Francesco Forcher

Personal data

Citizenship, Birth, Location:	Italian | 1994 | Lugano	LinkedIn:	francesco-forcher
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Website/Portfolio:	forcher.dev	Languages:	English C2, Italian native

About me

- **Software Developer** and **Machine Learning Engineer** with **over 6 years** of **professional** experience, driven by a life-long passion for programming and inspired by my academic career in physics and applied mathematics. **ETH Zürich CSE MSc**. Areas of expertise and interest include **Rust, AI/Machine Learning, robotics. Autonomous AI agents, distributed systems**, Computer Vision, Physics, High-Performance Computing (HPC), functional programming,

Technology stacks

Currently: **Rust**, **Python for ML**, **Databases/SQL/NoSQL**, **Docker**, **Kubernetes**, **Time Series**, **Julia**,
Previous experiences: **C++**, **Javascript/Typescript**, **Java**, **R**, **Stochastic Differential Equations**, **Quantum Mechanics**, **Deep Learning**, **Matlab**

Employment

Research assistant at University of Stockholm • Feb 2025 - Curr

- Coauthor responsible for the AI research and ML engineering side of a research project in computer vision and political economy, led by professors **Alex Lee** and **Per Andersson**. We analyze the link between economic development and innovations in art and culture using multimodal AI embeddings to analyze large scale art datasets efficiently, exploiting similarities in concept space.

Freelance technical consultant • Jan 2021 - Curr

- For **BLU software** (2021): Used **Talend** and **Airflow** for **ETL**/**ELT** workloads. Created interactive forecasts of demand using Facebook's Prophet framework.
- Technical co-author contributing ML, algorithms, and performance optimization work on a research project by **Per Andersson** and Prof. **A. Matranga** (2024): reconstruct the cost function underlying paths of geographically distributed infrastructure such as aqueducts and roadways, using Dijkstra-like algorithms on Hi-Res topographic GIS dataset.

Rust Database Developer and AI Engineer at Natzka • Jun 2021 - Mar 2024

Contributed to the design and development of a next-generation **OLAP database for data warehousing**:

- Development of several **engine and query language features**, such as Boolean formulas and COUNT algorithms, with **Rust**. Contributed to **backend** database **API** development, including **gRPC** and **REST** API.
- Integration of AI/ML features into the product. Bringing Python and Julia scripts from research prototypes into production-ready **containerized microservices**, integrating state-of-the-art **Gaussian Process** based time series **forecasting services** optimized for **low latency**. Worked on a custom **Julia distributed logger** for **observability**.
- Research on a custom **Kubernetes predictive autoscaler**. Advanced load testing with **Grafana k6**.

Data analyst and Physicist at **CERN, BE-ABP-HSS** • Sep 2016 - May 2018

CERN Technical Student in the Beams Department, Accelerator and Beam Physics Group.

- I developed advanced statistical routines using **Python Pandas** and **scikit-learn** to analyze crystal parameters for CERN's **UA9** experiment. My algorithm enabled the analysis of **very noisy** datasets, with a significant impact in the tender process to award the crystal manufacture contract worth **several hundred thousands CHF**.
- My thesis has been published as CERN internal note.
- Using **C++** `ROOT` library, I developed routines to analyze nuclear dechanneling for high energy particle beams in bent crystals, improved the simulation accuracy of `SixTrack` software.

Education

ETH Zürich Master's Degree in Computational Science and Engineering • Sep 2018 - Dec 2020

- Master's degree with courses on high performance parallel computing, differential equations, Quantum Computing, Computational Statistics, Deep Learning and Computer Vision. I worked at **PSI** to develop an application to perform intrusive **Polynomial Chaos** expansion for **uncertainty quantification** in simulations based on approximate Hamiltonian maps, using **SymPy**.

University of Padova Bachelor's Degree in Physics • Oct 2013 - Sep 2017

- Physics degree with an emphasis in Computational Physics, simulations, statistics and data analysis