

AI - ML Researcher | Computer Engineer

Portfolio

Andrea Vaiuso

Welcome to my portfolio.

This is a brief overview of my projects, ranging from professional to personal. I bring passion, cleanliness, and tidiness to all of my creations, ideas, and concepts. I hope you enjoy them.



Master Degree in
**Computer Engineering, Artificial Intelligence
and Computer Security**



Bachelor Degree in
Computer Engineering and Telecommunications

Contacts



andreavaiuso@hotmail.com



+41 79 238 41 08



AndyWann



@AndreaVaiuso



Andrea Vaiuso



AndreaVaiuso, andrea-vaiuso



OCRID: 0009-0001-0048-8072

Introduction

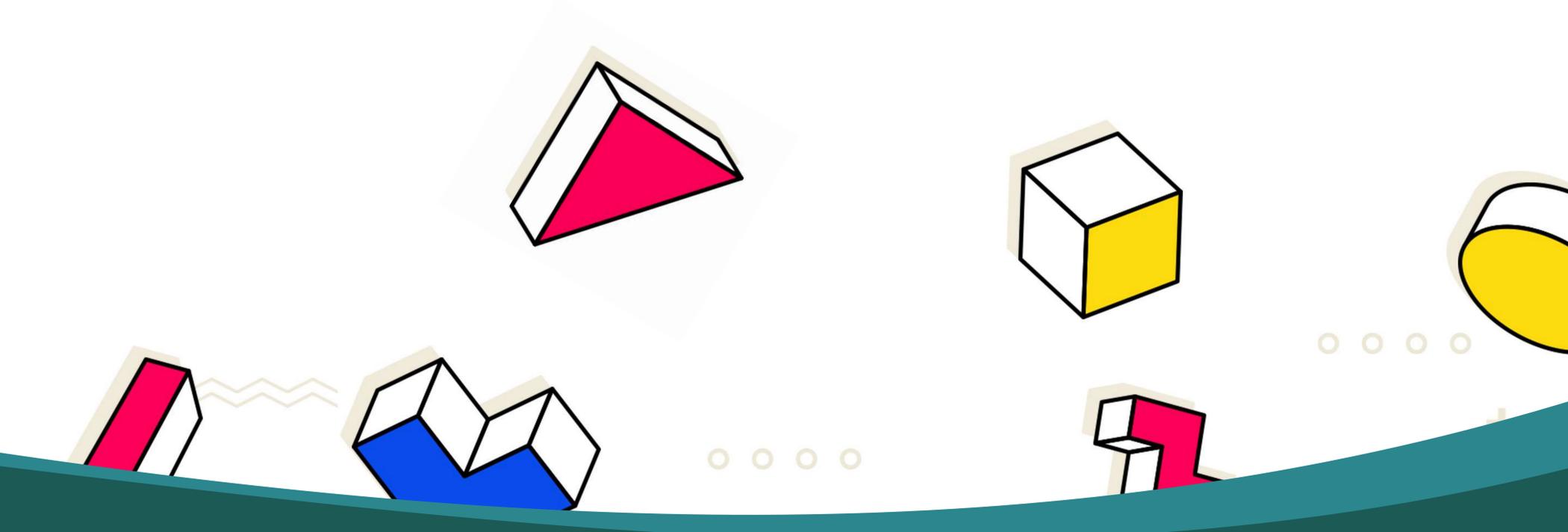
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I believe personal experiences shape your professional life.

Artificial Intelligence is about changing people's lives and the way people do their jobs. To keep up with the step, you must understand people's real needs. I have made this my life motto.

Authenticity, clarity, honesty, and transparency allow me to connect with others, understand them, and communicate in a positive and constructive way.

My strongest skills rely on creativity, solution design, and abstract thinking, which guide me in finding well-designed, effective outcomes.

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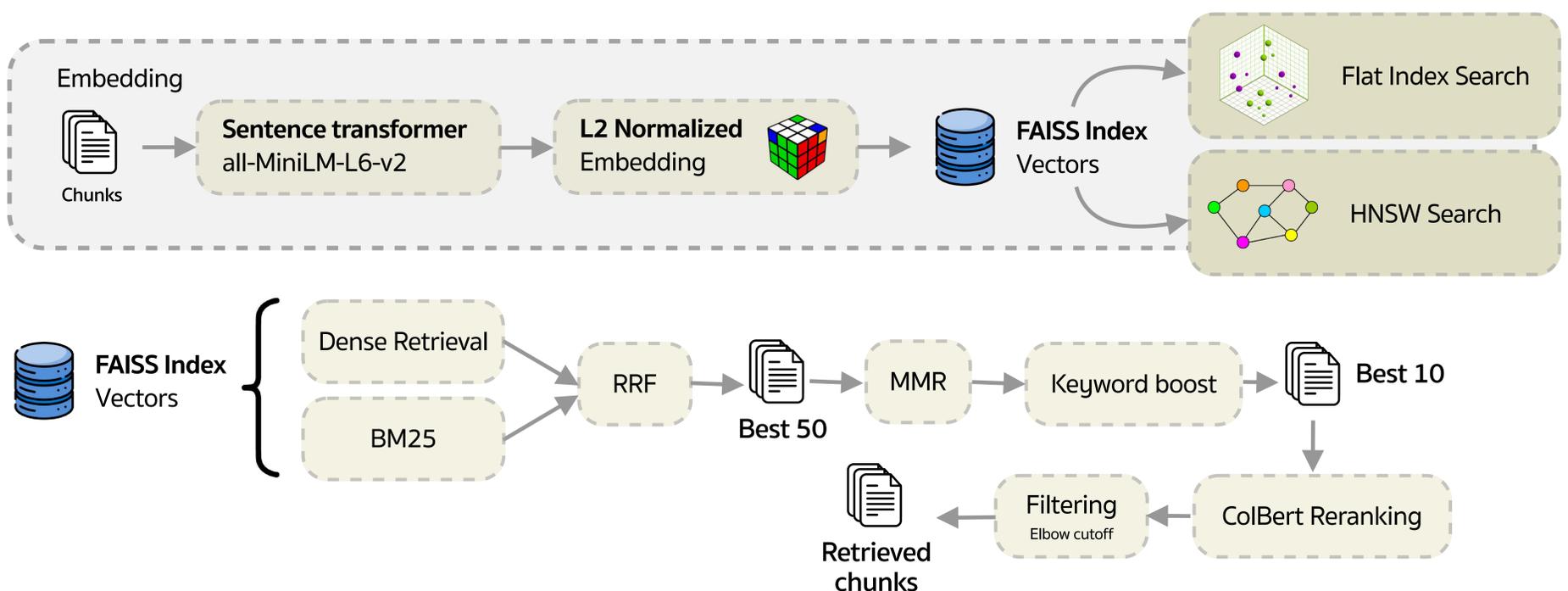
1.

Artificial Intelligence Architectures

2026 Skysafe

This is a project that I personally wrote and managed. It was financed by the Swiss Federal Office of Civil Air Transportation (BAZL).

Skysafe is a distributed architecture for implementing a Large Language Model with augmented information retrieval. The architecture is open source, available on GitHub, and is used to guide users in the compilation of Operational Risk Assessment requests to BAZL.

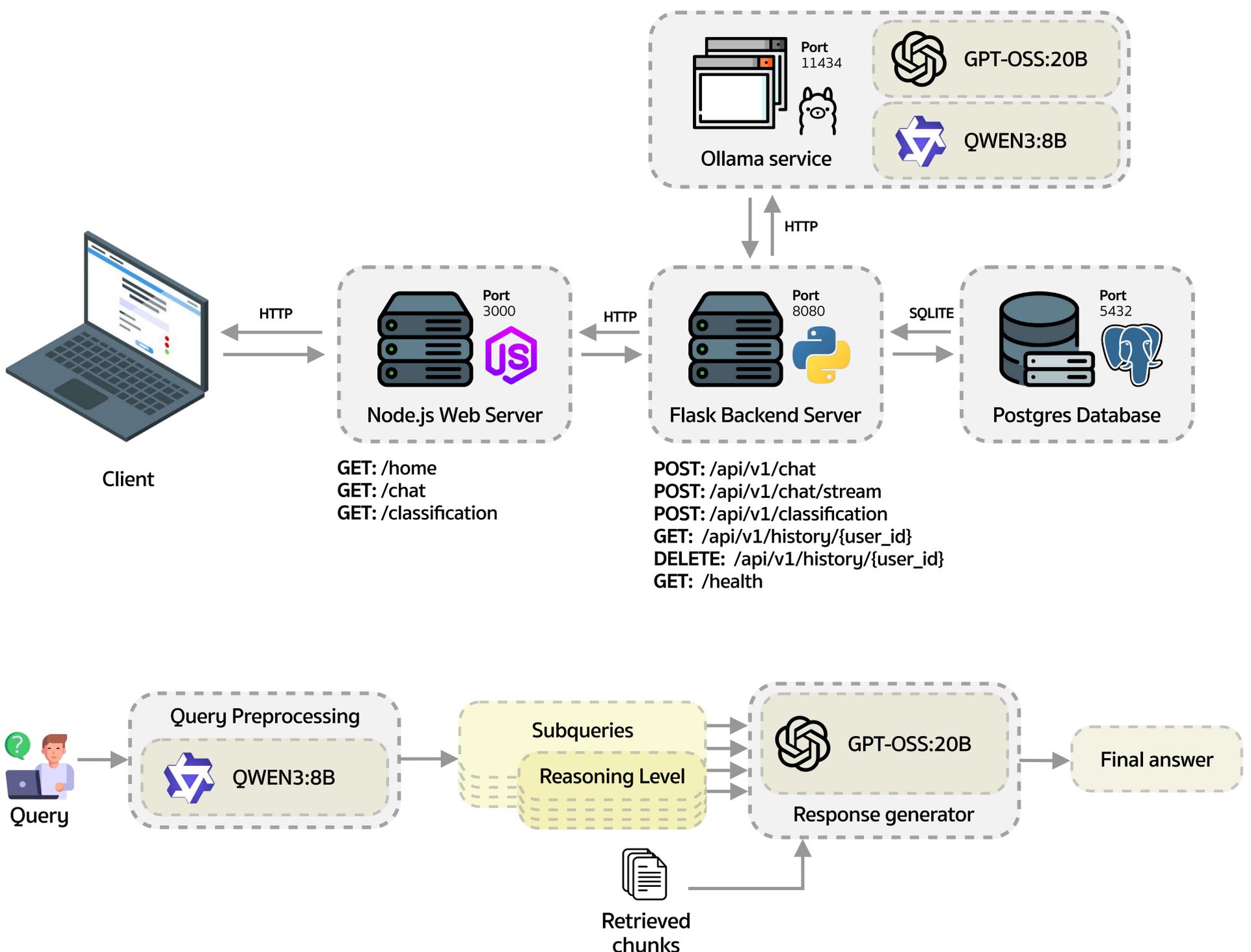


This is the RAG architecture. Chunks of ground truth text are embedded in a way that can be retrieved easily starting from a natural language query.

When a query is written by the user, candidate chunks are extracted, evaluated with a score, and retrieved to be a knowledge base for the LLM. We investigated the potential use of Knowledge Graphs to improve information retrieval.

2026 Skysafe

It's a straightforward architecture. The client interacts with a Node.js web-application, the Python Flask backend orchestrates the message exchanges between the Ollama service (which communicates with GPT-o1 and Qwen instances for answering and pre-processing), and the PostgreSQL database to save chat history and other important information.

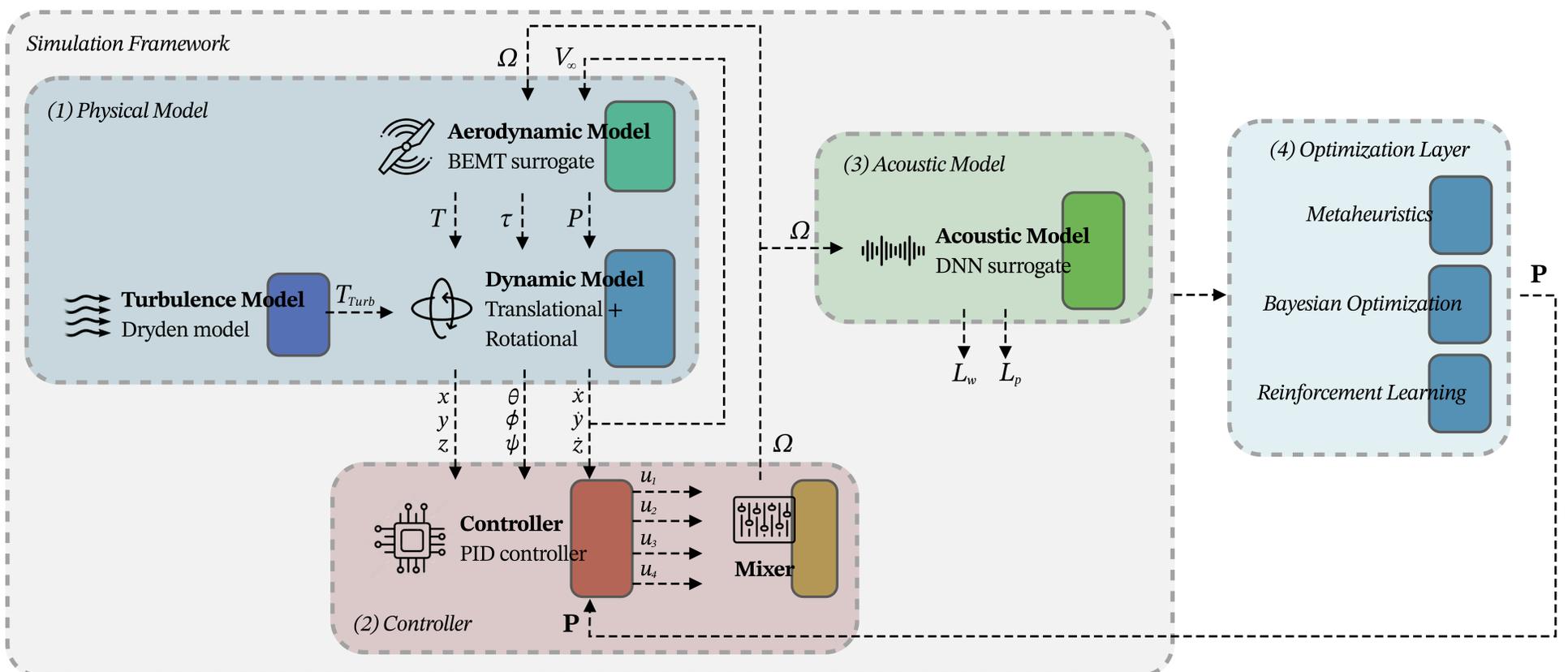
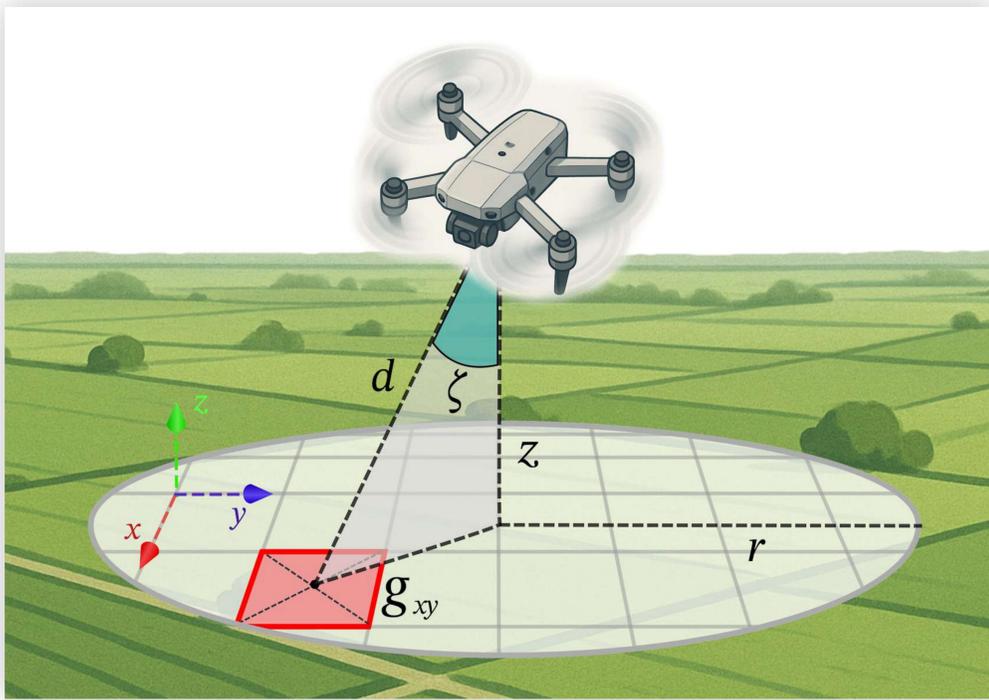


2025

UAV Controller Optimization

This is an automated optimization pipeline for getting UAV (drones) movement more silent, to reduce public disturbance.

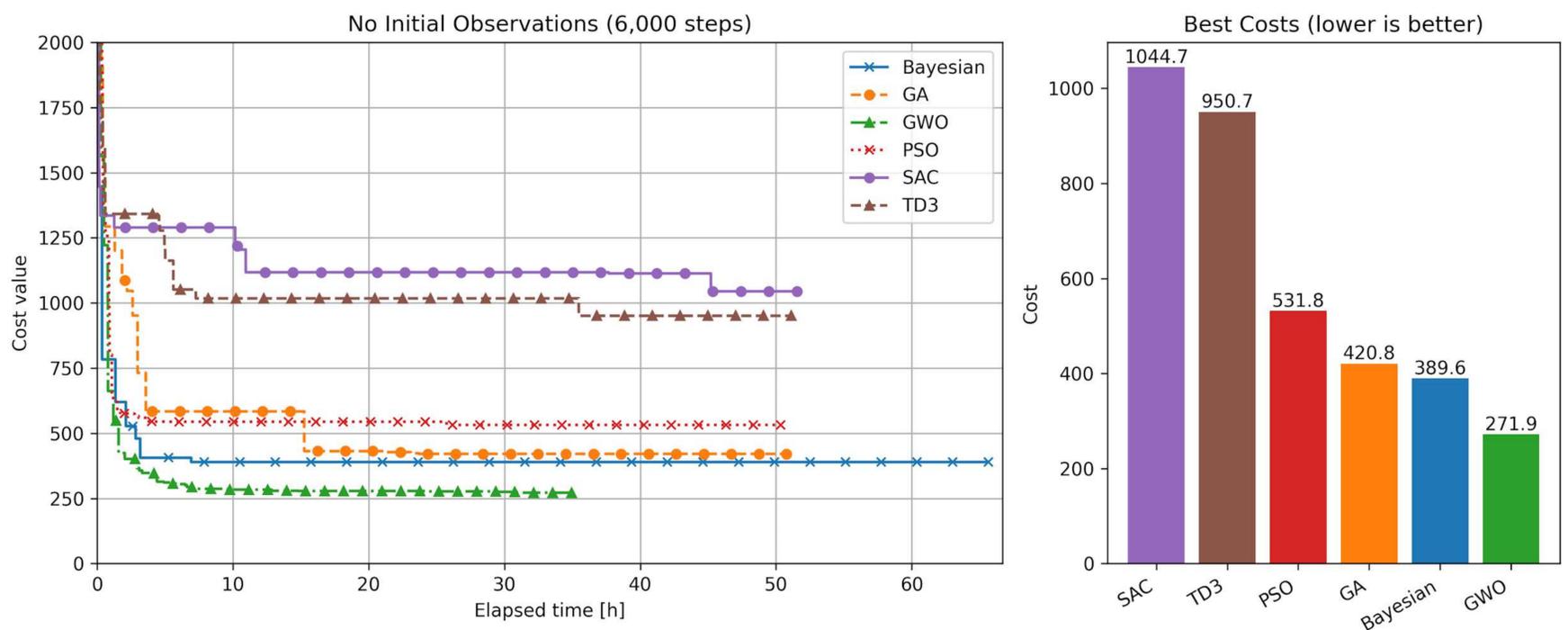
This framework uses an aerodynamic simulator bound with an open-source PID-based controller that iteratively improves drones' maneuvers and trajectories, reducing battery consumption, speed, and blades' loudness.



2025

UAV Controller Optimization

Many optimization methodologies were used, both heuristic and machine learning-based. Heuristic methods demonstrated their efficiency with a good cost-function improvement and low effort implementation. The results are published in arXiv and under review for publication in JAT - Journal of Aircraft Transportation (AIAA).



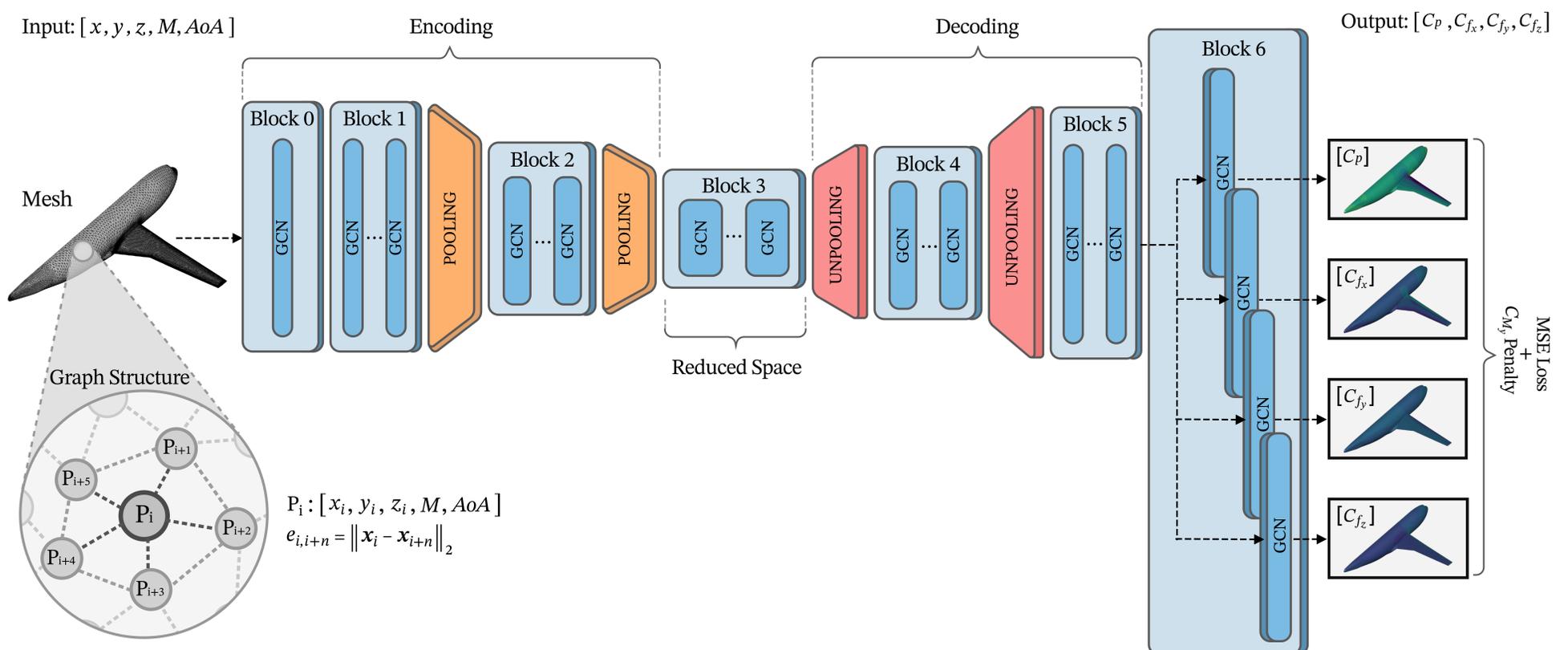
Read the publication here

<https://arxiv.org/abs/2509.17423>

2024-2025

Fluidodynamic Neural Surrogate

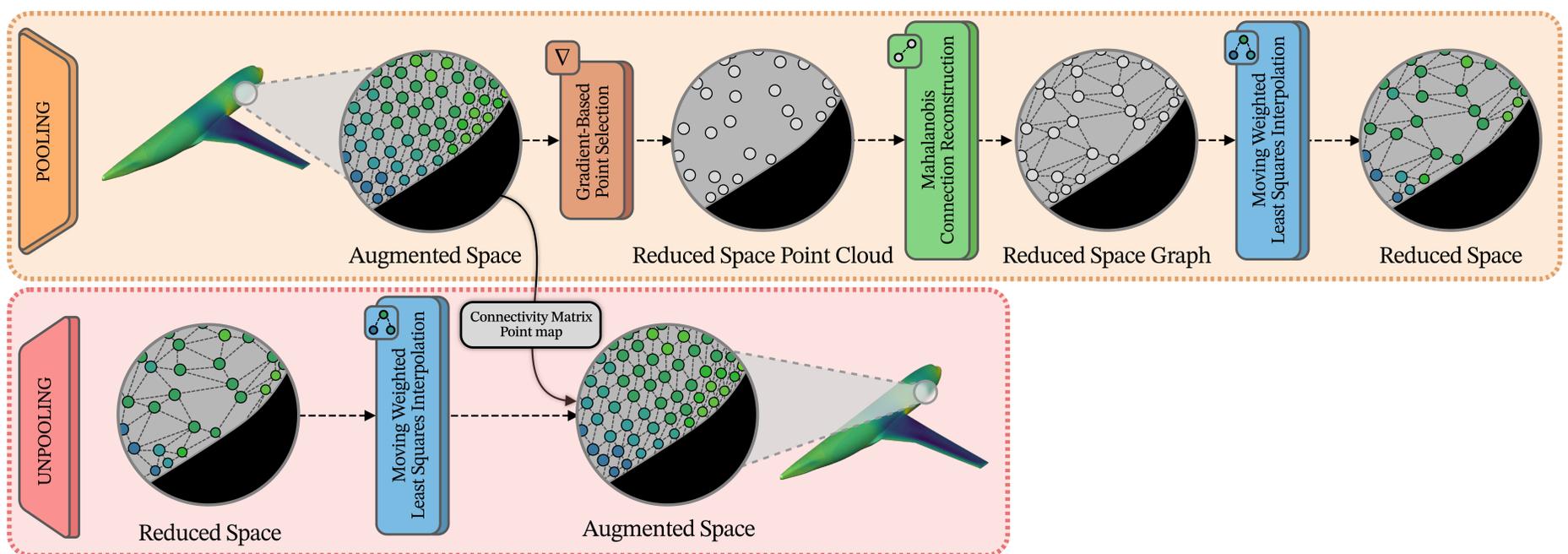
This was a very complex project. I tutored the writing of a PhD thesis that has an ambitious goal. Use a surrogate that could have been able to predict fluid-dynamic physical quantities in a 3d grid of many thousands of points. A graph-based autoencoder, among all the other proposed solutions, became our solid backbone for a very powerful CFD prediction. This architecture has the potential to reduce by over 90% the computational power required from a standard CFD.



2024-2025

Fluidodynamic Neural Surrogate

A big challenge was finding a way to avoid the curse of dimensionality. ML techniques don't work well with raw data because we account for the elimination of redundant information to the network itself. A performance boost was definitively the introduction of an effective dimensionality reduction technique that reduced the parameters by 80% while keeping the necessary information to perform predictions.



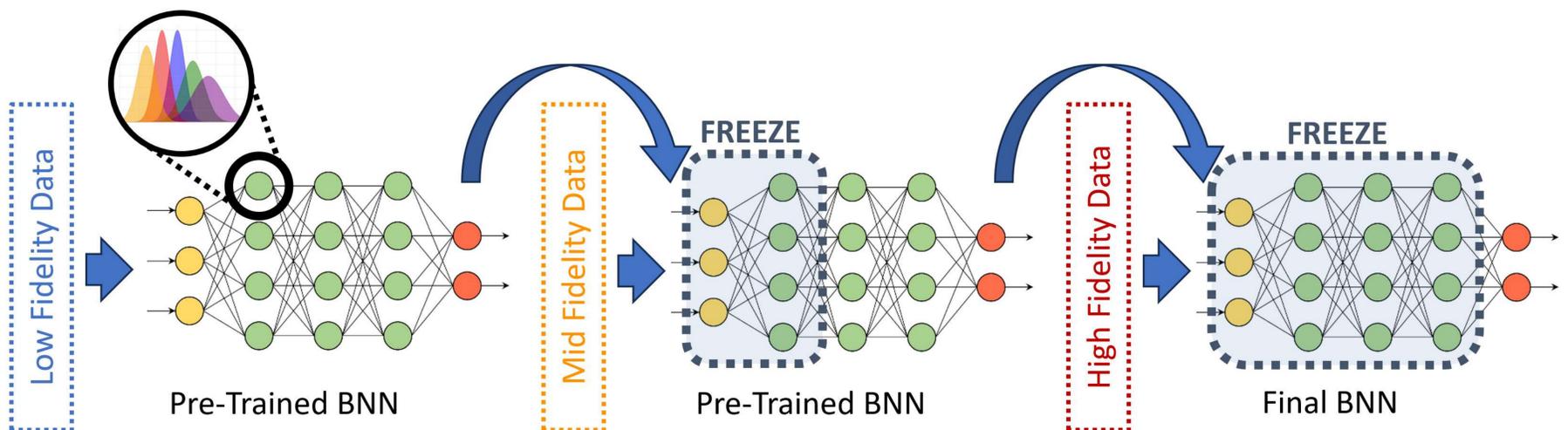
Read the multiple publications here

1. <https://www.sciencedirect.com/science/article/pii/S0021999124009562>
2. <https://www.sciencedirect.com/science/article/pii/S1270963825005875>
3. <https://arc.aiaa.org/doi/abs/10.2514/6.2025-0885>

Bayesian Data Fusion

2023-2024

In many simulation scenarios, we observe different results for the same input depending on the fidelity. This raises important questions about how uncertainty relates to our predictions and how it can be quantified when multiple fidelities are involved. In this work, I designed and developed a deep learning-based multi-fidelity data fusion model capable of incorporating and weighting datasets of increasing fidelity, while estimating uncertainty bands. I trained this stochastic architecture and validated it across two distinct aerodynamic case studies.



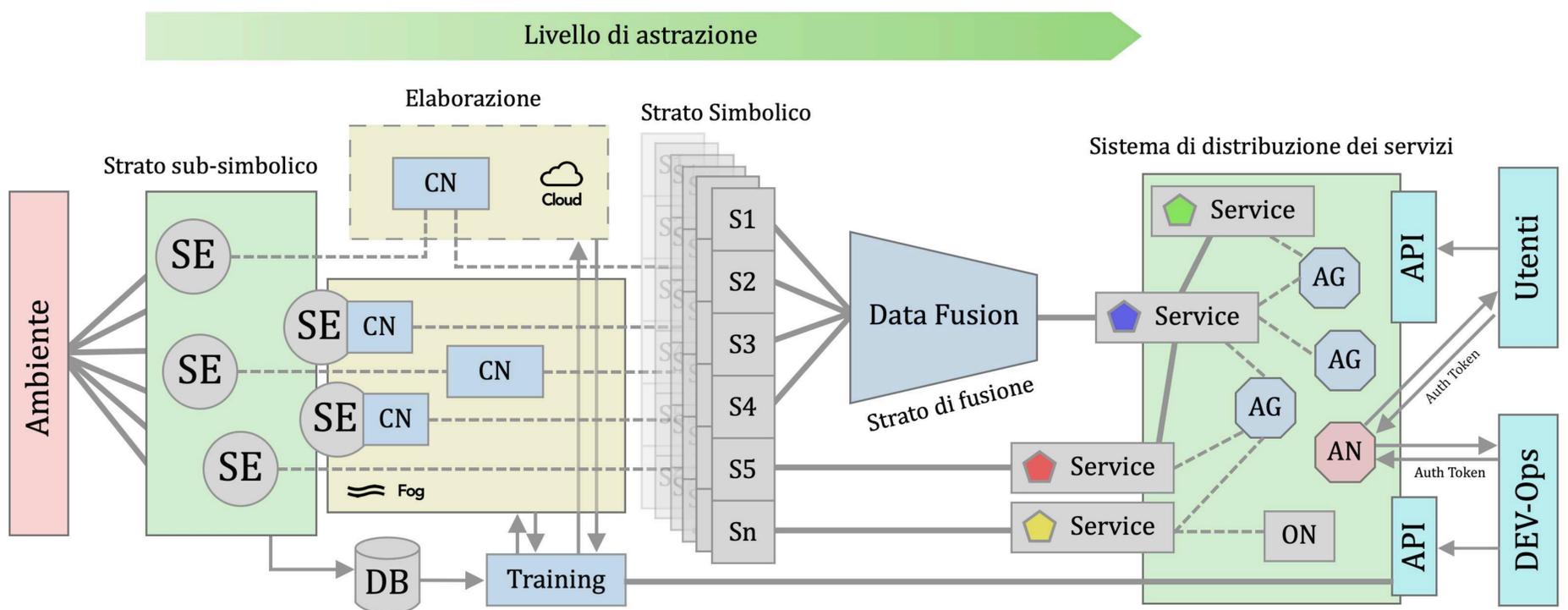
Read the publication here

<https://www.sciencedirect.com/science/article/pii/S1270963825003724>

2022-2023

Campus Smart Parking

This architecture focuses on the design and implementation of an intelligent smart-parking system based on heterogeneous data fusion techniques deployed in a distributed environment. The system is structured as a multi-layer architecture that integrates sensing, machine learning processing, symbolic reasoning, probabilistic fusion, and service distribution, with particular attention to security and performance evaluation.



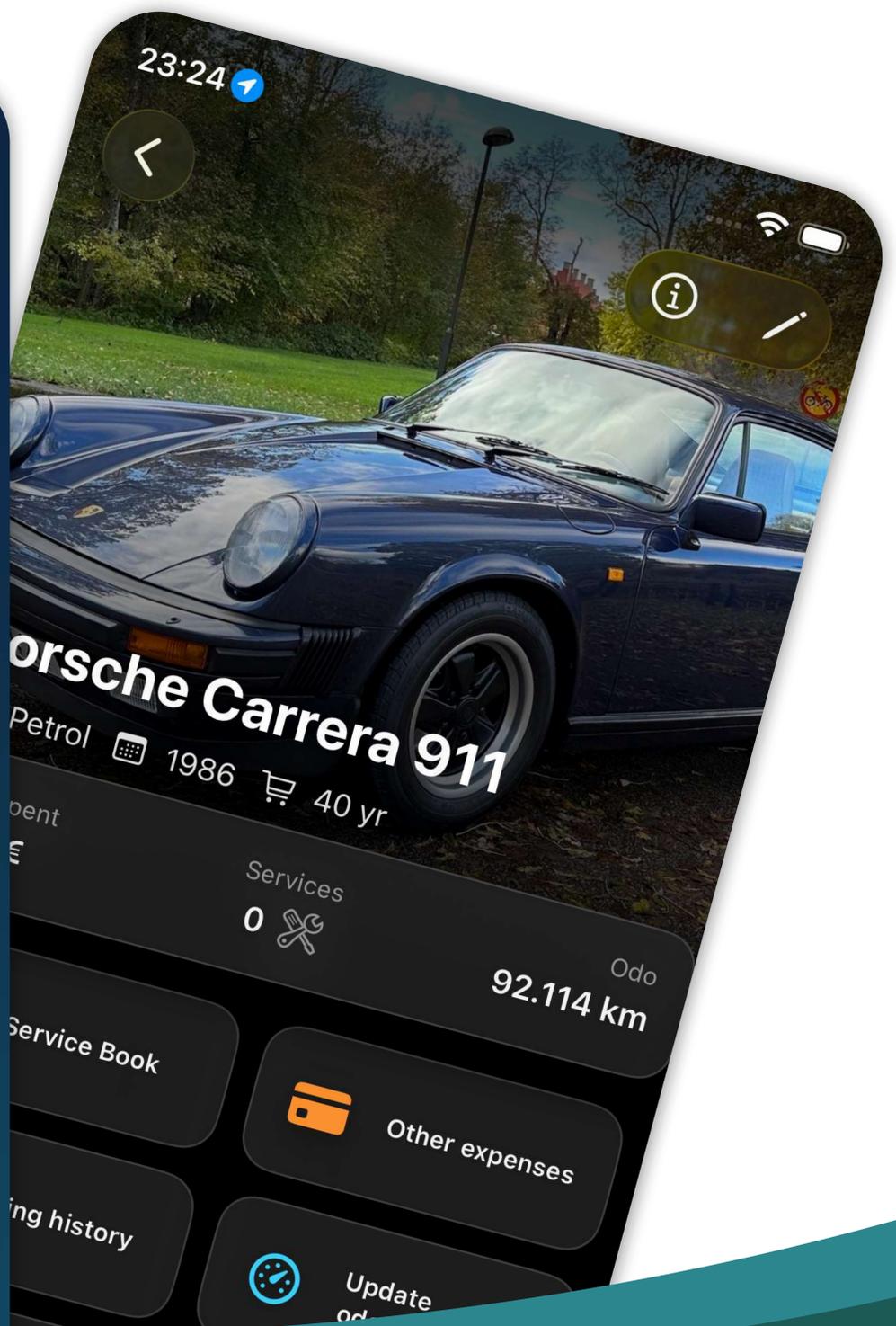
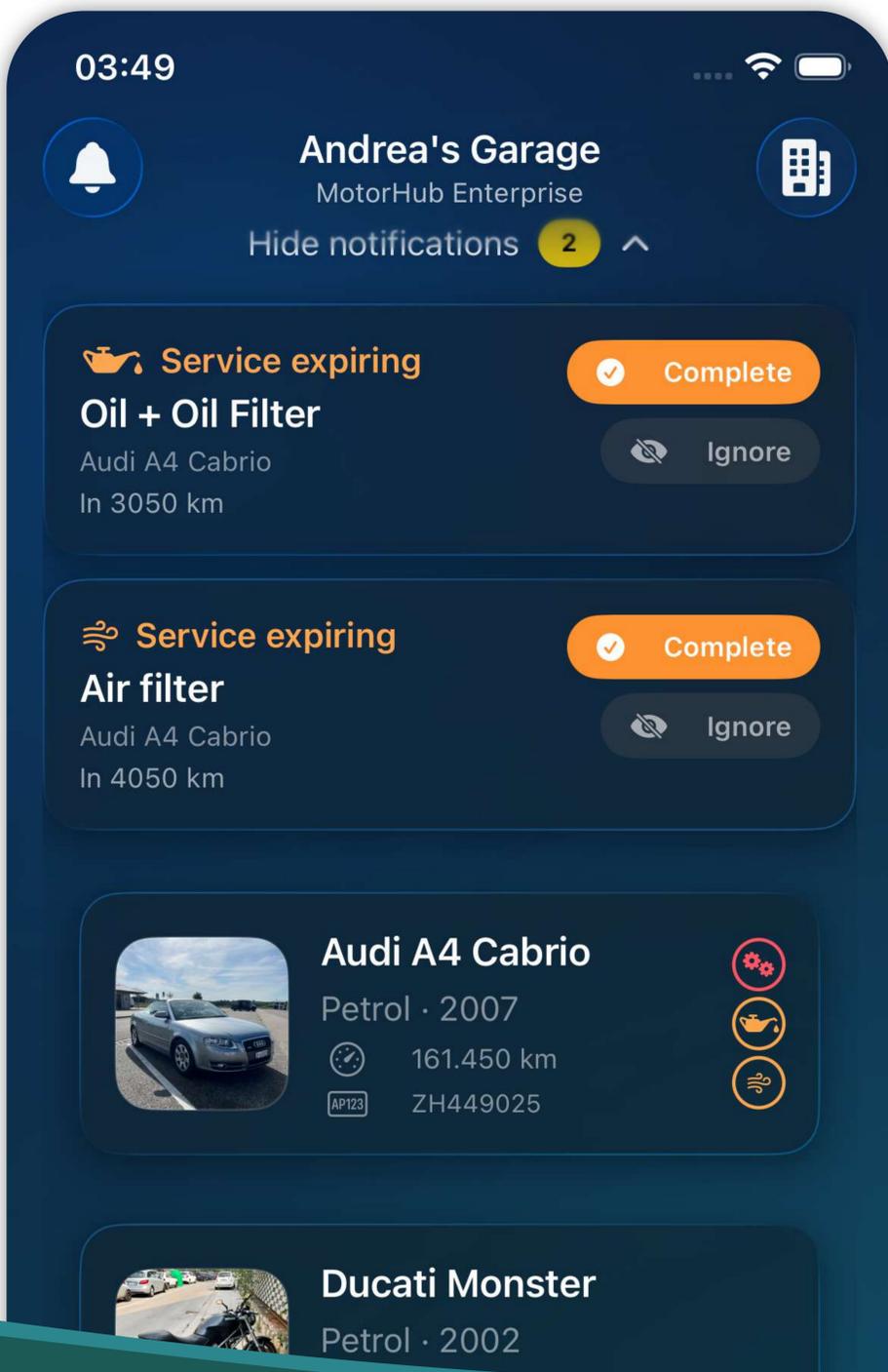
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**iOS App
Developer**

2025-2026

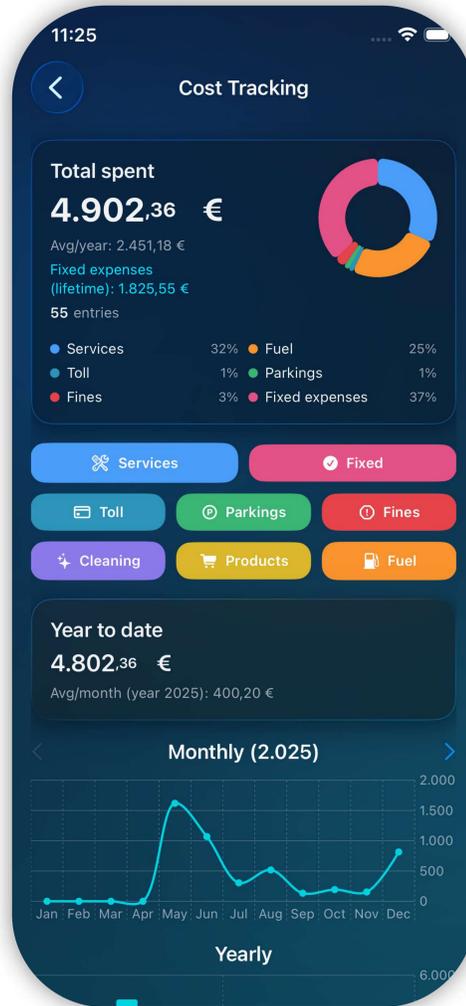
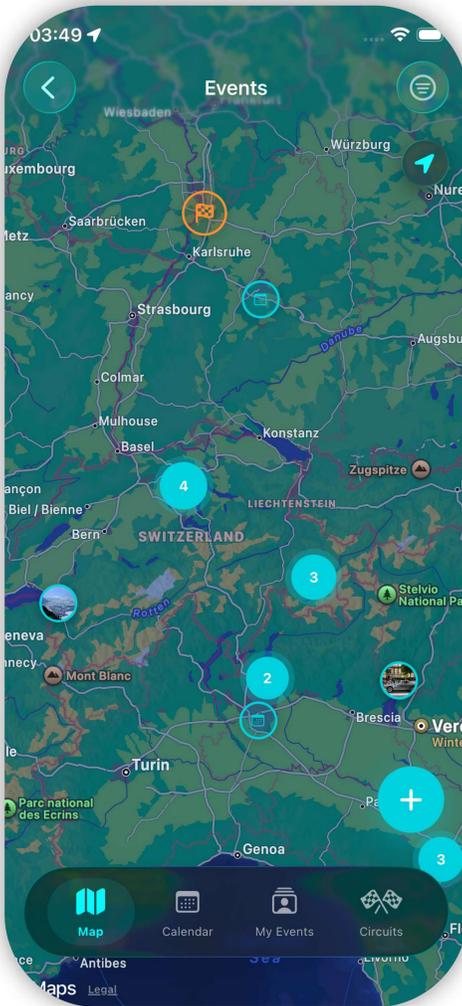
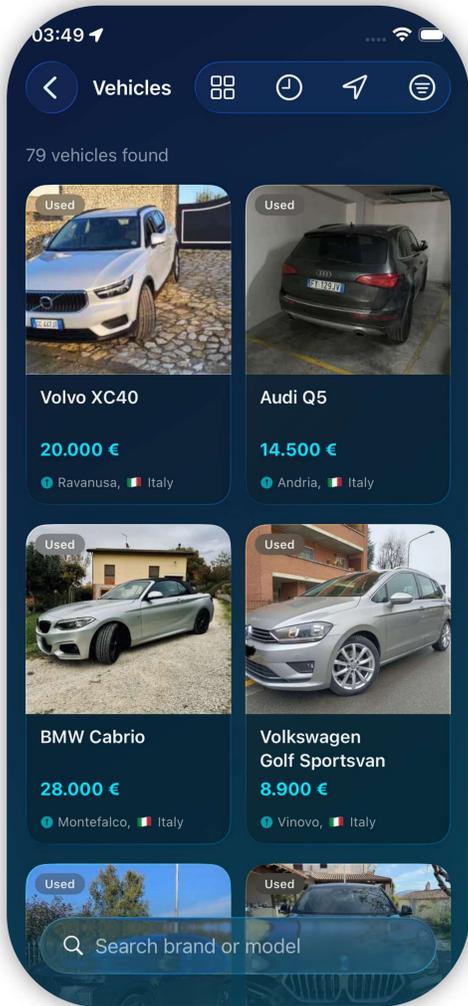
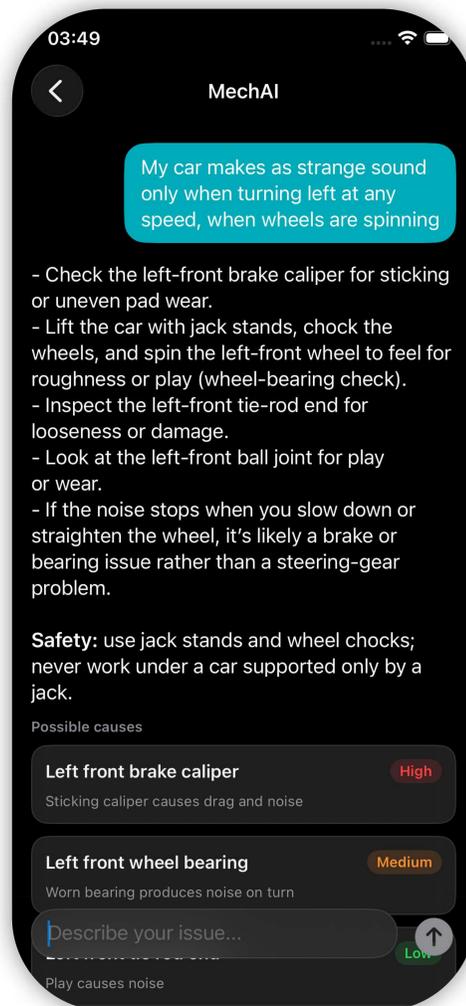
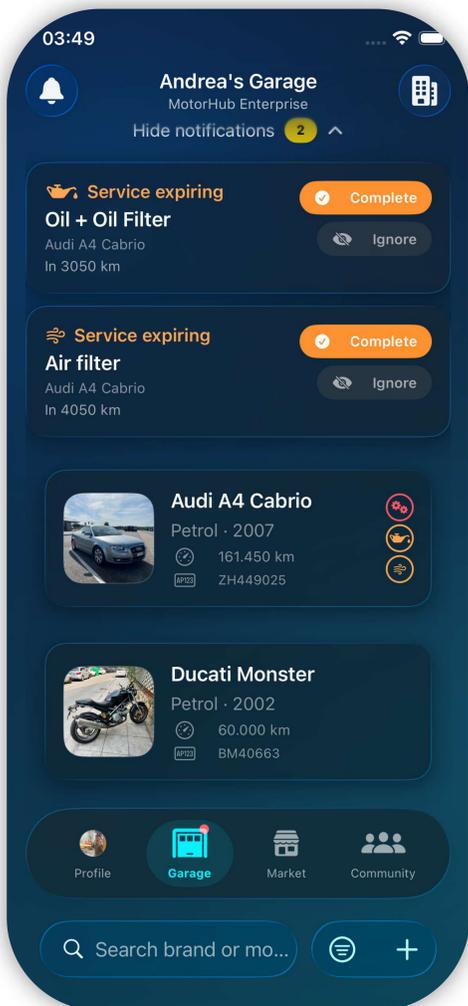
MotorHub

MotorHub is a social platform I developed that connects vehicle enthusiasts, enables event planning, provides AI-powered maintenance tools, and synchronizes digital service books via the cloud. This is a fully self-built personal project. The backend runs on Cloudflare Workers, using a D1 database and R2 object storage. AI features are powered by Workers AI and AWS Bedrock, hosting a GPT-OSS-20B model with structured outputs to deliver maintenance recommendations and purchase guidance. Authentication is handled via OAuth with JWT-secured requests, and the platform includes automated AI moderation with Llama Guard 3 plus rate limiting to mitigate abuse and DDoS risks.



2025-2026

MotorHub

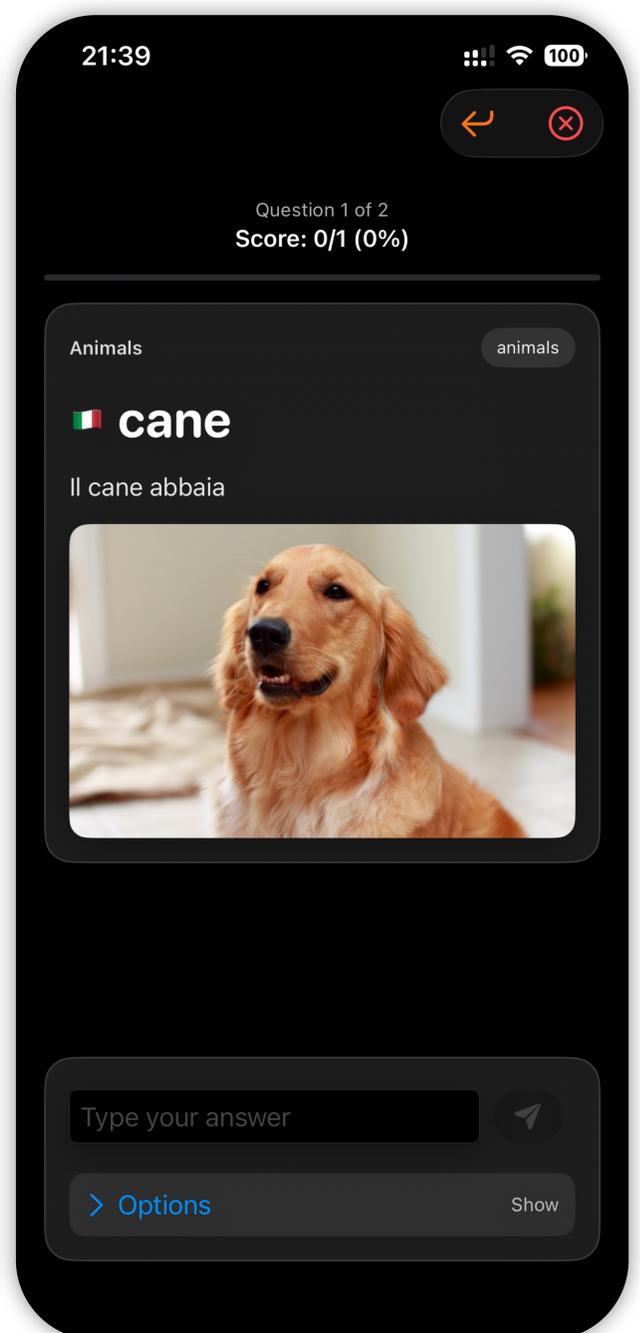
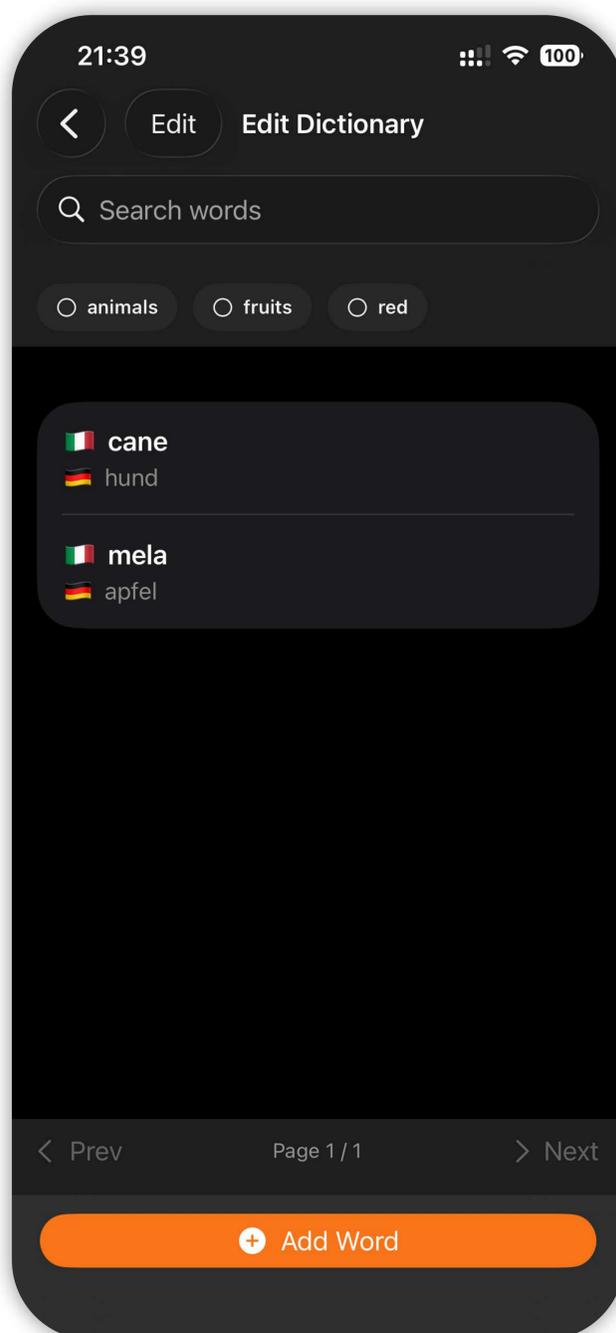


<https://apps.apple.com/ch/app/motorhub-pro/id6757120459>

2025-2026 FlashLingo!

Flashlingo is a language learning app built around customizable flashcards and engaging game modes. Users can create their own cards, organize them into categories, and practice through interactive activities designed to reinforce memory and retention.

The app is completely free and focuses on a clean, modern experience that makes studying feel light, intuitive, and enjoyable.



<https://apps.apple.com/ch/app/flashlingo/id6757874761>

3.

Personal Projects

One of Us

One of Us is a social deduction board game I designed and physically produced end-to-end, from mechanics and narrative to graphics, playtesting, and printing. Set on a stranded spaceship, players cooperate to repair systems while hidden saboteurs create chaos.



The result is a fully playable original board game that showcases both creative direction and end-to-end project execution.

Film making

I'm a passionate filmmaker, and this experience has helped me develop strong skills in visual perception, proportions, composition, and narrative structure. These competencies extend beyond storytelling and contribute valuable creative insight to any project involving visual presentation, aesthetics, or stylistic direction.



Omnia Vincit Amor (2013): This was my first short film, and it won the public prize at the Sicily-Queer-Filmfest in 2013



Path (2023): Experimental short movie on life in Switzerland as a foreigner