Ryan Bush

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Education

University of Waterloo Waterloo, ON

Bachelor of Mathematics in Pure Mathematics (Co-op) *Sep. 2020 – Aug. 2025*

- 4th-year student with major average of 93%
- Coursework including linear algebra, multivariable calculus, functional analysis, differential geometry, computational mathematics, statistics, formal logic, graph theory, optimization, functional programming, imperative programming

Experience

Tutoring Centre Coordinator May 2023 – Aug. 2023, Sept. 2024 – Dec. 2024

University of Waterloo *Waterloo, ON*

- Guided students' learning in 8 mathematics courses, including linear algebra and multivariable calculus
- Managed scheduling and accountability of tutors
- Gathered usage statistics and recommended data-backed changes to scheduling

Undergraduate Research Assistant Jan. 2024 – April 2024

University of Waterloo (Supervisor: Prof. Alexandru Nica) *Waterloo, ON*

- Delivered department seminars on high-dimensional analysis relating to machine learning theory
- Developed Python scripts to numerically analyze the structure of semi-meandric systems
- Proved novel theorems regarding the enumeration of semi-meandric components
- Funded by the Mathematics Undergraduate Research Award (MURA)

Computer Science Instructional Support Assistant Jan. 2022 – April 2022, Sept. 2022 – April 2023

University of Waterloo (Course: CS135, Functional Programming) *Waterloo, ON*

- Led team responsible for automatically testing and grading student-submitted code
- Communicated with course instructors and delivered on strict timelines for a class of more than 1100 students
- Worked fluently in a Linux terminal environment
- Developed detailed online documentation for job duties
- Proof-read and marked assignments
- Held additional instructional sessions for students

Projects

PyTorch Transformer Model for Shakespeare | *Python, PyTorch* Feb. 2025

- Followed the paper *Attention Is All You Need (2017)* to replicate the transformer architecture
- Obtained and processed training data
- Ported trained model to run CPU bound on the browser

Neural Network for Handwritten Digit Recognition | *JavaScript, Node.js, npm, HTML, CSS* Dec. 2021

- Developed a neural network with feed-forward architecture to recognize digits from the MNIST database
- Implemented without the use of any external libraries
- Visualized network input and corresponding logits
- Applied advanced linear algebra and multivariable calculus

Raymarching Rendering Engine | *C* Sept. 2021

- Developed a 3-dimensional capable renderer employing the raymarching method
- Implemented without the use of external libraries in C
- Applied advanced linear algebra and multivariable calculus

Technical Skills

Languages: Python, C/C++, JavaScript, HTML/CSS, R, Racket
Developer Tools: Git, SVN, Visual Studio Code, Vim, Netlify CI/CD
Libraries: NumPy, SciPy, Matplotlib, PyTorch