

Edouard Dufour

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Belgian | French | Swiss

[Google Scholar](#) | [GitHub](#) | [Website](#)

PhD researcher developing machine learning and optimization methods for complex engineering problems.

My work combines generative modeling with hands-on engineering, emphasizing physical constraints, problem-specific resource limitations, and real-world applicability.

EDUCATION

EPFL - PhD in Computer and Communication Sciences Computer Vision Laboratory · Advisor: Prof. Pascal Fua	09/2025 – Present
EPFL - MSc in Robotics, Minor in Data Science	09/2021 – 07/2025
EPFL - BSc in Mechanical Engineering	09/2018 – 07/2021

SELECTED RESEARCH & ENGINEERING EXPERIENCE

CVLab EPFL – PhD Researcher - Independently developed black-box optimizers that leverage generative models to search complex design spaces of problems with costly evaluations, including SPARROW^[1]. - Current work investigates constrained generative modelling, uncertainty estimation for commercial solvers and joint shape-control optimization for aerodynamic design.	09/2025 – Present Lausanne - CH
ROLEX SA – Data Scientist for Industry 4.0 – Intern - Built an end-to-end production orchestration tool to optimize machining parameters and production quantities, targeting higher throughput with lower intermediate inventories. - Independently identified and initiated additional projects with production teams, including machine drift and failure detection using equipment logs. - Worked closely with production teams to translate operational constraints and needs into applications usable in daily operations.	08/2024 – 01/2025 Biel/Bienne - CH
CVLab EPFL – Research Projects & Master’s Thesis - Developed the initial DiffAirfoil proof of concept, using latent-space diffusion to generate geometrically valid airfoils and guide their design properties. ^[3] - Investigated gradient-free test-time guidance of pretrained diffusion models for non-differentiable aerodynamic objectives. Developed a diffusion-guided evolutionary strategy that outperformed the tested baselines.	08/2023 – 07/2025 Lausanne - CH

PUBLICATIONS

- [1] [Generative Refinement for Low-Budget Black-Box Optimization](#) – Under review at ICLR 2027
E. Dufour, O. Heinimann, P. Fua
- [2] [Aerodynamic shape design space exploration with deep latent diffusion model](#) - AIAA Journal, 2026
Z Wei, E Dufour, C Pelletier, M Bauerheim, P Fua
- [3] [Diffairfoil: An efficient novel airfoil sampler based on latent space diffusion model for aerodynamic shape optimization](#) - AIAA Aviation Forum, 2024
Z Wei, E Dufour, C Pelletier, M Bauerheim, P Fua

SKILLS

- Machine Learning: Neural Network Design & Training, Generative Modelling, Diffusion & Flow Matching, Uncertainty Quantification
- Optimization & Control: Bayesian & Evolutionary Optimization, Constrained Optimization, Optimal Control, Model Predictive Control
- AI-Assisted Development: Coding Agents, Repository-level Development, Automated Testing, Code Review
- Programming: Python, C (embedded), MATLAB
- ML & Optimization Libraries: PyTorch, NumPy, SciPy, scikit-learn, BoTorch, GPyTorch, Optuna
- Data: SQL, Spark, Pandas/Polars, Matplotlib.
- Infrastructure: Docker, Docker Swarm, Linux, Git, Bash

LANGUAGES

- French: Native
- English: Fluent
- German: Fluent

INTERESTS

- AV systems & Home cinema
- Homelab & Self-hosting
- Cinema & Television
- Music & Piano
- Sports; Ski & Tennis
- General Physics & Astrophysics

SELECTED PROJECTS

Bacterial Classification with Raman Spectroscopy - <i>Semester Project; Supervised by M. El Chazli and C. Galland</i>		2024
E. Dufour – LQNO EPFL		
- Developed a Raman-spectrum classification pipeline using data preprocessing and random forests for rapid bacterial identification, targeting food-safety monitoring and industrial quality control. - Reached 97% species-level accuracy under matched acquisition conditions. Identified measurement repeatability as the primary barrier to deployment. - Contributed to the early feasibility work preceding the creation of EPFL spin-off Myriad Optics.		
Mechanical Design and Motorisation of a Radio Telescope - <i>Bachelor's Thesis; Supervised by P. Muellhaupt</i>		2021
M. Aguiriano Calvo, L. Cayroche, E. Dufour, C. Rochet – Callista EPFL; LASTRO EPFL		
- Co-designed and built a 2 m steerable radio telescope for 2000CHF, with 2 arcsec positioning resolution and 42 arcsec pointing accuracy. - Designed to cover requirements from satellite tracking to deep-space observations. Still used for teaching and research at EPFL.		
Experimental Aircraft for Joint Shape-Control Optimization – <i>Research Project</i>		Ongoing
L. Cantoni, D. Affinita, E. Dufour – CVLab EPFL; Advanced Manufacturing Lab ETHZ		
- Developing a 3D-printed aircraft testbed for joint shape-control optimization alongside a supervised student. - The project involves CAD design, system identification, and real-world validation.		

ADDITIONAL SELECTED EXPERIENCES

Fréquence Banane – Technical Manager		02/2019 – 07/2022
- Rebuilt the radio's broadcast and IT infrastructure after a critical failure. Developed a high-availability system for 24/7 broadcasting with redundant servers, automated failover, and a virtual backup studio. - Led the relocation and technical redesign of two studios, mobile broadcasting infrastructure, servers, and shared facilities. Built and trained a technical team to run and improve the infrastructure independently.		Lausanne - CH
EPFL – Teaching Assistant & Student Supervisor		02/2020 – Ongoing
- Taught Bachelor's and Master's students in physics, mathematics, computer science, control, and engineering across 10 semesters. - Supervised or supervising 7 students on Master's theses and semester projects.		Lausanne - CH
Various Event Organizers – Technical Producer & Event Manager		09/2015 – 07/2026
- Led teams of up to 150 staff and volunteers through team leads. Managed safety-critical operations under severe time and staffing constraints, with a focus on delegation, novice training and team well-being. - Managed sound, lighting, and technical production for events ranging from private performances to major festivals with up to 250,000 attendees across six days.		Various - CH
ETA SA; Swatch Group – Mechanical Engineer – Intern		08/2021 – 09/2021
Designed production-machine improvements addressing part damage and thermally induced tool misalignment.		Grenchen - CH