

CALLUM HEPWORTH

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Education

University of British Columbia

Bachelor of Applied Science, Engineering Physics

- Cumulative GPA: 4.00/4.33

Vancouver, BC

Sept. 2018 – Present

Skills

Languages: Python, JavaScript, Java, C/C++, HTML/CSS, SQL

Frameworks: ReactJS, VueJS, Bootstrap, Flask, ROS

Tools & Libraries: Git, mpi4py, pytest, JUnit, OpenCV

Work Experience

Teaching Assistant - Data Structures & Algorithms

September 2022 – Present

University of British Columbia

Vancouver, BC

- Supervised twice-weekly lab sessions of **30+ students**, providing guidance on assignments assessing the fundamentals of data structures and algorithms
- Hosted a weekly office hour, providing 1:1 support to a class of **200+ students**

Machine Learning Research Intern

July 2022 – August 2022

SLAC National Accelerator Laboratory, Stanford University

Menlo Park, CA

- Empowered research teams by enabling **real-time** data analysis, visualization, and error detection through the development of a **Python** tool to concurrently parse and analyze streams of high-dimensional experimental image data
- Developed an algorithm to perform incremental principal component analysis (iPCA) at scale ($\sim 10^5$ images of $\sim 10^5$ features each) by leveraging relevant academic findings as identified through a comprehensive literature review
- Achieved a **100x** increase in runtime performance by identifying and parallelizing rate-limiting steps through performance benchmarking using the **MPI Message Passing Interface**

Software Developer Intern

January 2020 – December 2020

Validus Research, Inc.

Waterloo, ON

- Significantly decreased project turnaround times by streamlining user workflows through the development of an internal-facing web application in **Vue.js**
- Facilitated the intuitive comparison of varied client information by retrieving, formatting, and displaying analytical data through an integrated UI and data retrieval pipeline
- Empowered users by enabling the exporting of formatted project data to a customized .xlsx file through a **Flask API** in **Python**, retrieving relevant data from an internal database using **SQL**
- Returned after initial four month internship (January - April) on a part time basis starting in July 2020

Projects

Particle Simulation and Reconstruction | Docker, Python, C

September 2021 – May 2022

- Developed user-facing **Python** wrapper for **Docker** deployed **C** program used to generate simulated datasets of particles imaged through cryogenic electron microscopy, improving runtimes to adequately handle large workloads
- Implemented iterative refinement algorithm to reconstruct simulated 2D datasets into 3D particles, leveraging academic literature to benchmark performance
- Upheld best software development practices, including maintaining a rigorous test suite in **pytest** with minimum **90%** code coverage, to facilitate extensibility of open-source project repository

Autonomous Robot Control | Python, ROS, Deep Learning, Computer Vision

September 2020 – December 2020

- Using the **ROS** framework, developed a simulated robot in **Python** and **C++** capable of autonomously navigating a competition surface
- Designed an image capture algorithm to reliably record the license plates of passing vehicles, subject to a SIFT keypoint match threshold
- Planned and implemented a convolutional neural network using **TensorFlow** and **Keras** to classify characters from license plate images, achieving **99%** classification accuracy on test dataset