Luiz Mugnaini

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EDUCATION

University of São Paulo   São Paulo, Brazil
B.S in Molecular Sciences (GPA 9.2/10)   *Jul. 2020 - Aug. 2024*
- Specialization in computer science and mathematics

RESEARCH EXPERIENCE

Scientific Initiation   *Prof. Dr. Sinai Robins*
Discrete Differential Geometry & Computer Graphics   Jan. 2024 - Aug. 2024
University of São Paulo
- Studied smooth differential geometry and the emergent field of discrete differential geometry.
- Studied the fundamentals of computer graphics, and applications of differential geometry to mesh processing.

Scientific Initiation   *Prof. Dr. Ivan Struchiner*
Dendroidal Homotopy Theory & Operads   Aug. 2022 - Dec. 2023
University of São Paulo
- Studied abstract homotopy theory in the context of Quillen's model categories.
- Studied homotopy theory by means of simplicial sets, and the newly developed theory of dendroidal sets.
- Studied coloured operads as a way of generalising the notion of a category to an n-category.

TEACHING EXPERIENCE

Teaching Assistant   *Prof. Dr. Sonia Garcia*
Mathematics III (CCM0213)   Aug. 2022 - Dec. 2022
University of São Paulo

- Teaching assistant under the USP-PEEG scholarship.
- Held weekly sessions where students could ask questions and solve problems with my assistance.
- Class contents: vector spaces, linear maps, multivariable differential calculus.

SELECTED PROJECTS

Game Boy Emulator | *C++, Vulkan*   Apr. 2024 - Present
- Currently developing a Game Boy emulator with C++ and Vulkan.
- Exploring hardware emulation, and low-level systems programming.

2D Topological Quantum Field Theory and Frobenius Algebras | Feb. 2023 - Aug. 2023
- As a final project for my mathematical-physics class, I studied the categorical equivalence between 2D TQFT's and commutative Frobenius algebras.

CHIP-8 Virtual Machine | *Rust*   Dec. 2022
- Implemented a CHIP-8 virtual machine, an interpreted language from the mid-1970's, as a way of learning techniques for hardware emulation.

Ray Tracer | *Rust*   Nov. 2021 - Mar. 2022
- Implemented a CPU-based ray tracer, learning the fundamentals of computer graphics.

Number Theory - IMPA Summer Program | *Grade: A-*   Jan. 2021 - Feb. 2021
- Attended a Master's level introductory number theory course, held by the Instituto de Matemática Pura e Aplicada (IMPA).