

Roman Knyazhitskiy

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Summary

Cambridge MPhil student combining deep technical expertise in JAX/PyTorch with real-world impact. Built differentiable simulators enabling more efficient RL algorithms, developed MPC systems improving robot trajectory accuracy, and contributed to major open-source ML libraries. Proven track record spans 10 years of robotics experience, from hackathon victories to published conference papers.

Education

MPhil in MLMI (Machine Learning), University of Cambridge 10/2025 - 09/2026

BSc Computer Science and Engineering, TU Delft 09/2022 - 07/2025

- GPA: 8.7/10. Graduated with Honours.

Work Experience

Research Associate, TU Delft 03/2023 - 08/2025

- Maintained regular research engagement through weekly supervisory consultations.
- Participated in departmental research meetings and academic discussions.
- Advanced research competencies through active involvement in university research programs.

Head of AI, Delft Mercurians (Student Robotics Team) 05/2023 - Present (Part-Time)

- Led a team of 2-5 engineers in developing AI control systems for RoboCup competitions.
- Designed and implemented a Model Predictive Control (MPC) system for robot trajectory optimization, significantly enhancing path-following accuracy and tactical execution.
- Introduced a continuous-time, differentiable simulator in JAX, providing the foundation for the implementation of more efficient learning algorithms.
- Ensured AI solution robustness via CI/CD, runtime type checking, and a comprehensive test suite.

Software Engineer, Delft Mercurians (Student Robotics Team) 05/2023 - 10/2023

- Developed a sensor fusion toolkit for our wheeled platform, leading to more accurate Kalman Filter calibration.
- Analyzed past movement data to establish sensor fusion performance benchmarks and improve system reliability.

Honours and Awards

- **1st Place**, Bunq Hackathon 6 (2025), team of 4 against 50+ teams with a prize of €30,000.
- **2nd Place & Special Prize**, Epoch AI Hackathon (2024).
- Recruited by San Francisco robotics startup for founding engineer role; prioritized continued education at Cambridge.
- **'Best Software Solution'** award, RoboCup World Championships, Sydney (2019).
- **1st Place**, RoboCup Junior National Competitions (2017, 2018, 2019).

Open Source Contributions

- Enhanced functionalities in [jaxtyping](#) and [Equinox](#), resolving multiple issues and enabling IPython runtime type checking.

- Contributed to [Gymnax](#), a widely used JAX RL environments collection with 800+ stars on GitHub.

Publications

Knyazhitskiy, R., Van der Vaart, P.R. "A Simple Scaling Model for Bootstrapped DQN". Submitted to AAAI Conference on Artificial Intelligence (2025). Under review.

Luijmes, J., Gielisse, A., **Knyazhitskiy, R.**, van Gemert, J. (2025). "ARC: Anchored Representation Clouds for High-Resolution INR Classification". *Accepted at ICLR 2025 Workshop on Weight Space Learning*.

Selected Projects

Lyapunov Discounting for BPTT Optimization, JAX, Differentiable Simulation 2024

- Novel stability improvement method for backpropagation through differentiable simulators, achieving significant gains over windowed BPTT, 5-fold increase in the peak performance achieved on Brax environments

pytest-mut: High-Performance Mutation Testing, Python, Parallel Computing 2024

- Developed mutation testing library achieving 10-15x speedup over alternatives through novel partial parallelization strategies

High-Frequency Weather Forecasting, Hierarchical Bayesian Models, CNF 2023

- Developed hybrid forecasting system combining continuous normalizing flows with autoregressive models for improved temporal resolution

Quadrotor Control System, C/C++, Embedded Systems 2023

- Implemented low-level control algorithms with hardware integration for autonomous quadrotor flight control

Skills

- **Machine Learning:** JAX, Equinox, PyTorch, OpenCV
- **Programming:** Python, Rust, C/C++, Full stack web development
- **Robotics & Hardware:** CAD (Autodesk Inventor/SolidWorks), embedded systems programming, sensor integration
- **Tools:** Git, CI/CD, containerization