SURAPAT EK-IN, PHD

Software Engineer, Experimental Physicist

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🐙 BlueShifTA   🪪 Swiss permit C

ABOUT ME

Software engineer and physicist (PhD) with expertise in high-performance computing, algorithm optimization, and real-time image/data processing. Experienced in camera and photo-detector systems, embedded platforms (Jetson), and large-scale data pipelines. Proven track record of accelerating scientific discovery and delivering scalable, production-grade software solutions, including products successfully launched to market.

SOFTWARE ENGINEERING SKILLS

- **Programming Languages & Frameworks:** Python, C/C++, TypeScript, React, Next.js, Bash
- **Data Science & Machine Learning:** NumPy, OpenCV, SciPy, Pandas, PyTorch, Scikit-Learn, Jupyter
- **Backend Development:** FastAPI, Django, SQLite
- **Cloud & DevOps:** AWS (S3, EC2, SageMaker), Docker, Git (CI/CD), GitLab CI, Ansible
- **Operating Systems:** Linux (systemd, udev, GRUB, Tegra System), ROS2
- **Embedded & Hardware:** Jetson TX2, Jetson Orin Nano, Silicon Photomultiplier (SiPM), CMOS
- **Software Quality:** Pytest, CI/CD pipelines, Code Profiling (KCachegrind)

EDUCATION

PhD in Physics   EPFL/CERN, Switzerland   2018 – 2022
Thesis: Model-independent measurement of charm mixing parameters.
Nominated for a distinction thesis.

Master of Science in Physics   EPFL/CERN, Switzerland   2016 – 2018
GPA: 5.07/6.00
Thesis: Reconstruction of semileptonic decays and search for rare decay at LHCb.

Bachelor of Science in Physics   Mahidol University, Thailand   2012 – 2016
First Class Honours, GPA: 3.86/4.00
Thesis: Projected Search for Physics Beyond the Standard Model at the CERN Future Circular Collider.

PROFESSIONAL EXPERIENCE

Software Engineer   Lino Biotech (Acquired by Miltenyi Biotec) / Zürich, Switzerland   2023 – Present

- Achieved a **10x speedup** in real-time molecular analysis workflows (1 Hz processing) by profiling and optimizing CPU-bound processes using KCachegrind and parallelization (asyncio, multi-threading, multiprocessing).
- Increased biosensor sensitivity **5x** by redesigning statistical analysis pipelines, camera operation, and implementing advanced image processing methods.
- Delivered robust, fully typed Python libraries for biosensor control, image processing, and data pipelines, following strong scalable design. Automate different control parts (stepping motors, cameras, shutters, lasers) for machine operation.
- Developed and optimized embedded software solutions on Jetson TX2 and Jetson Orin Nano, enabling real-time data processing for biosensor product integration.
- Maintained CI/CD pipelines (GitLab CI) and containerized development environments (Docker, Ansible), ensuring reproducibility and reliability of edge-device deployments.
- Built and maintained a Next.js/React frontend integrated with Python backends (FastAPI/Django), supporting full-stack product development.
- Contributed core software and pipeline optimizations to **two product series successfully launched to the market**, ensuring reliable real-time biosensor performance in production environments.

Experimental Particle Physicist CERN, LHCb collaboration / EPFL, Switzerland 2018 – 2022

- Reduced systematic uncertainty by **4x** in precision measurements through advanced statistical modeling and large-scale data pipeline optimization (Python, C++).
- Contributed to the **first observation of the mass difference between neutral charm-meson eigenstates**, a milestone in particle physics, by leading data analysis and algorithm improvements.
- Improved detector performance by developing real-time tracking algorithms in C++ with neural network integration, significantly enhancing algorithmic efficiency under hardware constraints.
- Modernized and documented legacy C software for ASIC board readout, increasing maintainability and usability across the collaboration.
- Built and validated software pipelines for silicon photomultiplier sensors (SND@LHC project), supporting detector R&D and optimization.
- Implemented automated testing pipelines (Docker, GitLab CI) to ensure reliability of online data capture during experiments.
- Mentored graduate students in scientific computing and data analysis, fostering knowledge transfer within the collaboration.

Data Scientist (Remote - Freelance) Altruistic Innovation Limited, UK 2021 – 2022

- Developed machine learning models for smart electricity grid monitoring on an optical sensor.
- Architected cloud-based solutions using AWS (SageMaker, S3, EC2).

PUBLICATIONS AND ACHIEVEMENTS

- **LHCb Collaboration**, "Model-independent measurement of charm mixing parameters", PRD, 2022.
- **LHCb Collaboration**, "Observation of the mass difference between neutral charm-meson eigenstates", PRL, 2021.
- **S. Ek-In et al.**, "Effects of a Guide Field on the Larmor Electric Field", ApJ, 2017.
- Delivered keynote talks at major physics conferences (ICHEP, SPS, Lomonosov Conference).

CERTIFICATIONS

- AWS Cloud Practitioner
- Machine Learning in High Energy Physics

LANGUAGES

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

LEISURE

- Popping and Bachata Dancing, Skiing, Scuba Diving, Hiking