Eduardo Marinho

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Education

Federal University of Rio Grande do Norte *RN, Brazil*
BS in Computer Science *Jan 2023 – present*

- Expected graduation date December 2027
- **Systems Coursework**: Embedded Systems, Computer Architecture, OS, Computer Organization, Computer Vision

Experience

Undergraduate Research Assistant *RN, Brazil*
Federal University of Rio Grande do Norte *Jun 2023 – Apr 2024*

- Collaborated with the development of automated cardiovascular diagnosis tools by applying Deep Learning and **Computer Vision** algorithms to medical datasets.
- Refined data preparation pipelines by implementing noise reduction and feature extraction techniques, enhancing training data quality on **resource constrained hardware**.

Projects

Minke | C++, Rust, Bullet ML Framework, CMake, Make, Git *May 2024 – present*

- Attained **#2 ranking** among Brazilian chess engines on the Computer Chess Rating List (CCRL).
- Engineered **SIMD-vectorized kernels** for **x86 and ARM** architectures to optimize neural network inference and integrated NNUE network evaluation, **increasing search throughput by +105%** and **engine strength by +75%.**
- Optimised the search engine by implementing bitboard representations and cache-efficient memory layouts, achieving a **27% speedup** in negamax algorithm.
- Analyzed performance and memory profiles using **LLDB and Valgrind**, debugging and ensuring stable execution of high-concurrency algorithms.

Comp | C++, Flex, Bison, Make, Git *Mar 2025 – Jul 2025*

- Constructed a compiler prototype using Flex and Bison to **lower a custom language** into Three-Address Code (TAC).
- Developed code-generation backend that translates TAC into portable C enabling integration with **GCC/Clang toolchains** for **hardware-specific cross-compilation.**
- Designed a linear **Intermediate Representation** (IR) to support IR-level optimizations, mirroring the logic used in firmware to **minimize instruction count and memory footprint.**
- Executed **semantic analysis passes**, including symbol table construction and static type checking, **ensuring program correctness** prior to IR lowering.

Tgames | Rust, Cargo, Git *Feb 2024 – Apr 2024*

- Architected a **high-performance** terminal UI engine in Rust, enabling **asynchronous input** and state-driven rendering for a suite of 5 mini-games.
- Published on crates.io with **9,200+ downloads**, demonstrating real-world adoption and production-quality code.
- Designed a **modular architecture** using Rust traits and enums, applying design patterns to ensure the system is **extensible** and **fault-tolerant.**

Pasture Biomass Prediction | Python, PyTorch, Vision Transformers *Oct 2025 – present*

- Engineered an **automated ML and inference pipeline** integrating ensemble prediction and Test Time Augmentation (TTA), **improving accuracy by 11%.**
- Incorporated a pre-trained **DINOv2 Vision Transformer (ViT-S/14)** as backbone with a **shared feature extractor** and 4 auxiliary heads to automate biomass estimation from ground images.
- Leveraged **multitask learning** with auxiliary metadata to improve generalization, validated via 5-fold cross-validation.

Skills

Languages: C/C++, **Rust**, Python, Java, Bash

CS Fundamentals: Operating Systems, Data Structures & Algorithms, Object-Oriented Design, Concurrent Programming

Expertise: Low-Level Systems Programming, Embedded Systems, Computer Architecture, **SIMD Optimization**

Tools: Git, **Linux, GDB/LLDB, Valgrind, CMake**, GoogleTest, Make, GCP, **PyTorch, TorchVision, OpenCV**