantum-bit Fourier Transform applied to a section of music. Achieved Honorary Mention/Runner-up of the competition.

Science Atlantic MSCS 2022*Attendee, Presenter*

October 2022

Sackville, NB

- Attended Science Atlantic Mathematics, Statistics, and Computer Science Conference 2022 at Mount Allison University
- Presented summer research results as student contributed talks.
Abstract Title: Hybrid Search: Application of Zermelo's Navigation Problem.;
Supervisor: Dr. Robert Milson.

Symmetry, Invariants, and their Applications*Attendee*

August 2022

Halifax, NS

- Attended Symmetry, Invariants, and their Applications: A Celebration of Peter Olver's 70th Birthday Conference.

Komorebi AI*Summer Intern*

June 2022 - August 2022

Halifax, NS

- Prototyped and developed a path-routing algorithm for container ships to reduce fuel consumption (carbon emissions) and voyage time using Python (Numpy, Scipy, Google's JAX) as an application of Zermelo's Navigation Problem;
- Improved a time-dependent, Discretized-Jacobi-Newton Method developed by Sebastián J. Ferraro et al., and implemented in previously mentioned path-routing algorithm.
- Results presented at Science Atlantic MSCS 2022 as mentioned above.

TEACHING EXPERIENCES

Dalhousie University*Teaching Assistant*

September 2021 - Ongoing

Halifax, NS

- MATH 1280T08: Engineering Calculus I
- MATH 1290T04: Engineering Calculus II

Nova Scotia Math Circles*Presenter, organizer*

April 2022 - Ongoing

Halifax, NS

- Presented intriguing math topics to K-12 students around Halifax Region;

PUBLICATIONS

Preprints

- Hybrid Search method for Zermelo's navigation problem

ACHIEVEMENTS

Graduate Presentations, Science Atlantic MSCS 2023

October 2023

- First place in Graduate Student Presentations.

Mitacs Accelerate International Program

June - Aug. 2023

- Awarded CAD\$15,000 worth internship for research in maritime transportation routing optimization mentioned above.

George H. Campbell Scholarship

2022

- CAD\$1000 worth scholarship for outstanding GPA

Dean's List

2019-2022

- Award for achieving term GPA above 3.70.

Student Honour Roll, Fermat Contest

2018

The Center for Education in Mathematics and Computing (CEMC)

Edmonton, AB

- Achieved Group IV (132 - 133) in 2018 Fermat Contest.

EXTRACURRICULAR ACTIVITIES

University Societies

Sept. 2019 - Ongoing

DGMSS & DUMASS & DUGS

Halifax, NS

- Sept. 2019 - May. 2020: DASSS (Dalhousie Arts and Social Sciences Society) representative, Dalhousie Undergraduate German Society (DUGS);
- Sept. 2020 - May. 2021: President, DUGS; Secretary, Dalhousie Undergraduate Mathematics and Statistics Society (DUMASS);
- Sept. 2021 - May. 2022: Secretary, DUMASS;
- Sept. 2022 - June. 2023: President, DUMASS; Dalhousie Science Society (DSS) representative (Acting).
- Sept. 2023 - May. 2024: Masters Students representative, Dalhousie Graduate Mathematics Students Society.

Director/Executive Member

September 2017 - September 2018

Canadian Student Leadership Conference 2018

Edmonton, AB

- Planned and Organized Seating arrangements for ~ 1000 students and teachers in school gym; Made Blueprint layout for seating with AutoCAD.
- Attended workshops and talks by Chris Hadfield and others.

SKILLS

Languages

Python, Java (OOP), Maple, Mathematica

Software

Affinity Photos, AutoCAD

Tools

LaTeX, Git

Spoken Languages

English (fluent), Chinese (native); German (Deutsches Sprachdiplom A2\B1)