RODRIGO GOMES DE ARAÚJO

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EDUCATION

Master's in Computer Science *Sep 2025 – Present (Expected 2027)*
Faculdade de Ciências da Universidade do Porto (FCUP)
Focus: Distributed Systems and Performance Optimization

Bachelor's in Computer Science and Engineering *Sep 2022 – Jul 2025*
Faculdade de Engenharia da Universidade do Porto (FEUP)

PROJECTS

SimpleSPEC: SPEC2017 Benchmark Automation — Python — Regex — Bash *2025*
Collaborative project with SPeCs research lab (Bachelor's Final Project – 17/20)

- Developed **automated extraction tool** for SPEC CPU® 2017 benchmarks achieving **90% reduction** in configuration time, enabling compatibility with Clava compiler framework developed by SPeCs for **advanced source-to-source transformations**.
- Implemented **213 transformation patterns** using regex to remove proprietary build system from 4 benchmarks while **preserving functional equivalence**, validated through systematic comparison with original suite.
- Applied **iterative refinement methodology**, progressively testing pattern implementations against benchmark outputs to ensure correctness, demonstrating **systematic problem-solving** in complex legacy codebase adaptation.
- **Collaborated with research team** to align tool requirements with lab objectives, adapting specifications based on feedback to deliver **production-ready solution** for ongoing compiler research initiatives.

Black Hole Light Simulation — Rust — Raylib — Computational Physics *2025*

- Independently developed a **real-time 2D simulation** of **gravitational lensing** around a Schwarzschild black hole, combining **computational physics** with graphics programming.
- Implemented **null geodesic integration** using **4th-order Runge–Kutta method**, ensuring numerical stability and physical accuracy while maintaining 60 FPS rendering performance.
- Validated simulation against **theoretical predictions** through reference orbit analysis; applied **memory optimization techniques** to handle complex light path calculations efficiently.

Data Link & Network Layer Protocol Suite — C — TCP/IP — Socket Programming — Protocol Implementation *2025*

- Engineered **custom data link layer protocol** with sliding window ARQ, byte stuffing, and timeout-based retransmission achieving 95%+ efficiency over serial connections; implemented state machine-driven frame processing with BCC error detection and REJ/RR acknowledgment mechanisms.
- Developed **RFC-compliant FTP client** using **Berkeley sockets API** with dual TCP connection management (control/data channels), passive mode negotiation, and segmented file transfer handling at application layer.
- Configured **multi-subnet enterprise network infrastructure** with VLANs, static routing, NAT, and DNS; analyzed protocol behavior through Wireshark packet captures validating ARP resolution, ICMP redirects, TCP congestion control phases, and measuring transmission efficiency across network layers.

Parallel All-Pairs Shortest Path Solver — C — MPI — High-Performance Computing — Dynamic Programming *2025*

- Designed and implemented **parallel Floyd-Warshall algorithm** using **MPI** with 2D Cartesian process topology, achieving efficient distribution of computation across multiple nodes for All-Pairs Shortest Path (APSP) problem.
- Developed **hybrid communication strategy** combining Fox's algorithm matrix distribution with **non-blocking MPI_Ibcast** operations, optimizing data movement patterns and reducing synchronization overhead.

ACHIEVEMENTS & AWARDS

2nd Place – IEEE RetroJam Game Development Competition — IEEE UP Student Branch — Rust *2025*

- Collaborated in a team to design, implement, and deliver a complete **2D built-from-scratch game** within **48-hour deadline** in **Rust**, demonstrating **rapid prototyping**, time management, and **teamwork under pressure**.

Academic Merit Awards — Escola Secundária Carlos Amarante *2020–2022*

- Recognized for outstanding academic performance in science and technology disciplines throughout high school.

World 4th Place – RoboCup Rescue Superteam — RoboCup Leipzig, Germany *2016*

- Represented Portugal internationally in **autonomous robotics** competition, developing **navigation algorithms** and **autonomous systems** for **rescue** scenarios.

National 1st Place – Robotics Championship (CoSpace Rescue) — Portugal *2016*

National 4th Place – Canguru Matemático Sem Fronteiras — Portugal *2016*

TECHNICAL SKILLS

Programming Languages: Rust, C, C++, Java, Python, SQL
Technologies & Tools: TCP/IP, Git, Linux, Docker, Portainer, PostgreSQL, MPI, OpenMP, scikit-learn, Streamlit
Skills: Systems Programming, Algorithm Design & Optimization, High-Performance Computing, Computer Networks, Telecommunications