

Aleksander Kalacun

Causal Reinforcement Learning | Geometric Deep Learning | Scientific Computing | Computational Intelligence

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Education

2024-2027 **BSc (Computer science and information technologies)**
University of Maribor
Average: 9.95 (10 is best), best in the generation

Job Experience

2026– **Intelligent Systems Laboratory-Institute of Informatics University of Maribor**
Junior Researcher
Projects:

April 2025–April 2026 **Vega supercomputer-Institute of Information Science Maribor**
Student Researcher and maintainer
Projects: Collaboration with the industry, projects include LLM model training and independent research

August 2026– **Ultimate Frisbee team coach, player, and board member**
One of 3 coaches and a board member of 5 in a club with over 100 members

Selected Journal Publications

2026 **Aleksander Kalacun**, Iztok Fister Jr., Iztok Fister, *Parameter-Dependent Intervention Pruning in Causal Reinforcement Learning via Tropical Geometry*. Submitted to IEEE TNNLS, available on open review

Selected Conference Publications

2026 Iztok Fister Jr., **Aleksander Kalacun**, Iztok Fister, *Self-Rewriting Differential Evolution with Operator Synthesis*. ACM GECCO 2026, San José, Costa Rica. We presented a new optimization paradigm: an algorithm that modifies its own source code. Implemented in Python. Greatly outperformed vanilla SOTA (up to 40% improvement):
<https://dl.acm.org/doi/pdf/10.1145/3795101.3805457>.

2025 **Aleksander Kalacun**, Iztok Fister Jr. *MARNN: A New Method for Multi-agent Reinforcement Learning*. IEEE - ERK 2025, Portorož, Slovenia, pp. 601–604,
[https://erk.fe.uni-lj.si/2025/papers/kalacun\(marnn__a\).pdf](https://erk.fe.uni-lj.si/2025/papers/kalacun(marnn__a).pdf). We proposed a new algorithm for Multi-agent Reinforcement Learning that improves agents' performance in dynamic, partially observed environments. It outperformed SOTA on the efficiency metric (0.89%–0.92% improvement).

Publications before College

2024 **Aleksander Kalacun**, Jakob Žorž, Matjaž Meža, *Shorov algoritem - Študija* [Shor's Algorithm - A Study]. Slovenian Math Research Bootcamp 2024, DMFA (Association of Mathematicians, Physicists, and Astronomers Slovenia).
https://scholar.google.si/citations?view_op=view_citation&hl=sl&user=TUe8zA0AAAAJ&citation_for_view=TUe8zA0AAAAJ:u-x6o8ySG0sC

Aleksander Kalacun, Natalija Jančič, *Factors affecting the rate of reaction of benzyl alcohol oxidation with potassium permanganate in nonpolar solvent using crown ethers*. 54th KRKA (pharmaceutical company) Prizes (2024). https://www.krkinenagrade.si/media/store/54-KN/FINAL_544004-2024-KN-Krka-prizes-Book-of-abstracts-SI-EN2.pdf

2023 Matic Bratina, **Aleksander Kalacun**, Vasja Žorž, *Končni avtomati* [Finite Automata]. Slovenian Math Research Bootcamp 2023, DMFA (Association of Mathematicians, Physicists, and Astronomers Slovenia).
http://mars.dmfa.si/stare_strani/src_old/projekti/marsZbornik2023.pdf#page=63

- 2022 **Aleksander Kalacun**, Mitja Osojnik, Marko Jagodič, *Prihodnost je zapisana v qubitih* [Future is Written in Qubits]. 56th Meeting of Young Researchers of Slovenia (2022), Murska Sobota, Slovenia. Won Silver Award.
https://zbirke.zotks.si/2022/resources/SS_račun_1311.pdf. Survey of current quantum computing applications. I used the Qiskit framework and Python to show practical implementations of the algorithms.
- 2020 **Aleksander Kalacun**, Črt Cigale, Jožef Senekovič, *Koliko je ulomkov?* [How Many Fractions Are There?]. 54th Meeting of Young Researchers of Slovenia (2020), Murska Sobota, Slovenia. Won Golden Award.
https://zbirke.zotks.si/resources/Zlato_OS_Matematika_ali_logika_584812.pdf

Other Projects

1st place at GameJam	After winning, we continued developing the game for a soon-to-be-published release. Find a preview of the winning build in the GitHub repo: https://github.com/Kalacun/Winter-is-coming-preview . Implemented in the Godot game engine. 1st place out of 12 university teams.
Research Hackathon (2025)	achieved 4th–5th place Team Doner Keez: Aleksander Kalacun , Miha Govedič, David Krajnc – I led a team of Informatics and Medicine students to develop Syntherra, an RL+GNN molecular generator for drug discovery, using a digital twin of chemical simulations run on HPC. Implemented in Python using PyTorch. We published results on Zenodo and code on Codeberg: https://zenodo.org/records/15205817 https://codeberg.org/kalacun/Syntherra , https://hackathon.si/resitve-ekip-2025/ .
HPC optimization tool	After being introduced by Prof. Fister Jr. to https://www.mdpi.com/2227-7390/13/13/2122 , the idea was to mine profiler data from HPC systems and analyze performance using rule-based mining to identify optimization opportunities. The first part implemented includes OS optimizations, where flags like numactl and nice are added to running commands. I improved performance on benchmarks (CPU- and memory-intensive, etc.) by up to 100-fold (from 3.7 to 0.03 s). Implemented in Python.
Scientific Computing Lecture	I had a lecture on Computer Science class for computer science class (see presentation material on my website)

Extracurricular activities

Awards and Honors

2020–	Zois Scholarship for gifted students receiver
2025, 2026	Dean's Award for the top 5% of students
Ultimate Frisbee	Ultimate Frisbee mixed national champion indoor (2026, 10 teams) and 4th place (2025), vice-champion in the youth section (2023, 2024), all with Team Cosmo Maribor.
Languages	English: fluent, IELTS score 8 German: Completed a B2-level course certificate

Received Certificates

HPC certificates received:	<i>Introduction to Quantum Programming, Containers on HPCs Course, NVIDIA Workshop: Fundamentals of Accelerated Computing with Modern CUDA C++, NVIDIA Certificate of Competency: Fundamentals of Deep Learning, Profiling AI Software Bootcamp, Gray Scott HPC Summer School, Multi-GPU Programming Bootcamp, Rapid Application Development with Large Language Models (LLMs), Advanced Big Data Processing in Python. (see LinkedIn??)</i>
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