

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

WORK EXPERIENCE

Teaching Assistant - Data Structures & Algorithms

September 2022 – Present

University of British Columbia

Vancouver, BC

- Provide personalized support to a class of **200+ students** through the hosting of a weekly office hour
- Supervise twice-weekly lab sessions, providing guidance on assignments assessing the fundamentals of data structures and algorithms

Machine Learning Research Intern

July 2022 – August 2022

SLAC National Accelerator Laboratory

Menlo Park, CA

- Expanded an existing data analysis framework in **Python** to concurrently parse and perform principal component analysis (PCA) at **120 Hz** on a **4-megapixel** image data set
- Explored existing solution landscape through a comprehensive literature review, correctly identifying incremental PCA (iPCA) as a method of promise
- Identified rate-limiting steps through performance benchmarking, parallelizing iPCA using the **MPI Message Passing Interface** to achieve a **100x increase** in update frequency

Software Developer Intern

January 2020 – December 2020

Validus Research, Inc.

Waterloo, ON

- Designed and expanded internal-facing web application in **Vue.js** to streamline analyst workflow, significantly reducing work overhead for the creation and maintenance of new and existing projects
- Developed UI and data pipeline allowing analysts to retrieve, format, and display analytics data from multiple sources, facilitating an intuitive comparison of varied client information
- Built **Flask API** in **Python** to allow for retrieval of relevant data from a **SQL** server, exporting formatted and cleaned project data to customized .xlsx file
- 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

TECHNICAL SKILLS

Programming Languages: Python, JavaScript, Java, C/C++

Frameworks & Databases: ReactJS, VueJS, Flask, ROS, MySQL

Tools & Libraries: Git, pytest, JUnit, MPI, OpenCV, Keras, Tensorflow