Patrik Buhring

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Education

University of Waterloo Sept. 2022 - Aug. 2027

- **Double Majoring** in **Computer Science** (94% GPA) and **Pure Mathematics** (86% GPA).
- Candidate for a **Bachelors in Mathematics**.

Experience

Informatics Coop Student Jan. 2024 – Aug. 2024
University of Guelph – Center for Biodiversity Genomics
Go, **C**, **Python**, **Bash**, and **JavaScript**

- Drove a major project to completion, optimizing an existing 15 day process **to a 2 day** process.
- Implemented a **horizontally scalable** pipeline, allowing for future scaling with hardware.
- Optimized new and existing code, leading to **40-80%** RAM and **50-70%** CPU time reduction.
- Developed a cached asynchronous aggregations endpoint reducing request times by **70%**.

Projects

Fluidic: Spherical Fluid Simulations Apr. 2024 – Present
Rust, **WebGPU**, and **WGSL**

- Implements a shallow water simulation re-adapted for spherical geometry with high stability.
- Runs on the GPU using WebGPU allowing for an **interactive WASM demo** that runs on Chrome.

TUI Game Engine Dec. 2023
C++

- Wrote a **terminal game engine** as well as a space invaders style game and a snake clone.
- Designed an incredibly flexible **ECS** API that achieves **realtime framerate** on a **terminal**.
- Incorporated **mouse input**, fine-grained rendering using braille characters, and colour support.

Hypersphere: An Exploration of 3D and 4D Spherical Geometry Dec. 2022 – Present
Rust, **WGSL**, **WebGPU**, **WASM**, **JavaScript**, **HTML**, and **CSS**

- Publishes updates to a live **WebGPU enabled** demonstration in a custom-written HTML website.
- Developed an open source **4D spherical math utilities** library.
- Adapts an existing **hydraulic erosion simulation** for spherical terrain: **demo video**.

Hexasphere: Open Source Sphere Generation Aug. 2020 – Present
Rust

- Implements an efficient sphere subdivision algorithm with the aim of reducing distortion.
- **2.2 Million downloads**, with **14700** projects depending indirectly on Hexasphere on GitHub.
- Maintains and updates the project, ensuring quality and well-documented code.
- Optimized to produce cache-friendly meshes for efficiency when rendering very detailed spheres.

Skills

Languages **Rust, Python, Bash, C, Go, C++, C#, Java, JavaScript, Dart, GLSL**

Frameworks & Libraries **OpenGL, DirectX 11, Android, .NET, Unix/Linux, CUDA, FastAPI**

Spoken & Written Languages **English, Spanish, French**