

PORTFOLIO · 2026

José Luis López López

Computer Engineering · University of Granada · Applied AI, cybersecurity and backend systems

> Almost everything I build starts with a question I can't let go of. I answer it by building something, measuring how well it works and writing down what I learned along the way.

7
Honours with Distinction at the University of Granada

3.68
GPA at the University of Montana · Dean's List ×2

900+
students represented as Faculty Student Delegate

5
featured projects published on GitHub

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01 · ABOUT ME

Understanding in depth how systems work

I'm a fourth-year Computer Engineering student at the University of Granada. I spent a full academic year at the University of Montana (USA) on an exchange programme and worked there during that time, which taught me a lot about landing in an unfamiliar place and figuring things out quickly. From January 2027, only my Final Degree Project (thesis) will remain.

The areas I keep coming back to are **backend systems**, **applied AI**, **security** and **optimisation**, and above all the places where they overlap.

How I work

✍️ I write the design down first

Specifications, requirements and architecture decision records (ADRs) come before the code. CompanyAgentsHQ has 161 functional requirements and 10 ADRs; I-CPU has nine ADRs.

📏 Numbers, not impressions

I-CPU runs steganalysis against its own output; the openScope bots are scored on separation losses and runway throughput.

🛡️ Safety is part of the design

Approval steps, audit logs, safety shields and strict content policies are there from the first commit, not added later.

🗣️ I like explaining things

I write technical content in English and Spanish, aiming for something a beginner can follow and an expert won't wince at.

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02 · FEATURED PROJECT

Bot A working · Bot B implemented, not yet trained

openScope

AI air traffic controllers

github.com/jossseluuu/openScope

JavaScript · Python · PyTorch · ONNX · PPO · DAgger · CMA-ES · Gymnasium

Two programs that act as the air traffic controller for an entire airport: arrivals, departures and every conflict between them. The rule I set myself is that they may only do what a human controller can, giving the same commands through the same command line, under real **ICAO, EASA and FAA** separation rules.

Fork of the open-source openScope ATC simulator. The bots, realism layer, headless simulator, Python tooling and the two new airports are my additions.

0	20–22	21–25	4–11
collisions or runway incursions	landings per hour	departures per hour	separation losses per hour

Untuned Bot A results · 60-minute sessions · seeds 1–3 · Madrid-Barajas and Munich.

Bot A · expert rules

Arrival and departure sequencing (AMAN/DMAN), vectors, holds and conflict resolution. Every command carries its reason, and its parameters can be tuned with CMA-ES.

Bot B · reinforcement learning

A PPO agent in PyTorch with a curriculum, designed to start by imitating Bot A (DAgger) and export to ONNX to play in the browser.

Safety shield

Blocks unsafe commands from either bot. Rules ranked by priority: safety → separation → procedure → efficiency.

What I built

- **Headless simulator** with seeded randomness, a Bot API and a Python bridge exposed as a Gymnasium-style environment.
- **Realism layer:** a regulatory profile per airport (EASA with RECAT-EU, FAA or ICAO), wake turbulence separation, runway wind limits, terrain clearance and minimum vectoring altitudes.
- **Two new airports:** Madrid-Barajas (LEMD) and Málaga (LEMG), with procedures and terrain data.

Training pipeline

- Bot A plays and every decision is recorded on an audit page.
- Bot B learns to imitate it (DAgger), then improves with PPO behind the same shield.

Known limitations

Bot A still loses separation a few times per hour, mostly with aircraft bunching on the downwind or leaving holds. Taxiing is modelled as a waiting time.

02 · FEATURED PROJECT

v2.0.0 released

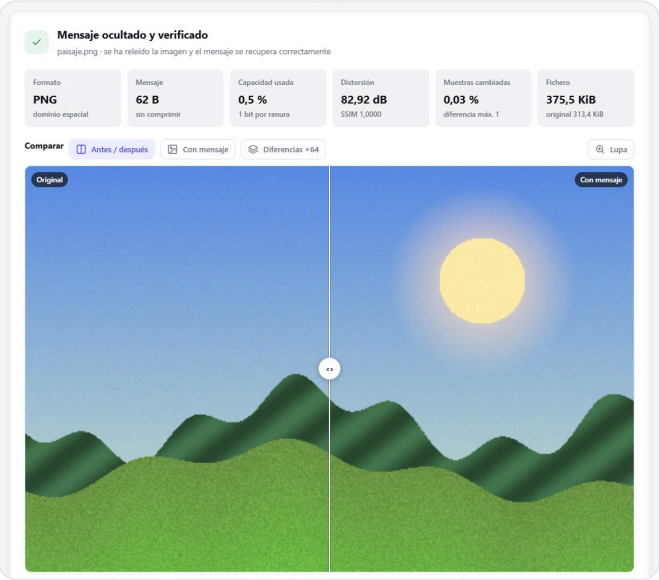
🔐 I-CPU

Hide data in images, then try to find it

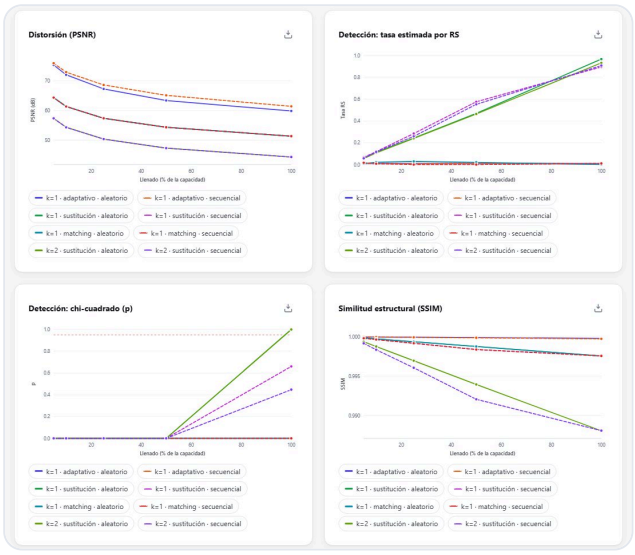
github.com/jossseluuu/I-CPU

C++20 | CMake | Argon2id | XChaCha20-Poly1305 | libjpeg-turbo | doctest · libFuzzer | CI Windows/Linux

I-CPU hides an encrypted message or file inside an image so that it can't be read without the password, and tries to make it hard to tell anything is there at all. Most steganography tools stop at hiding the data; I-CPU also **attacks its own output** with standard steganalysis, so configurations can be compared by numbers instead of guesses.



Local web GUI: message hidden and verified, with a before/after slider.



Experiment mode: distortion (PSNR, SSIM) and detection (RS, chi-square) by payload.

Features

- **Three hiding domains** picked from the output format: pixel bits (PNG, BMP, TGA, QOI, PNM), JPEG DCT coefficients without recompression, and GIF palette indices, animated GIFs included.
- **Adaptive embedding** with Syndrome-Trellis Codes: changes few samples and prefers textured areas.
- **Modern cryptography:** Argon2id, XChaCha20-Poly1305, a random salt per embedding and an encrypted header.
- **Built-in evaluation:** chi-square, RS analysis, DCT chi-square, PSNR and SSIM.

Engineering

- Own codecs for PNG, QOI, PNM and GIF/LZW.
- CLI with a guided mode and a local web GUI served only on 127.0.0.1, fully offline.
- doctest test suite, a libFuzzer target for the decoders, CI on Windows and Linux.
- Nine ADRs and a threat model documenting what it protects against and what it doesn't.

02 · FEATURED PROJECT

In development

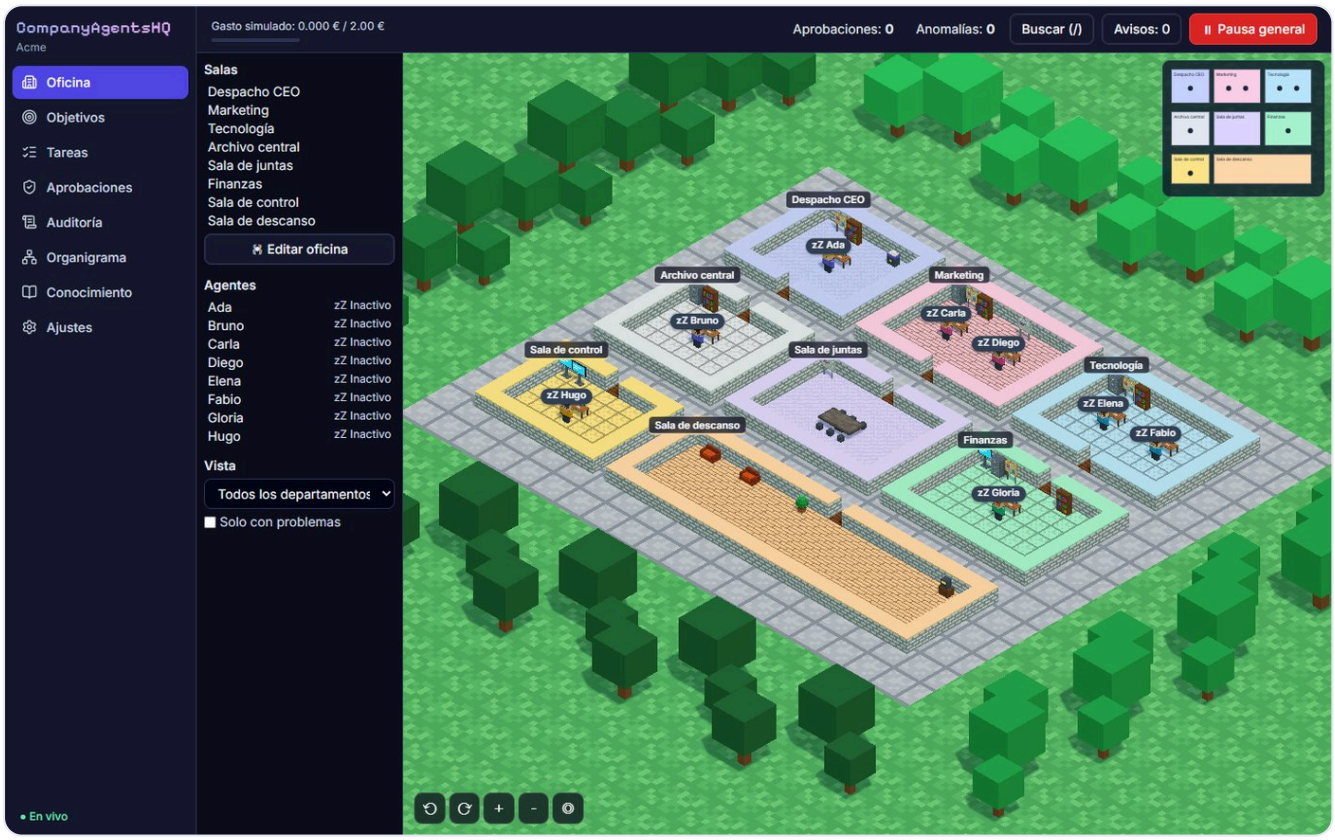
🏢 CompanyAgentsHQ

A company of AI agents you can actually manage

github.com/jossseluuu/CompanyAgentsHQ

Python · FastAPI | React + TypeScript | Three.js / R3F | PostgreSQL + pgvector | Redis | WebSockets | Docker Compose

Multi-agent systems are usually black boxes. CompanyAgentsHQ makes the company visible: you give a goal to the CEO agent and approve its plan, managers review their team's work, and everything is archived, audited and costed while you watch the agents move between rooms of an isometric office.



The isometric office with the default company's eight agents in their rooms.

A real org chart

Supervisors, escalation to the owner and an approval inbox for sensitive actions such as deleting files.

Accountable by design

A hash-chained audit log, an Auditor agent that pauses others when it detects loops, and daily AI budgets per agent.

Zero cost by default

A scripted fake model for development, local models through Ollama, any OpenAI-compatible server, or the Claude API.

161 + 66
functional and measurable non-functional requirements, prioritised with MoSCoW

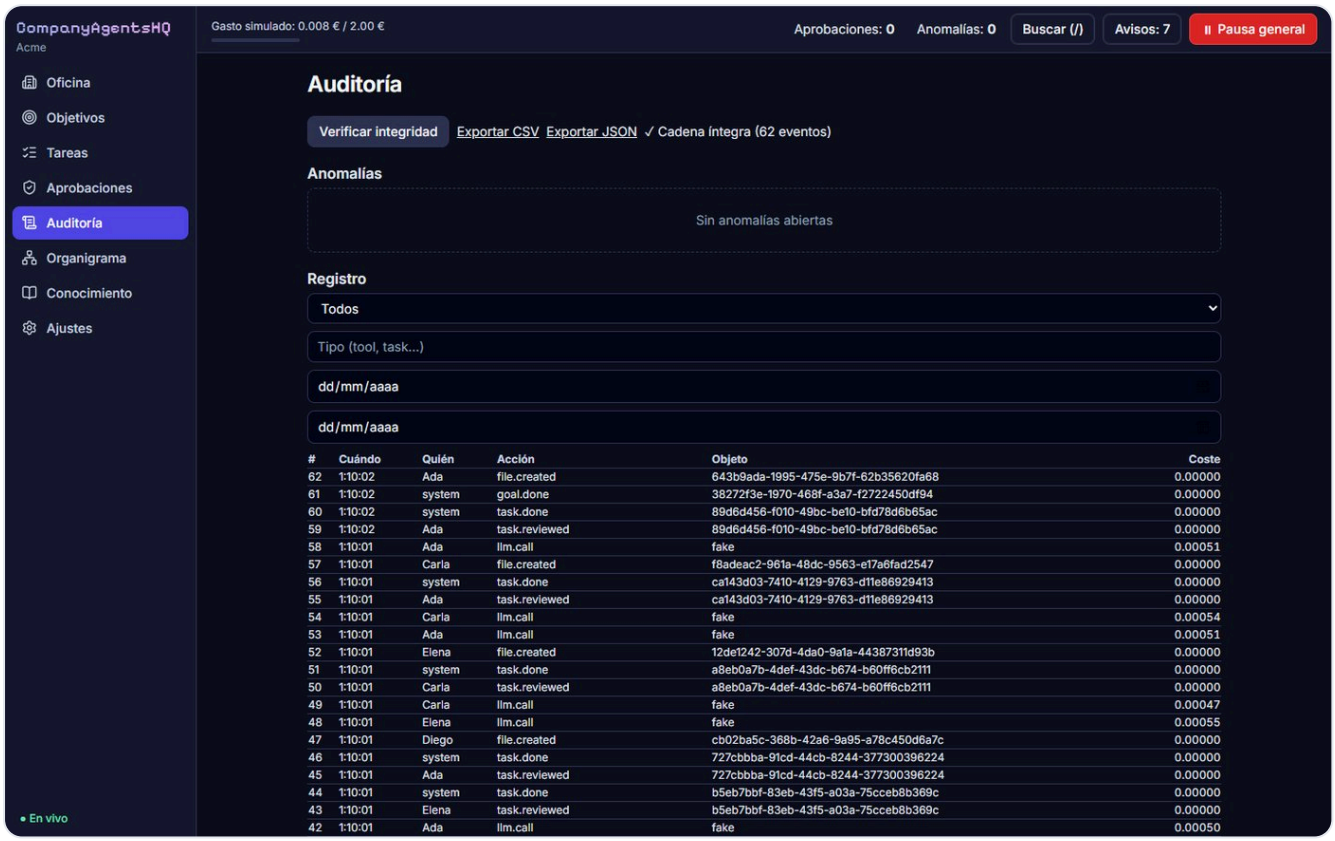
646
hireable roles across 25 areas

10
ADRs · ruff, mypy, pytest, Vitest and Playwright in CI

02 · FEATURED PROJECT · ARCHITECTURE

Inside CompanyAgentsHQ

A modular monolith with clear domains (agents, tasks, knowledge, files, approvals, audit, finance, office and real-time events), designed so that every agent action can be traced.



Audit panel: a verifiable event chain and traceability for every action.

Architecture

- **Rooms as plugins** (task board, file cabinet, knowledge base, finance, audit…): each adds furniture to the map, a tab in the UI and tools for the agents in that room.
- Agent work runs in a **separate worker** queued through Redis, with events streamed to the browser over WebSockets.
- PostgreSQL + pgvector for data and embeddings; MinIO/S3 for files. Knowledge answers cite their sources.

Agent safety

- File and web content is handed to agents **as data, never as instructions** (prompt-injection-aware design).
- Human approval for sensitive actions and a global pause button.
- Tested end-to-end with local models on an 8 GB laptop GPU, with results and limitations written down.

02 · TECHNICAL WRITING

Explaining the technology we use without thinking

Two bilingual writing projects (English and Spanish) where the engineering lives both in the content and in how it is generated and published.

📡 HowThingsTalk

Ongoing

github.com/jossseluuu/HowThingsTalk

EN · ES | Markdown | CC BY-SA

A library of explanations about phones, laptops, earbuds, watches, cards, light bulbs and cars. Each article answers **one concrete question**, such as how GPS computes your position or why phones randomise their MAC address.

- **Four layers of depth:** the question and its prerequisites, a one-sentence answer, an everyday mental model (and where it breaks), and the technical mechanism with protocols and real numbers.
- **Written twice, not translated once:** the same structure in both languages, with a shared style guide and glossary.
- 12 topic areas: Wi-Fi, cellular networks, short-range radio, positioning, storage, IoT, cryptography, privacy...

🚦 ZeroTrace

Daily editions

github.com/jossseluuu/ZeroTrace · jossseluuu.github.io/ZeroTrace

Python (stdlib only) | HTML · RSS | Strict CSP | EN · ES

A daily cybersecurity newsletter for everyone. Each edition covers **one concrete concept** about the devices people actually use, like what someone can do if they steal your phone after watching you type the passcode.

- **Two reading levels:** Basic and Deep dive, with the mechanism and what an attack looks like.
- **Right-sized advice:** impact, effort and audience for every action, plus what you *don't* need to do.
- **Primary sources** (INCIBE, CCN-CERT, CISA, NIST or the vendor) for every fact or CVE.
- **Dependency-free generator** producing Markdown and HTML editions, indexes, an alert log and RSS feeds in both languages.
- The build **fails** if an already-published alert or CVE shows up again.
- No cookies, analytics, third-party scripts or external fonts.

03 · OTHER PROJECTS

More work on GitHub

PROJECT	WHAT IT IS	STACK
📈 **InvestDashboard**	A personal portfolio dashboard: live prices converted into seven currencies, per-asset and portfolio P&L, historical charts, fundamentals, news per ticker and a weekly Telegram summary. Includes a Railway + Vercel deployment guide.	Flask · React · Vite · SQLite · Chart.js · APScheduler
🧮 **DataStructures-Algorithms**	Classic data structures written from scratch, starting with static and dynamic linear structures, with a test program and a roadmap.	C++
✈️ **airline-database-project**	Relational database design for airline operations (pilots, crew, flights, flight plans, aircraft, hangars and maintenance), with a work breakdown structure, a data-quality risk analysis and a small web front end.	MySQL · Flask · JavaScript
🎓 **eportfolio**	Web e-portfolio built in Django during the exchange year in Montana.	Python · Django

TECH STACK USED IN THESE PROJECTS

Languages	Python · C++20 · TypeScript · JavaScript · SQL · also C, Java, PHP and Bash
Backend & data	FastAPI · Flask · Django · SQLAlchemy · Node.js · PostgreSQL · MySQL · SQLite · Oracle · Redis · pgvector
Frontend	React · Vite · Three.js / React Three Fiber · Tailwind CSS · Chart.js · Figma · WCAG accessibility
AI & ML	PyTorch · ONNX · reinforcement learning (PPO, DAgger) · CMA-ES · RAG and embeddings · LLM agents and tool use · Claude API · Ollama · scikit-learn · pandas
Security	Applied cryptography (Argon2id, XChaCha20-Poly1305) · steganography and steganalysis · fuzzing · Content Security Policy · Microsoft Defender XDR · Wireshark · Nmap · Burp Suite · Kali Linux
Tooling & quality	Git · GitHub Actions · Docker · CMake · pytest · Vitest · Playwright · doctest · ruff · mypy · Linux

04 · EDUCATION

Academic background

2023 – PRESENT

Bachelor's Degree in Computer Engineering

University of Granada, Spain

4th	7.744	7	174/240
year	grade average / 10	Honours with Distinction	ECTS completed

From January 2027, only the Final Degree Project (thesis) will remain. "Honours with Distinction" (Matrícula de Honor) is the highest grade in the Spanish university system, awarded to a limited number of top students per course.

AUG 2025 – MAY 2026

International Mobility Program

University of Montana · Missoula, Montana, United States

3.64	3.74	3.68
GPA Fall 2025	GPA Spring 2026	cumulative GPA / 4.0

- **Dean's List in both semesters** (semester average of 3.50 or higher and no grade below B).
- Full two-semester academic year with all teaching, coursework and exams entirely in English.
- Advanced coursework in software engineering, algorithms, databases and SQL, data analytics, web development and UI design.

2021 – 2023

Spanish Baccalaureate in Science · Health Sciences track

IES La Madraza · Granada · Passed the university entrance exam (PEvAU) in 2023

ADDITIONAL TRAINING

Microsoft Learn

30 learning paths, 95 modules, 69 h (2026). Cybersecurity (SC-200 preparation, Defender XDR, Security Copilot) and AI and data (ML with Python, AI agents on Azure, generative and responsible AI).

TOEFL · B2

English certificate issued by ETS in December 2024.

Ángel Barrios Conservatory

Elementary Music Diploma, transverse flute (2013 – 2018), completed alongside compulsory schooling.

Launching projects and building teams

DEC 2024 – MAY 2026

Faculty Student Delegate and Student Representative

University of Granada

900+
students represented

11
roles in the team I built

3
Faculty governing bodies

- **Revived the Student Council**, which had been inactive for some time, and built an eleven-person team: delegate, deputy, treasury, secretariat and coordinators for academic affairs, activities, communication, finance and infrastructure.
- Represented students on the **Faculty Board**, the **Governing Committee** and the **Committee for Outreach, Students and Inclusion**, and in meetings with the Dean's team.
- Co-organised the Rector's Trophy basketball and volleyball tournaments, the 3rd University League and a visit to Telefónica's 42 Málaga coding campus.
- Proposed biannual meetings between each degree's coordinators and its class delegates to speed up communication.
- Represented the Faculty at national forums such as **AEALCEE** and **RITSI**.

JAN 2026 – MAY 2026

UM Catering

University of Montana · Missoula, United States

- Worked in the kitchen of the university's catering service to learn first-hand how work is organised in the US: shifts, team coordination, service pace and quality standards, all in English.
- An excellent, highly diverse work environment where I made great friends.

During my year in Montana I made the Dean's List in both semesters while working on campus and building my personal projects. It's the clearest proof that I perform well under pressure and adapt quickly to new environments.

06 · SKILLS

Skills and competencies

Programming	C++ (STL, dynamic memory), Java, Python (NumPy, pandas, Matplotlib, scikit-learn), JavaScript, PHP, SQL; OOP; data structures; algorithm design (divide and conquer, greedy, dynamic programming, backtracking).
Databases & BI	MySQL, Oracle, PostgreSQL; ER modelling and normalisation; database administration; distributed databases; data warehousing and OLAP; Power BI, Tableau.
AI & data science	Supervised and unsupervised learning; deep learning fundamentals; heuristic search and intelligent agents; generative AI, RAG and prompt engineering; Azure AI services; Jupyter.
Systems	Linux (Bash), Windows; processes and system calls; concurrent programming (threads, semaphores, monitors); computer architecture; assembly language.
Software engineering	Requirements analysis, UML, information systems analysis and design, ADRs, automata theory and formal languages.
Cybersecurity	Microsoft Defender XDR, Defender for Endpoint, Entra ID Protection, Security Copilot; incident detection, investigation and response.

LANGUAGES

Spanish	Native
English	B2 (TOEFL) + a full academic year and work experience in the US
French	Basic

COMPETENCIES

Leadership · Initiative · Problem solving · Communication & negotiation · Performance under pressure · International adaptability · Self-directed learning · Diverse teams

Interests: aviation, AI, cybersecurity, web and mobile development, fitness and music.

CONTACT

Let's talk

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📰 jossseluuu.github.io/ZeroTrace