

Xavi Arnal

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[Website](#) | [GitHub](#) | [LinkedIn](#)

Software engineer with a background in competition mathematics and a focus on building well-structured production systems. Particularly strong in algorithm thinking, modeling, and structuring complex systems, with a focus on Python services and data infrastructure.

Experience

Software Engineer | Huum Fresh

Feb 2024 - Current

- Engineered robust data pipelines to ingest, normalize, and validate daily inventory CSV exports from 200+ retail locations. (*Python, pandas, FastAPI, SQLAlchemy*)
- Developed an automated alerting suite that identified spoilage risks, resulting in an estimated 15% reduction in waste for clients. (*Python, pandas, FastAPI, SQLAlchemy*)
- Built a data analysis toolkit, used for creating periodic tailored analysis reports for clients. (*Python, pandas, scikit.learn, SQLAlchemy, mpl*)

Early stage researcher | NVIDIA + TU/e

Jan - Oct 2023

- Optimized latency & throughput of post-quantum cryptography on NVIDIA DPPUs.
- Developed telemetry and performance analysis tools to identify bottlenecks.
- Delivered regular presentations on research progress to a large team.

Research assistant | Universitat Politècnica de Catalunya

Feb - Nov 2022

- Co-architected secure electronic voting protocols with post-quantum cryptography.
- Co-developed, benchmarked and optimized cryptographic protocols in Rust.
- Assessed resilience of said protocols against quantum adversaries.

Skillset

PROGRAMMING LANGUAGES Python (*primary*) | JavaScript / Typescript | C | Rust

PYTHON LIBRARIES NumPy | Pandas | Selenium | SQLAlchemy | FastAPI

TECHNOLOGIES SQL | Git | React | Docker | PyTest

Honors & Teaching

- Bronze medalist — International Mathematics Competition (2019)
- Freelance teacher (2017-2022) — Mathematics & CSS (undergrad/early grad level)
- Volunteer mentor — UB Olympiad Program (2019)
- Author — Language learning resources with 1k+ users ([Chinese](#), [Japanese](#))

Independent projects

Planets ([website](#), [github](#)) - Highly configurable astrology dashboard powered by a custom client-side astronomic calculation engine.

Technologies: React, Typescript/Javascript, astronomy-engine

Tansō ([github](#)) - Language learning tool for sentence-based Anki card generation. Includes automatic parsing, sentence retrieval, dictionary integration, and audio synthesis.

Technologies: SQLAlchemy, PyQt6, AnkiConnect, ffmpeg

Resonant ([github](#)) - Music library analysis tool that extracts emotive embeddings from tracks to build similarity-based playlists and graphs. Includes web UI and REST API.

Technologies: FastAPI, SQLAlchemy, TensorFlow, h5py, D3.js

Education

MSc in Mathematical Engineering | U. Politècnica de Catalunya

2021 - 2022

- Minor in Innovation and Research in Informatics
 - Thesis on *multivariate cryptography key optimization* (Honors | [report](#))

BSc in Mathematics | Universitat de Barcelona

2016 - 2021

- Minor in Computer Science
 - Thesis on *topological generalization metrics in deep learning* (9.4 | [report](#))