

# RODRIGO GOMES DE ARAÚJO

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## EDUCATION

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### Master's in Computer Science

Faculdade de Ciências da Universidade do Porto (FCUP)

*Focus: Distributed Systems and Reliable Computing*

*Sep 2025 – Present (Expected 2027)*

### Bachelor's in Computer Science and Engineering

Faculdade de Engenharia da Universidade do Porto (FEUP)

*Sep 2022 – Jul 2025*

## PROJECTS

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### PoW blockchain for decentralized auctions — Rust, libp2p, gRPC, Docker, Blockchain

- Built a **Proof-of-Work blockchain** for a decentralized auction platform, implementing block construction, mining, transaction pooling, miner rewards, block verification, and longest-chain consensus.
- Built the system with **strong cryptographic primitives** and a robust libp2p network layer that Kademia for discovery, GossipSub for block propagation, and request-response for chain catch-up and block recovery upon failure or churn.
- Designed the **auction state-transition model**, covering account and auction creation, bidding, a stop signal, invalid transaction rejection, and consistent world-state updates across independently running nodes.
- Created a **Docker-based adversarial simulation** with miners, clients, honest nodes, and malicious bots to validate the implementation against attacks such as replay, flooding, eclipse-style and Byzantine behavior.
- Leveraged all of the above to build a secure and reliable production ready system.

### Embedded distributed synthesizer — C, Arduino, Raspberry Pi, Android, Real-Time Audio

- Built a **distributed embedded audio system** composed of an Arduino controller, a Raspberry Pi audio engine, and an Android client for streaming and waveform visualization.
- Implemented a **low-resource modular real-time audio engine** in C using miniaudio, supporting polyphony, wave generation, modulation and filtering.
- Designed the **controller-to-engine communication model** over serial, compacting physical inputs from potentiometers, buttons, joystick and ultrasonic sensor into validated control packets with checksums.
- Built a **non-blocking concurrent architecture** using atomic state and ring buffers for a lock-free concurrency model, erasing interruptions to the real-time audio callback.
- Extended the system with **UDP audio streaming** to Android, using AudioTrack playback and an oscilloscope-style visualizer to stress test latency across the complete embedded pipeline.

## ACHIEVEMENTS & AWARDS

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

- Collaborated in a 3-person team to design and implement a complete **2D game from scratch** within a **48-hour deadline** in Rust; composed the **original soundtrack**, designed in-game **audio effects**, and handled final **audio mixing and mastering**.

### 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

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**Programming Languages:** Rust, C, C++, Java, Python, Haskell, SQL

**Technologies & Tools:** TCP/IP, Git, Linux, Tokio/Tonic, Docker, Portainer, PostgreSQL, MPI, OpenMP, TLS

**Skills:** Systems Programming, Algorithm Design & Optimization, High-Performance Computing, Computer Networks, Telecommunications, Distributed Systems, Reliable Computing