ORION JUNKINS

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Passionate about building intelligent systems with tangible impacts in the real world.

EDUCATION

Eidgenössische Technische Hochschule (ETH) *September 2023 - Present*
MSc in Computer Science *Zürich, Switzerland*
Major in Visual & Interactive Computing, Minor in Machine Learning
Overall GPA: 5.6 / 6

Oregon State University Cascades *November 2019 - June 2023*
B.S. in Computer Science *Bend, Oregon*
Major in Software Engineering
Overall GPA: 3.99 / 4

University of Canterbury *February 2019 - November 2019*
Overall GPA: 8.5 / 9 *Christchurch, New Zealand*

WORK EXPERIENCE

Full Stack Data Reporting Intern *June 2022 - September 2022*
Tanium *Remote, OR*

- Developed features for Tanium's Reports, Dashboards, and Data Explorer tools.
- Improved server-side data pipelines in Golang to enable flexible downsampling for large volumes of temporal data.
- Introduced new front-end features using Typescript and React to increase the actionability of data insights.

Computer Vision/Automated Testing Intern *June 2021 - September 2021*
Intel *Remote, OR*

- Constructed an AI agent using Tensorflow Object Detection to automate complex GUI interaction workflows.
- Provided a high-level API for scripting workflows across any human-facing GUI (e.g., Vulkan / DirectX11 / DirectX12 games, launcher applications, browser pop-ups, and system dialogue pop-ups).
- Integrated agent into the Graphics Performance Analyzer's existing Jenkins CI Pipeline to automate testing against AAA games.

PUBLICATIONS

P. J. Donnelly and O. Junkins, "Short-Term River Forecasting with a Stacked Ensemble of Tributary Models"
2022 7th International Conference on Frontiers of Signal Processing (ICFSP), Paris, France, 2022. View on IEEE.
Developed an efficient and scalable river flow forecasting approach using an ensemble of spatially distributed GRUs. Validated with a 110-day simulation for three rivers. Outperformed available forecasts from the National Oceanic & Atmospheric Administration (NOAA) with a 2.85 % reduction in MAPE for 24-hour forecasts. Read Paper. View GitHub. View Presentation.

PROJECTS

Functional Neural Connectivity During Cognitively Challenging Tasks *May 2024 - present*
Extending prior work by Dr. Hanna Poikonen, studying cortical activity in expert and novice mathematicians through EEG. Exploring differences in functional connectivity to understand how expert brains are unique. Additionally, exploring the role of embodied cognition in the form of free versus restricted hand gesture usage. Intending to pursue publication in early 2024.

Heart Rate Detection in Noisy PPG *February 2024 - June 2024*
Developed a custom algorithm for quantifying heart rate in noisy PPG data. Applied an augmented sliding window RANSAC approach to generate a continuous heart rate model that is robust to noise, motion artifacts, and interruptions in the signal. Developed as a course project for Mobile Health and Activity Monitoring. Received recognition as a top-performing model.

LevelSage - Real Time River Flow Rate Forecasting System *April 2021 - present*
Prototyped a novel approach to river level forecasting as a research project under Dr. Patrick Donnelly in 2021/22 (ICFSP paper described above). Led a team of three peers to build a full-stack application using this approach. Successfully hosted recurring model inference every 6 hours for 15 rivers on AWS with real-time forecasts available through a public-facing React front end. Attained total system maintenance costs of <$0.25 per model per month, proving the real-world feasibility of the approach. Continue to maintain as a passion project and teaching repository. View Poster. View Github. View Presentation.

Additional Work: A portfolio of some of my smaller course assignments and projects is available on GitHub. Notable highlights include Consensus Set Maximization with Branch and Bound and Structure From Motion.

TEACHING AND MENTORING EXPERIENCE

I held, and continue to maintain, a unique, multifaceted leadership role in my undergraduate program at OSU Cascades and Patrick Donnelly's Soundbendor Lab. My goals include growing the CS program and increasing the accessibility of research. Below is a collection of examples of my efforts toward these goals:

- **Lecture: "Stereo Triangulation for Object Distance in Self-Driving Cars"** *January 11, 2024*
  Interactively demonstrated stereo triangulation. Introduced the needed camera model and geometry theory. Guided participants through an example calculation on pen and paper. Delivered as a "Byte Session" talk at OSU Cascades.
- **Undergraduate Capstone Mentor** *June 2023 - June 2024*
  Mentored a 5 student capstone team through replacing the GRUs in my river forecasting codebase with Transformers.
- **Lightning Talk: "River Flow Rate Forecasting: A Deployability Centric Approach"** *May 22, 2023*
  Presented undergraduate capstone work. Won "Outstanding Lightning Talk Award" at CRSS 2023. View Presentation.
- **Lecture: "Introduction to Computer Vision"** *April 27, 2023*
  Interactively trained an object detection model. Delivered as a "Byte Session" talk at OSU Cascades. View Presentation.
- **Lecture: "Parallelism in Modern Languages: Python, Golang and Rust"** *April 26, 2023*
  Provided an overview of parallelism features across Python, Golang, and Rust. Delivered as an OSU course guest lecture.
- **Teaching Assistant for CS475: Parallel Programming at OSU Cascades** *Spring 2023*
  Assisted in crafting lecture and assignment content. Offered tutoring and office hours. Graded assignments.
- **Lecture: Introduction to Large Language Models** *January 26, 2023*
  Explained simple language models and outlined the advances that led to GPT3. Discussed the practical and ethical implications of using LLMs effectively in academia. Delivered as a "Byte Session" talk at OSU Cascades. View Presentation.
- **Founding Member of OSU Cascades CS Student Advisory Council** *December 2022 - June 2023*
  Engaged in regular meetings with the University President, Dean of College of Engineering, and CS Department head. Advocated for the student body in a series of conversations to shape the program's direction and structure.
- **Lecture: "Introduction to Time Series Forecasting"** *October 26, 2022*
  Introduced challenges and methodologies for applying ML to temporal data. Delivered as an OSU course guest lecture.
- **Manager of OSU Cascades Local Compute Resources** *September 2022 - June 2023*
  Negotiated the acquisition of and maintained $15,000 of computing resources, including NVidia GPUs, for free use by students in the CS department. Ensured all students have equitable hardware access for projects requiring CUDA.
- **Lecture: Conda Virtual Environments** *April 8, 2022*
  Outlined basics of Conda virtual environments. Delivered as a "Byte Session" talk at OSU Cascades. View Presentation.
- **Teaching Assistant for CS434: Introduction to Data Mining and Machine Learning** *Spring 2022 & Fall 2022*
  Assisted two semesters. Updated and restructured projects. Offered tutoring and office hours. Graded assignments.

AWARDS AND RECOGNITIONS

- **Award:** OSU Cascades Computer Science Distinguished Student *June 2023*
- **Award:** Student Life "Best Club President" *June 2022*
- **Research Grant:** Layman Fellowship Recipient *September 2021 & September 2022*
- **Scholarship:** Finley Academic Excellence *Recurring, 2021-2023*
- **Scholarship:** Randy V Puckett Memorial *Recurring, 2021-2023*
- **Scholarship:** Crouch Family Scholarship *Recurring, 2021-2023*
- **Scholarship:** UC International Merit *February 2019*
- **Scholarship:** UC College of Engineering Merit *February 2019*

TECHNICAL STRENGTHS

Languages:	Python, Golang, C++, Javascript/Typescript
Tools & Technologies:	Pytorch, Tensorflow, DarTS Forecasting, Pandas, Numpy, OpenCV, React, CUDA, OpenCL, SLURM HPC Manager, AWS, GCP, Git/GitHub, CI/CD
Bachelor's Coursework:	Visual Computing, Computer Graphics, Machine Learning & Data Mining Parallel Programming, Operating Systems, Advanced Web Dev, Cloud App Dev
Master's Coursework:	Advanced Computer Graphics, Computer Vision, Math. Foundations of Graphics & Vision Machine Perception, Algorithms Lab, Mobile Health, Probabilistic Artificial Intelligence Introduction to Neuroscience, Digital Technologies & Armed Conflict