

# Roman Knyazhitskiy

✉ cv@knyaz.tech — 🌐 knyaz.tech — 💬 knyazer

## Summary

---

Master's student with 2 years of work experience in robotics and AI. Designed control systems for robots with complex physical interactions, utilizing both model-based (MPC) and data-driven (RL) control techniques. Experienced in custom physics simulators in JAX, contributed to various OSS libraries, and conducted some machine learning research. Familiar with ROS.

## Education

---

<b>MPhil in MLMI (Machine Learning)</b> , University of Cambridge	10/2025 - 09/2026
<b>BSc Computer Science and Engineering</b> , TU Delft	09/2022 - 07/2025

- GPA: 8.7/10. Distinction (Cum Laude, top 5%) + Honours.

## Work Experience

---

<b>Machine Learning Engineer</b> , Delft Mercurians	05/2023 - 09/2025
<ul style="list-style-type: none"><li>• Started as an individual contributor, then grew my own team to 5 people. Then abandoned the team to become an individual contributor in Software department.</li><li>• Designed a Model Predictive Control (MPC) system from ground up, vastly improving control performance compared to bang-bang.</li><li>• Co-authored a continuous-time differentiable physics simulator in JAX for training control policies via reinforcement learning.</li><li>• Worked on integration Python-based ML models with multithreaded Rust codebase.</li></ul>	
<b>Research Associate</b> , TU Delft	03/2023 - 08/2025

- Researched applications of transformer-based models (Prior-Data Fitted Networks) for meta-learning.
- Investigated LLM applications in software engineering and contributed to research on diffusion models.

<b>Applied Machine Learning Intern</b> , Central Robotics Institute	06/2021 - 07/2021
<ul style="list-style-type: none"><li>• Developed computer vision algorithms for a robotic drawing application, including image segmentation and path optimization.</li></ul>	

## Publications

---

- [1] J. Luijmes, A. Gielisse, R. Knyazhitskiy, and J. van Gemert. ARC: Anchored representation clouds for high-resolution INR classification. In *ICLR 2025 Workshop on Weight Space Learning*, 2025. Accepted.
- [2] R. Knyazhitskiy and P. R. Van der Vaart. A simple scaling model for bootstrapped DQN. 2025. Under review.

## Selected Projects

---

<b>Bootstrapped DQN Scaling Laws</b> , JAX, Deep RL Research, HPC	2025
<ul style="list-style-type: none"><li>• Conducted a large-scale deep reinforcement learning study (~40,000 experiments), discovering a novel scaling law for bootstrapped exploration methods.</li></ul>	

**Stack-Associated Beam Tracing**, C++20, 3D Graphics, Computational Geometry      2022

- Implemented a 3D rendering engine in C++20 based on sparse voxel octree traversal for efficient beam queries.

**Lyapunov-Stabilized Continuous Control**, JAX, Deep RL, Robotics Simulation 2024

- Developed an RL framework for continuous control (locomotion) using truncated backpropagation stabilized by Lyapunov factors, enabling stable gradient flow in long-horizon tasks within the Brax physics engine.

**Speculative decoding and multi-token prediction**, JAX, Equinox, Deep Learning 2023

- Implemented a GPT-style autoregressive transformer from scratch in JAX/Equinox, architected for distributed training and featuring speculative decoding and multi-token prediction.

## Honours and Awards

---

- **Best Software Solution**, RoboCup World Championships, Sydney (2019).
- **1st Place**, RoboCup Junior National Competitions (2017, 2018, 2019).
- **2nd Place & Special Prize**, Epoch AI Hackathon (2024).
- **1st Place**, Bunq Hackathon 6 (2025).
- **Silver Medal**, AIIJC International AI Competition for Juniors – Sign language recognition application.

## Open Source Contributions

---

- Improved **libccd** (**collision detection library in C++**) by fixing a critical infinite loop bug.
- Enhanced functionalities in the JAX ecosystem libraries **jaxtyping** and **Equinox**.
- Contributed to **Gymnax**, a widely used collection of JAX-based RL environments.