

Surapat Ek-In, PhD

Software R&D Engineer | Full-Stack & Data Systems | Ex-CERN Physicist

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ABOUT ME

- Software R&D Engineer and Data Scientist, 8+ years building full-stack production systems and scientific data pipelines in Python, C++, and TypeScript.
- Shipped biosensor software across **10+ client sites**; delivered a **10x** real-time speedup and a **5x** sensor-sensitivity gain.
- Led the data-engineering pipeline on **~1B-event** CERN datasets, cutting a key systematic uncertainty **4x**.
- Advise AI startups on data pipelines and LLM agents.

SKILLS

- **Languages:** Python, C++, TypeScript, Bash
- **Full-Stack:** FastAPI, Django, React, Next.js, REST APIs, PostgreSQL, SQLite
- **Data Science & AI:** NumPy, Pandas, PySpark, PyTorch, Scikit-Learn, OpenCV, LangChain, DuckDB, RAG
- **AI Coding Tools:** Claude, token-optimisation plugins, workflow definition, automated verification loops
- **Systems & Edge:** Linux, SLURM, NVIDIA Jetson Orin platform, hardware control, real-time processing
- **Cloud & Delivery:** AWS, Docker, GitLab CI, Pytest, Ansible, Datadog, Better Stack
- **Soft Skills:** Technical leadership, cross-functional collaboration, client requirement discovery, end-to-end ownership

PROFESSIONAL EXPERIENCE

Independent Consultant (Part-time, Remote)

Zürich, Switzerland

03/2026 – Present

- Architect a multi-source data ingestion and normalisation pipeline for **Engram.health**.
- Architect a customised LLM agent via **Altruistic AI** using LangChain, RAG, DuckDB, and Azure to reduce hallucinations and improve time to first token.

Software R&D Engineer (Full-Stack)

Lino Biotech (Acquired by Miltenyi Biotec) / Zürich, Switzerland

02/2023 – 06/2026

- Delivered core software for **one prototype** and **two product series launched to market (The MACS[®] Matchmaker)**, deployed across **10+ client sites**.
- Provided customer-facing technical support for production sensor software.
- Accelerated real-time molecular analysis by **10x** through profiling and the use of asynchronous and concurrent programming.
- Led a multidisciplinary data-analysis project that increased biosensor sensitivity **5x** by redesigning statistical analysis pipelines, camera operation, and image processing.
- Owned end-to-end full-stack development across typed Python/FastAPI backends, TypeScript/React frontends, hardware control, data pipelines, and NVIDIA Jetson Orin edge processing, using test-driven development and CI/CD.

Experimental Particle Physicist

CERN, LHCb Collaboration / EPFL / Switzerland

09/2018 – 01/2023

- Led the data-engineering pipeline for the **first observation of the mass difference between neutral charm-meson eigenstates** (PRL, 2021).
- Led the **model-independent measurement of charm mixing parameters** (PRD, 2023), reducing key systematic uncertainty by **4x** through statistical modelling and large-scale optimisation.
- Performed Decision Tree- and Neural Network-based signal extraction on **~1B-event datasets** from petabyte-scale LHCb data using distributed grid computing.
- Built detector Monte Carlo simulation with uBoost decision-tree sim-to-real calibration against recorded data.
- Developed low-latency detector tracking software in C++ with neural-network components.
- Built validation pipelines for silicon photomultiplier detector R&D (SND@LHCb).

Lead Data Engineer / Data Scientist (Freelance, Part-time, Remote)

Altruistic Innovation Limited / UK

09/2021 – 09/2022

- Led client requirement discovery and translated business constraints into fast prototypes for production-oriented data and ML solutions.
- Originated and validated a method to reduce temperature-induced noise in optical edge sensors for smart electricity-grid monitoring, improving signal reliability.
- Developed ML pipelines and architected cloud-based solutions on AWS (SageMaker, S3, EC2) for scalable deployment.

EDUCATION

PhD in Physics

EPFL/CERN, Switzerland

2018 – 2022

Thesis: Model-independent measurement of charm mixing parameters.

Nominated for Doctoral Thesis Distinction.

Master of Science in Physics

EPFL/CERN, Switzerland

2016 – 2018

Thesis: Reconstruction of semileptonic decays and search for rare decay at LHCb.

Bachelor of Science in Physics

Mahidol University, Thailand

2012 – 2016

Thesis: Projected Search for Physics Beyond the Standard Model at the CERN Future Circular Collider.

SELECTED PUBLICATIONS

• Observation of the Mass Difference Between Neutral Charm-Meson Eigenstates

Phys. Rev. Lett. **127**, 111801 (2021). DOI: 10.1103/PhysRevLett.127.111801

• Model-independent measurement of charm mixing parameters in $\bar{B} \rightarrow D^0 (\rightarrow K_S^0 \pi^+ \pi^-) \mu^- \bar{\nu}_\mu X$ decays

Phys. Rev. D **108**, 052005 (2023). DOI: 10.1103/PhysRevD.108.052005

• Affiliated co-author on LHCb Collaboration publications (2018–2023)

Full author record: CERN Document Server

• Effects of a Guide Field on the Larmor Electric Field and Upstream Electron Temperature Anisotropy in Collisionless Asymmetric Magnetic Reconnection

Astrophys. J. **845**, 113 (2017). DOI: 10.3847/1538-4357/aa7f2c

CERTIFICATIONS AND LANGUAGES

- AWS Cloud Practitioner
- Machine Learning in High Energy Physics

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- English (C1), German (B1, SDS Certificate), French (A2), Thai (Native)

TECHNICAL INTERESTS & PROJECTS

- **Robot-arm project (SO-ARM 101)** built and controlled with an NVIDIA Jetson Orin Nano (8GB) at home; policy training in Isaac Sim / Isaac Lab with ROS2.
- **Jetson Orin AI assistant** — local foundation-model inference with voice I/O.
- **LLM stock-screening agent** — ROIC and undervaluation analysis for trade ideas.

HOBBIES

Popping and Bachata dancer | Advanced skier | PADI Rescue Diver | Hiker