Luiz Mugnaini

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Experience

Founder & Lead Developer April 2024 - Present
Presheaf Studio *São Paulo, Brazil*

- Designing a native cross-platform application for professional digital sculpting based on my research on polygonal mesh retopology.
- Creating novel SIMD-optimized algorithms with multi-threading capabilities for mesh editing.

Software Development Engineer (SDE) February 2025 - Present
Amazon *São Paulo, Brazil*

- Spearheaded an invoice processing system for the Indian government handling 1 million updates per day.
- Led the implementation of the new transitive token security protocol for spec-compliancy of our global invoicing services.
- Ported the legacy testing framework of Amazon's world-wide store-front website for all of our invoice solutions.
- Worked on-call for our invoice pipeline with direct contact with both clients and third-party suppliers.

Fullstack Python Developer June 2023 - March 2024
Startup Founder *São Paulo, Brazil*

- Built a full web app for medical ultrasound courses hosted on Google Cloud.
- Used FastAPI and HTMX with Jinja2 templates and Tailwind to build a fluid user experience.
- Implemented user authentication using SQLite and a distributed asset versioning system using S3.

Education

University of São Paulo São Paulo, Brazil
Master's in Computer Graphics (GPA -/-) *Aug. 2024 - Present*

I research novel techniques for geometry processing of 3D meshes leveraging ideas from the growing field of Discrete Differential Geometry. As part of my work, I'm developing algorithms for better re-topology workflows.

University of São Paulo São Paulo, Brazil
BSc in Molecular Sciences (GPA 9.2/10) *Jul. 2020 - Aug. 2024*

Interdisciplinary scientific research in Computer Science and Mathematics, originating in combinatorial models of Homotopy Theory, my studies evolved into the discretization of continuous surfaces and its applications to Computer Graphics. This led me into researching differential methods for the geometry processing of polygonal meshes. I've documented all of my studies in a comprehensive compendium of Mathematics and Computer Science.

Relevant course-work: Algorithms, Data Structures, Computer Graphics, Differential Geometry, Algebraic Topology.

Projects

runtime | *C++, C, Windows, Linux* Oct. 2023 - Present
My core C++20 library used as a high-performance substitute to the STL, containing the implementation of custom allocators, core algorithms, foundational data structures, OS compatibility layer, and a hardware abstraction layer.

Yet unnamed game | *C++, C, Vulkan, GLSL, Lua, Windows* Oct. 2023 - Present
2D pixel-art game written from scratch in C++ with a Vulkan-based rendering backend, and minimal dependencies. Implemented a multi-threaded hot-reloading system for the gameplay code for faster iteration times.

mina | *C++, C, GLFW, Vulkan, GLSL, Lua* Apr. 2024 - Paused
Cross-platform Game Boy emulator in C++ with WinAPI for Windows and GLFW for Unix-based systems. Explored the interaction of multiple device components with integrated CPU, graphics and audio pipelines.

chirp | *Rust, SDL, Emulation, Interpreters* Dec. 2022 - Dec. 2022
Emulator for the CHIP-8 virtual-machine, written in Rust with SDL. Researched techniques for emulating hardware and building interpreters.

radiant | *Rust, SDL* Nov. 2021 - Dec. 2021
Multi-threaded CPU-based ray tracer with SDL as the rendering backend.

Technical Skills

Programming languages: C++, C, Rust, Python, Lua, Java, Typescript, Javascript.
Libraries: Modern C++ STL, C11 stdlib, WinAPI, Linux ABI, Vulkan, OpenGL, SDL.