

Zihe (Zach) Liu

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Distributed RL, Long-horizon Alignment

EDUCATION

University of Cambridge

Master of Engineering, Information and Computer Engineering

July 2026 - Present

Masters Thesis: *Second Order Forward Optimization for Natural Policy Gradients*

- Develop efficient Gauss-Newton optimizer for RL, on custom ML compiler and AD stack (tinygrad-like)

Bachelor of Arts, Information and Computer Engineering — First Class Honors

Sep 2023 - June 2026

Coursework: RL, Deep Learning, Probabilistic Inference, [Information Theory](#), Optimization, Computer Architecture

- David Newland [Prize](#) for Design (best undergrad project)

EXPERIENCE

ERA: AI

Cambridge, UK

Research Fellow — Mentor: Elizaveta Tennant, *Google DeepMind*

July 2026 - Present

- [AI research program](#) (top 0.5% of 6,000+ applicants) working on long-horizon RL for LLM alignment
- Develop [multi-turn RL algorithm](#) to reduce violations over 128 turns (80K-token context) on MACHIAVELLI
- Distributed RL in verl with FSDP sharding, async vLLM inference on *4xB300* node

Amazon

London, UK

Software Development Engineer Intern

July - Oct 2025

- Built ML (*CatBoost*) triaging system to root-cause fatal Prime Video errors, with *AWS Bedrock* LLM log analysis
- Scaled throughput $100\times$ ($3\rightarrow 300$ sessions/cluster, 20GB logs) by batching SQL queries on *AWS Lambda*, *Athena*
- Refactored monolithic *AWS CDK* stack; unblocked a *Fargate* pipeline stalling deployment for 4 months
- *Turned down full-time return offer to work on alignment RL research*

UCL Centre for AI

London, UK

Student Researcher — Mentor: Peter Hayes, *Humanloop* (now *Anthropic*)

Feb - May 2025

- Developed *Critique Direct Preference Optimization*: generative critique for sample-efficient DPO | [Blog](#)
- Distributed training on *Qwen-2.5 3B* models with *16x H100 GPUs*, on UCL HPC facility | [GitHub](#)

Singapore AI Safety Institute, Infocomm Media Development Authority

Singapore

Research Engineer Intern

Dec 2024 - July 2025

- Research industry evaluation metrics for LLM reliability and robustness | [Report](#)
- Benchmark hallucination detectors on *HaluBench* (simple CoT LLM-judge outperforms all) | [GitHub](#)

Alignment Research Engineer Accelerator (ARENA)

London, UK

Research Engineer

Sep - Oct 2024

- Built GPT-2 LLM from scratch, reverse-engineered its internal reasoning circuits, and fine-tuned via RLHF (PPO)

Cambridge AI Safety Hub

Cambridge, UK

Operations Lead, Student Researcher

Oct 2023 - Present

- Organized AI safety workshops, hackathons, research reading groups on interpretability, alignment | [R1 Talk](#)

Changi Airport Group

Singapore

Machine Learning Engineer Intern

July - Aug 2023

- Trained P2PNet (object detection CNN model) to localize and count luggage trolleys (*MAE decreased by 5x compared to previous systems*). Quantized model with ONNX to deploy on edge (Nvidia Jetson Nano)

Republic of Singapore Air Force

Singapore

Security Trooper, Corporal First Class

Jan 2021 - Jan 2023

- Led Immediate Response Force team (2IC) to win APGC Eagles Challenge 2022. Best Airman Award.

PUBLICATIONS

Z. Liu, D. Le, E. Tennant. [MTMA: Multi-Turn RL for Long-Horizon Moral Alignment](#). *NeurIPS 2026 BiAlign Workshop* (also AI4GOOD, SocialAgent)

J. Robinson, L. Franceschetti, M. Lovett, D. Le, K. Sen, N. Narayanan, Z. Liu, E. Tennant. [Reasoning-Behavior Coherence Beyond the Rewarded Context](#). *NeurIPS 2026 AIWILD Workshop*

M. Saghir, N. Raghavendra, Z. Liu, E. Gunter. [NGD converges to less degenerate solutions than SGD](#). *arXiv*

AWARDS

SG Digital AI Scholarship | 500k\$+ Full undergraduate funding, for exceptional Singaporeans pursuing AI overseas

GB3 RISC-V CPU Competition 2026 | *1st place*. Optimize tiny CPU with instruction caches, lookaheads | [GitHub](#)

SF2 Image Compression 2026 | *1st place*. Built JPEG compression scheme with DCT, intra prediction | [Results](#)

Changi Airport Group Scholarship | Offered full undergraduate funding for fast-track graduate programme

SKILLS

Programming Languages: Python, C/C++, Verilog/SystemVerilog, TypeScript/JavaScript, MATLAB, Java

ML Systems: verl, TRL, vLLM, PyTorch FSDP, DeepSpeed-ZeRO, NumPy, tinygrad, JAX

AWS/Cloud: CloudFormation, CDK, Fargate, Lambda, S3, Athena

Non-ML: HPC (Sun Grid Engine), FPGA/Arduino/Embedded Systems, Git, SQL