KAI RUTH

(+41)768317416 ⋄ contact@kairuth.ch
Zürcherstrasse 48A ⋄ 8102 Oberengstringen CH
https://www.linkedin.com/in/kai-ruth-7385b4313/
https://github.com/Kai360-dot

TECHNICAL SKILLS

Programming	C++, Python, HTML/CSS, Bash, Unix, GAMS
Software & Tools	Aspen Plus, OpenFOAM, Autodesk Inventor/Fusion360, ORCA
Skills	CFD, CAD, PFDs & P&IDs, systems modeling, mathematical programming, process optimization, embedded systems, additive manufacturing, laser cutting

EXPERIENCE

Master's Thesis, *Imperial College London* *May 2026 - October 2026*
Visiting researcher with Prof. Benoît Chachuat (Department of Chemical Engineering): developing mathematical and software tools for feasibility and flexibility analysis of process systems, with graph-based extensions to handle feedback loops in flowsheeting environments. C++ implementation building on the group's MC++/omega-icl libraries.

Semester Project, *SUPERLab, ETH Zurich* *September 2025 - December 2025*
Developed novel surrogate-based algorithms for solving high-dimensional recycle loops in process simulators. Implemented Gaussian Process surrogates and a Surrogate Fixed Point (SFP) acquisition strategy that successfully converged 48-dimensional flowsheet problems where state-of-the-art Bayesian optimization methods failed. Group of Prof. Gonzalo Guillén-Gosálbez (ICB).

Industry Internship, *F. Hoffmann-La Roche, Basel* *March 2025 - June 2025*
Evaluated DSC thermal methods, implemented model-free kinetics in Python, and developed multiphysics/CFD models to predict pressure evolution in thermal safety tests.

Research Project, *Stark-Group, ETH Zurich* *September 2023 - June 2024*
Designed and tested membrane-less alkaline electrolysis prototypes (plate and tubular) via additive manufacturing: 3D-printed cells, investigated sealing, gas separation and ohmic losses, and issued design guidelines (ICB).

Teaching Assistant, *ETH Zurich* *September 2022 - February 2026*
Inorganic Chemistry (529-0012-02L); General Chemistry (529-2001-02L); Process Design and Safety (151-0951-00L);

Tutor *2020 - 2024*
Teaching Math, Physics and Chemistry to high-school and university students.

OPEN SOURCE & PROJECTS

Maintainer, MC++ / pymcpp *2026 - Present*
Open-source maintainer of `MC++` (omega-icl), a C++ library for bounding and relaxation of factorable functions, and of its Python equivalent `pymcpp` available on PyPI.

Turing Complete Computer from NAND Gates
Built a Turing complete 8-bit computer from logic gates, ALU, registers, control unit and instruction decoder — based on NAND gates.

EDUCATION

ETH Zurich, Switzerland
Chemical Engineering BSc. *September 2021 - September 2024*
Process Engineering MSc. *September 2024 - Present*
Ferdinand Porsche High School, Germany
High School Degree *July 2020*

AWARDS

IMC Prosperity 4 (Algorithmic Trading Competition) *April 2026*
Ranked 161st of 18,803 teams worldwide (top 1%) and 6th in Switzerland
Mathematics Award (top of graduating class) *July 2020*
Chemistry Award (top of graduating class) *July 2020*
Sustainability Award *July 2020*

LANGUAGES

German, English Fluent
French, Russian Basic

EXTRA-CURRICULAR

Member of ETH Zurich's Student Biolab, supporting student-led research and organizing hackathons
Prototyped projects and supported fellow students at ETH Zurich's Student Project House

`Last Update: July 23, 2026`