Richard Hladík

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A third-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 5.56 (out of 6.00) after the second semester

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*

- Currently **speeding up** data analysis as a part of a ≈15-people team (Rust).

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

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 (≈ 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] 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.