Mario Daniel **Panuco**

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Education

University of California, Santa Cruz
Santa Cruz, CA

Master of Science, Scientific Computing and Applied Mathematics (GPA: 3.96) *2024*

- Relevant courses: Dynamical Systems, Fluid Mechanics, Numerical Methods for Differential Equations, Applied PDEs, Computational Genomics, High Performance Computing, Numerical Linear Algebra.
- Research: Conducted research in the computing numerical solutions to the Kuramoto-Sivashinsky equation using Neural Operators.

University of California, Santa Cruz
Santa Cruz, CA

Bachelor of Science, Computer Science Engineering (GPA: 3.49) *2023*

- Relevant courses: Algorithm Analysis, Modern Algorithmic Toolkit, Functional Programming, Systems Design, Artificial Intelligence, Computational Methods and Applications.

Work Experience

Baskin Engineering, University of California, Santa Cruz
Santa Cruz, CA

Teaching Assistant - AM 10 - Mathematical Methods For Engineers 1 *January 2024 - June 2024*

- Led weekly discussions on complex variables, linear algebra, and differential equations, reinforcing engineering applications of mathematical methods.
- Graded assignments and exams, offering constructive feedback to enhance students' grasp of key concepts.
- Collaborated with instructors to ensure consistency between lectures and discussion materials, and maintained grading accuracy.

Physics Department, University of California, Santa Cruz
Santa Cruz, CA

Teaching Assistant - PHYS 116A - Mathematical Methods for Physicists *September 2023 - December 2023*

- Led discussions on linear algebra, infinite series, and ordinary differential equations, providing support for students' problem sets.
- Graded assignments and exams, providing feedback to support students' understanding and application of complex mathematical methods.
- Ensured grading standards and teaching methods aligned with the course instructor's objectives.

Baskin Engineering, University of California, Santa Cruz
Santa Cruz, CA

Grader/Reader for CSE 140 - Artificial Intelligence *April 2023 - June 2023*

- Evaluated assignments and exams on key AI topics, including constraint satisfaction problems, adversarial search, Markov Decision Processes, and reinforcement learning.
- Provided comprehensive feedback to enhance students' understanding of AI principles and their practical applications.
- Collaborated with faculty to ensure fairness and resolve grading discrepancies.

Learning Support Services, University of California, Santa Cruz
Santa Cruz, CA

Supplemental Instruction Leader - CSE 20 - Introduction To Python *January 2023 - March 2023*

- Provided supplemental instruction in Python, delivering in-person sessions and developing Jupyter Notebooks to enhance student learning.
- Guided students in debugging strategies, applying algorithmic design patterns (recursion, sorting, OOP), and optimizing code for time and space complexity.

Learning Support Services, University of California, Santa Cruz
Santa Cruz, CA

Small Group Tutor - CSE 102 - Introduction to Algorithm Analysis *August 2022 - December 2022*

- Facilitated peer-centered learning sessions focused on algorithm design patterns and optimization for time and space complexity.
- Mentored students in formalizing mathematical abstractions and applying algorithmic thinking to solve complex problems.

Projects

Linear Algebra Module - Fortran

School Project *January 2024 - April 2024*

- Developed a Linear Algebra library in Fortran for scientific computing, implementing core operations such as matrix multiplication, vector norms, LU decomposition, Cholesky decomposition, and Singular Value Decomposition (SVD).
- Integrated LAPACK to enhance the efficiency of SVD for numerical applications in scientific computing.
- Implemented advanced solvers, including QR decomposition using Householder transformations, Gauss-Seidel, Gauss-Jacobi, Conjugate Gradient methods, and eigenvalue solvers for solving complex systems and eigenvalue problems.
- Optimized algorithms for performance and numerical precision, benchmarking results to evaluate computational efficiency and stability.

Parallelized Game Of Life - Fortran

School Project *April 2024 - June 2024*

- Developed a parallelized version of Conway's Game of Life in Fortran, utilizing MPI for inter-process communication and SIMD for vectorized computations across processors.
- Applied domain decomposition techniques to split the simulation grid across multiple processors, improving parallel scalability on distributed-memory systems.
- Used non-blocking MPI operations to optimize boundary communication between processes, minimizing synchronization delays.
- Performed theoretical analysis of computational complexity as a function of scaling with processors, demonstrating a solid understanding of parallel algorithms.

Multi-Threaded HTTP Server - C

Independent Project *March 2023 - June 2023*

- Designed and implemented a multi-threaded HTTP server in C99, conforming to POSIX standards, with a thread pool architecture for handling concurrent requests.
- Implemented synchronization mechanisms (mutexes, condition variables) to ensure atomic and coherent handling of HTTP requests, optimizing for high-throughput and low-latency performance.
- Developed an audit log system to track request order, ensuring correct linearizability and facilitating debugging and performance analysis.
- Performed security analysis, identifying and patching vulnerabilities to ensure robustness and secure operations in a networked environment.

PlankAI - Rust

Independent Project *July 2022 - September 2022*

- Developed an AI model to optimize agent behaviors using Rust, leveraging knowledge of statistics, machine learning, and scientific computing.
- Utilized key Rust libraries such as nalgebra (linear algebra), rand_chacha (random number generation), and wasm_bindgen (WebAssembly integration) to create efficient, high-performance solutions.
- Employed a test-driven development approach to design and refine Neural Network and Genetic Algorithm modules.

Honors & Awards

2021 **Recipient,** UCSC Campus Merit Hihn Scholar *Santa Cruz, CA*

Skills

Programming/Scripting Languages C, C++, Python, Fortran, LaTeX, Rust, Bash, Julia, MATLAB, Java

Frameworks/Libraries

Language	Frameworks
Python	Pytorch, Jax, Numpy, Polars, Pandas, SciPy, Skikit Learn, Matplotlib, Seaborn
Fortran	MPI, OpenMP, LaPack
Rust	Dioxus, Axum, Tokio, Clap, Tower-HTTP, Tracing, Serde, Polars, TUI, WASM_Build
Julia	Statistics, Sparse Arrays, Linear Algebra, Bio

Tools GIT, Markdown, Shell Scripting, Nix, Anaconda, Docker, Google Cloud Platform

Languages: English (Native), Spanish (Native), French (Conversational)