Uli Raudales

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Education

Whitman College Walla Walla, WA

Bachelor of Arts in Computer Science, Mathematics, and Physics *August 2021 – December 2025*

Relevant Coursework:

- Data Structures and Algorithms, Linear Algebra, Abstract Algebra I, Quantum Mechanics, Computational Physics, Theory of Computation, Algorithm Design and Analysis, Analog and Digital Electronics, Differential Equations, Computational Methods, Computer System Fundamentals

Technical Skills

Languages: Python, C/C++, Objective-C, Julia, Lua, TypeScript, Rust

Frameworks: React, Node.js, Apple Metal, Apple Cocoa, OpenGL

Tools: Git, Jupyter, Perf, Apple Instruments, Mathematica, SageMath

Libraries: pandas, NumPy, Eigen, SciPy, Google Benchmark, Three.js

Experience

Undergraduate Research Assistant June 2024 – Present

Whitman College *Walla Walla, WA*

- **Closed Diagrams in Information Field Theory for Bayesian Inference (May 2024 – Present)**
  - Part of research on "closed diagrams" in IFT to refine Bayesian inference via improved partition function calculations
  - Developed high-performance Python code for non-Gaussian distributions, linear regression models, and Random Parameterized Fields
  - Utilized skills in Python, Bayesian statistics, and scientific computing libraries (NumPy, SciPy) for data analysis
- **Numerical Methods for Delay Differential Equations in C++ (June 2024 – September 2024)**
  - Enhanced a C++ library for solving delay differential equations by optimizing data structures and algorithms for efficient past-state retrieval
  - Used profiling tools (Perf) to optimize performance and benchmark results against leading libraries in various languages achieving a 10-100x speedup
  - Leveraged object-oriented design principles (crtp) and efficient memory usage for large-scale simulations
- **Salmon Migration: Interactive Fluid Simulations (September 2023 – May 2024)**
  - Developed an interactive web application to teach children about salmon migration patterns across the Columbia River
  - Led math and physics components of the simulation to ensure accuracy and educational value
  - Built a TypeScript-based Lattice Boltzmann fluid simulation with interactive obstacles and a controllable salmon model

Projects

CPlotLib | *C, OpenGL* github.com/UlizesR/CPlotLib.git

- Developed a simple 2D plotting library in C with C++ bindings for visualizing mathematical functions using OpenGL
- Implemented a custom shader pipeline for rendering lines and curves with anti-aliasing
- Applied knowledge of computer graphics, linear algebra, and GPU programming

RASM | *Rust* github.com/UlizesR/RASM

- A Rust CLI tool for assembling and linking on macOS/Linux
- Integrated parallel assembly, dry-run mode, TOML config, and robust error handling
- Automated deployment via a Makefile for binary installation and shell alias setup

MetalLib | *C, Objective-C, Apple Metal* github.com/UlizesR/MetalLib

- Developed a graphics library in C that wraps Apple Metal for creating 3D scenes on macOS with a custom windowing system
- Implemented a camera, 3D objects and lighting, and a custom shader pipeline for rendering 3D scenes
- Leveraged Objective-C bridging with C to maximize performance and maintain a clean, modular design