

# ORION JUNKINS

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Looking for an applied research position at the intersection of vision, graphics, and AI.

## EDUCATION

### Eidgenössische Technische Hochschule Zürich (ETH Zürich)

MSc in Computer Science

Major in Visual & Interactive Computing, with a minor in Machine Learning

Overall GPA: 5.67 / 6

September 2023–Present

Zürich, Switzerland

### Oregon State University Cascades

B.S. in Computer Science

Major in Software Engineering

Overall GPA: 3.99 / 4

November 2019–June 2023

Bend, Oregon

### University of Canterbury

Overall GPA: 8.5 / 9

February 2019–November 2019

Christchurch, New Zealand

## EXPERIENCE

### Real-Time Graphics Intern

NVIDIA

September 2025–Present

Helsinki, Finland

- Developing real-time algorithms in the Slang GPU shading language to improve spatial sample reuse across all ReSTIR variants.
- Exploring bounds on path-space similarity across pixels. Work to be published as an ETH master's thesis in 2026.

### Full Stack Data Reporting Intern

Tanium

June 2022–September 2022

Remote, USA

- Developed server-side data pipelines in Golang to enable flexible downsampling for large volumes of temporal data.
- Introduced new frontend features using TypeScript and React to increase the actionability of data insights.

### Computer Vision/Automated Testing Intern

Intel

June 2021–September 2021

Remote, USA

- Created an AI agent for automating complex interactions in human-facing GUIs with the TensorFlow Object Detection API.
- Enabled automation of testing against AAA games for Intel's Graphics Performance Analyzer tool.

## 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

### Advanced Computer Graphics Final Project

September 2024–January 2025

Implemented RIS, ReSTIR DI spatial reuse, and a realistic camera model for physically based rendering. Built these features on top of the Nori 2 educational platform after implementing core functionality (e.g., sampling, BRDFs, ray tracing, path tracing, photon mapping) throughout the semester. Completed as part of the Advanced Computer Graphics course at ETH Zürich. Won second place in the 2024 ETH Rendering Competition. [View report](#).

### Functional Neural Connectivity During Cognitively Challenging Tasks

May 2024–January 2025

Extending prior work by Dr. Hanna Poikonen, studying cortical activity in expert and novice mathematicians through EEG. Exploring the relationship between expertise, embodied cognition (through free versus restricted gesture), and cognitive load, focusing on how these factors inhibit or promote alpha synchrony. Actively pursuing publication. [View semester thesis](#).

### LevelSage – Real-Time River Flow Rate Forecasting System

April 2021–June 2024

Extended my ([published](#)) research prototype into a full-stack application. Successfully hosted recurring model inference every 6 hours for 15 rivers on AWS with real-time forecasts available through a public-facing React frontend. Attained total system maintenance costs of less than \$0.25 per model per month, proving the real-world feasibility of the approach. Maintained as a teaching repository through 2024 with three professors and 10 student collaborators in total. [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](#), [CNN Super Resolution](#), and [Structure from Motion](#).

## RELEVANT COURSEWORK

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### Advanced Systems Lab

(Grade: 5.75/6.0) Spring 2025

In-depth exploration of low-level system architecture and how to optimize and analyze the performance of numerical code. Culminated in a highly optimized AVX-512 implementation of an N-Body gravity simulation. [View project report.](#)

### Advanced Computer Graphics

(Grade: 5.75/6.0) Fall 2024

Theoretical coverage of foundational ideas and SOTA practices in physical-based rendering. Applied coverage of sampling, BRDF creation, ray tracing, path tracing, photon mapping, realistic camera models, RIS, and ReSTIR DI. [View project report.](#)

### Machine Perception

(Grade: 5.75/6.0) Spring 2024

Theoretical coverage of SOTA approaches to machine perception, including Differentiable Volumetric Rendering, Gaussian Splatting, NeRF, Diffusion Models, VAEs, GANs, Transformers, Normalizing Flows, CNNs, and Reinforcement Learning.

### Mathematical Foundations of Computer Graphics & Vision

(Grade: 6.0/6.0) Spring 2024

Theoretical coverage of mathematical concepts critical to graphics and vision. Applied project-based coverage of graph cut segmentation, branch-and-bound consensus set maximization, implicit surfaces, CNN super-resolution, and optimal transport.

### Computer Vision

(Grade: 5.75/6.0) Fall 2023

Theoretical coverage of foundational topics in computer vision. Applied project-based coverage of structure from motion, feature extraction, object tracking, and deep learning-based classification, detection & segmentation using PyTorch.

## TEACHING AND MENTORING EXPERIENCE

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I have held and continue to maintain a unique, multifaceted leadership role in my undergraduate program at OSU Cascades and in Patrick Donnelly's Soundbender 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 five-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.](#)
- **Teaching Assistant for CS475: Parallel Programming at OSU Cascades** Spring 2023  
Assisted in crafting content for lectures and course assignments. Offered tutoring and office hours. Graded assignments. Delivered guest lectures on parallelism in modern languages, including Python, Golang, and Rust.
- **Lecture: "Introduction to Large Language Models"** January 26, 2023  
Explained simple language models and outlined the advances that led to GPT-3. 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 the College of Engineering, and CS Department head. Advocated for the student body in conversations to shape the program's direction and structure.
- **Manager of OSU Cascades Local Compute Resources** September 2022–June 2023  
Negotiated the acquisition of and maintained \$15,000 in computing resources, including NVIDIA GPUs, for free use by students in the CS department. Ensured all students had equitable hardware access for projects requiring CUDA.
- **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. Delivered guest lectures on Computer Vision, Virtual Environments, and Time Series Forecasting.

## AWARDS AND RECOGNITIONS

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- **Award: [OSU Cascades Computer Science Distinguished Student](#)** June 2023
- **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