Rafael Alani

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Education

Delft University of Technology Expected June 2028

Master of Science in Data Science and AI Technology *Delft, NL*

- **Focus Areas:** Probabilistic Decision Making & Reinforcement Learning • Computer Vision & Image Processing

Tsinghua University Spring 2027

Incoming Exchange Student *Beijing, China*

- Big Data Intelligence • Financial Data Analysis • Chinese language
- Distributed Database Systems • Artificial Intelligence of Things (AIoT)

Delft University of Technology Sep 2022 - Jun 2025

Bachelor of Science in Computer Science and Engineering *Delft, NL*

- **Thesis:** Exploring the benefits of Graph Transformers in Relational Deep Learning - 8.0

Experience

TU Delft - Computer Science Department Sep 2025 – Present

Part-time Software Engineer | Java, Spring, TypeScript, Svelte, MySQL, Redis

- Built a Gitlab project management dashboard, utilised the Gitlab API, university services and Redis caching for restructuring groups, repositories and students via drag-and-drop. Used by professors from **3** faculties.
- Expanded the Course Curriculum Visualiser to a programme-wide view, connecting topics across courses and extending the model to support Tracks and Programmes. Utilised by **1200** students.

Aug 2025 – Aug 2026

Teaching Assistant – Delft Center of Entrepreneurship | Flask, Python, TypeScript, Svelte, SvelteKit

- Created a recommendation algorithm matching students with co-founders based on background, experience and survey answers. Used by **250+ students** over 2 academic years.
- Curated and hosted talks by Y Combinator founders, including CarettaAI, and European industry leaders.

Aug 2025 – Nov 2025

Teaching Assistant – Advanced Data Science | Python, Pandas, NumPy, scikit-learn, pytest

- Industry projects with **Coding the Curbs:** Led a student team in developing a production model forecasting Amsterdam and Utrecht truck loading-bay occupancy, achieving **80% accuracy** over a two-week horizon.
- Supervised an explainable ML model predicting **ProRail** review outcomes and their drivers from freight-request data.

ZEPCAM – Professional Bodycam Solutions Apr 2024 – Jul 2024

Software Engineer Intern | *Expo, React Native, C#* *Zaltbommel, NL*

- Developed and Integrated a React Native app with ZEPCAM's C#/.NET backend services, bodycam devices and auxiliary devices, enabling mobile access to client workflows.

Projects

Self-Hosted Agent Infrastructure | *Python, Docker, Proxmox, Harness development, Cloud agents, Bash, n8n*

- Built and maintain infrastructure spanning **6 VMs** and **90+ Docker containers** for home, writing and hobby automation, media delivery, hosting, staging and production environments for my own projects.
- Built an orchestration layer that creates VM-based agents for Github issues. Developed a self-improvement coding harness based on my own issue feedback after a static harness proved insufficient.

Vision-Language-Action Benchmarking | *MuJoCo, RoboTwin2, LoRA, OpenCV, Python*

- Co-developed a robotic Go-stone manipulation benchmark. Fine-tuned and evaluated **4 VLA models**, testing robustness to changes in scene layout, lighting and camera pose.
- Measured OpenVLA success falling from **34% to 0%** under perturbations. Used image/text masking and activation patching to analyse model failures and decisions.

Multi-Agent Epidemic Simulation & Inference | *Julia, Agent Simulation, AgentsJL, GenJL*

- Modelled a high-state-space multi-agent simulation and demonstrated that standard Importance Sampling, Variational Inference, HMC and MH procedures become ineffective beyond 20 agents.
- Designed a Metropolis-Hastings proposal based on agents' locations over time that identified the true infection source in **37%** of runs and ranked it within the top 5 in **70%** of runs across 100-agent simulations (over 5 seeds).

Awards

1st Place, Databricks Challenge — ETH Datathon, Zurich | *Apache Spark, MLflow* 2026

- Built a forecasting pipeline in Spark for Iberian electricity demand over a **36-hour horizon**, incorporating weather, holidays, and historical demand. Used MLflow for experiment tracking.