

# Richard Hladík

🏠 Zürich, CH

☎ +420 608 176 814

★ 1997

📧 RichardHladik

@ rihl@uralyx.cz

🌐 rihl.uralyx.cz



*A final-semester student of the Computer science MSc programme at ETH Zürich. Theoretical computer scientist at heart, but currently also trying to gain experience in more practical fields, such as ML, software engineering, bioinformatics, or operation research. Open source enthusiast. I love pushing the boundaries of human knowledge and creating new and meaningful things, especially in a group of similarly passionate people.*

## Education

SEPT. 2021–NOW MSc in Computer science, **ETH Zürich** (expected graduation: September 2024)  
GPA of 5.58 (out of 6.00) after spring semester 2023 (not yet finalised)

SEPT. 2017–JUNE 2021 Bc. in Computer science, **Charles University**, Prague  
perfect grades (GPA of 1.00) throughout the studies and 224 ECTS credits

## Experience

**Software Engineering Intern** (SEP. 2022–FEB. 2023) – *Daedalean, Zürich*

- Developed a novel tool used to **scale up model evaluation** without human annotation. (Rust)
- **Designed and implemented an algorithm** for matching model detections with air traffic data based on their movement patterns.
- **Devised and analysed a heuristic** for deciding camera visibility of external air traffic.

**Student Researcher** (MAR. 2020–JUN. 2021) – *Charles University, Prague.*

- Algorithm research in **network flows** and **convex optimisation**. Basis for my [bachelor's thesis](#).
- **Constructed** new **algorithms** and investigated properties of their underlying combinatorial structure, in close collaboration with my [supervisor](#). Also verified our intuitions practically (C++, Python).
- **Improved the state of the art** convergence of combinatorial algorithms for the multicommodity flow problem **exponentially** on instances with small inflation rate.

**Student Researcher** (JUNE 2018–DEC. 2020) – *Czech Technical University, Prague.*

- Optimisation research in **scheduling**.
- **Proved NP-hardness** of a new periodic scheduling problem, proposed, discussed, **developed** and tested several **heuristics** for it. Wrote auxiliary tools (e.g. instance visualiser) in the process (C++, Python).
- **Decreased** the approximation error **10×** compared to the base implementation.

## Projects

**Research Project** (APR. 2023–NOW), *ETH Zürich* – universally optimal Dijkstra via beyond-worst-case heaps.

- We **improved Fibonacci heaps** to achieve beyond-worst-case guarantees and **proposed a modification of Dijkstra's algorithm** using this heap that is **provably universally optimal**.

**Lab Project** (MAR. 2022–JULY 2022), *ETH Zürich* – an optimised implementation of belief propagation.

- A four-person team project focused on **writing fast C code**.
- Achieved **100–500×** **speedup**: 80–250× due to optimisations in the underlying algorithm and 1.3–2× due to vectorisation, better cache locality, memory compaction etc.

**Outotune** (FEB. 2020–NOW) – a real-time C++ [harmoniser](#) implementation.

- Lets you **sing harmonies** by **synthesising** the chords you play on your keyboard **using your voice**.
- **Sped up** an open-source DSP library **3 times** by optimising FFT usage and data reuse.

## Skills

**Programming languages:** advanced: **Python**, **C++**, **C**, **sh**; intermediate: **Rust**; basic: **C#**, **Haskell**.

**Technologies:** **Git**, **NumPy**, **PyTorch**, **TensorFlow**, **Pandas**, **GoogleTest**, **GDB**, **Make**. Long-time (> 10 years) **Linux** user with **sysadmin** and **systems programming** experience.

I also try to broaden my scope by taking **courses in related areas**. So far, I have taken, for example: **Computer Linguistics**, **Deep Learning**, **Computer Graphics**, **Data Compression Algorithms**, **Reliable and Trustworthy AI**, **Information Theory**, **Principles of Distributed Computing**.

**Languages:** **Czech** (native), **English** (C2 – CAE Grade A), **German** (B2–C1), **French** (basics)

## Extracurricular Activities

2018–2022 [Czech Olympiad in Informatics](#), *Czech IOI Selection Camp* – I implemented, tested and wrote up algorithmic tasks; in the latter, I **rewrote** and **simplified** a big part of the technical infrastructure.

2017–2020 [KSP](#) – an algorithmisation correspondence seminar for Czech highschoolers; **led the main category** in 2018–2019, managing 10–20 people. Co-organised several **educational camps** with lectures and informatics-related (and -unrelated) activities.

2019–2020 **Programming I/II** for advanced students, *Charles University* ([Spring & Fall 2019](#), [Spring 2020](#)); co-taught the exercises with Martin Mareš. Set, discussed and solved algorithmic questions during class and prepared C++ programming tasks for the students to solve.

## Achievements & Awards

2021 **ETH-D scholarship** for excellent Master’s students ( $\approx 90$  out of 2500 students awarded each year)

2019 ACM-ICPC Central European Regional Contest – [5th place](#), advanced to World Finals 2020

2018 **ACM-ICPC World Finals** – [56th place](#) out of 140 teams

2017 International Olympiad in Informatics (IOI) – [Silver medal](#), [69th place](#) out of 304 participants

2016 ACM-ICPC Central European Regional Contest – [12th place](#) (unofficial high school participation)

2016 International Olympiad in Informatics (IOI) – [Bronze medal](#), [154th place](#) out of 308 participants

## Publications

- [1] Bernhard Haeupler, Richard Hladík, Václav Rozhoň, Robert Tarjan, and Jakub Tětek. Universal optimality of Dijkstra via beyond-worst-case heaps. *ArXiv*, abs/2311.11793, 2023.
- [2] Richard Hladík. Combinatorial algorithms for flow problems, 2021.
- [3] Richard Hladík, Anna Minaeva, and Zdeněk Hanzálek. On the complexity of a periodic scheduling problem with precedence relations. In *International Conference on Combinatorial Optimization and Applications*, page 107–124. Springer, 2020.