Hu Lifan

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EDUCATION

National University of Singapore *Aug 2024 - Present*
*Bachelor of Engineering in **Computer Engineering** (Specialization: IoT)*
Second Major: Innovation and Design Program, Minor: Mathematics, GPA: 4.6/5.0
Shanghai Jiao Tong University (Summer School) *Jun 2025 - Jul 2025*
Courses: Algebra(A), Statistics Inference(A)

PUBLICATIONS

Lifan Hu, "Learning Lie Group Generators From Trajectories," arXiv.org, April 4, 2025, https://arxiv.org/abs/2504.03220.

Lifan Hu, "GNN-Augmented RL for Fraud Detection in Decentralized Finance," CONF-SEML 2025(Published), April 14, 2025, https://doi.org/10.54254/2755-2721/2025.22856.

INTERNSHIP EXPERIENCE

Shanghai MAHLE Thermal Systems Co., Ltd., Digital Developer **Shanghai, CN**
Intern, Finance, Controlling & IT *May 2025 - July 2025*

- Wrote a real-time multilingual meeting transcriber/translator using Vosk + MarianMT; fully offline-capable, deployed in constrained industrial environments with >95% ASR accuracy in quiet speech
- Trained YOLOv5 model on blueprint .tif images, achieving >85% precision in detecting diagrams, tables, and handwritten notes in manufacturing documents
- Developed OCR pipeline combining Tesseract and PaddleOCR to extract structured data from multi-format scanned documents with layout reconstruction, with accuracy over 98% of texts
- Created an OCR-based screen snipping data extractor for QM factory interfaces, integrating image hashing and keyboard automation to enable zero-integration telemetry, now operating on 90% of local factory interfaces
- Established a predictive model (Decision Tree, Extra Trees) for factory downtime forecasting; achieved Mean Absolute Error < 0.045 across evaluation sets
- Deployed multiple lightweight Flask APIs to serve model inference, real-time OCR, and monitoring dashboards across local networked systems

RESEARCH EXPERIENCE

GNN + MARL for DeFi Fraud Detection *Jan 2025 - May 2025*
Researcher, Supervised by Prof. Pietro Liò, Cambridge University

- Built a GNN-augmented multi-agent PPO system in a custom PettingZoo ParallelEnv to detect fraudulent behaviours in DeFi transaction graphs; validated against 50K+ Ethereum records
- Benchmarked hybrid GNN-RL-GAN model against RL-only and traditional ML with 50k Ethereum records

Lie Group Trajectory Encoder *Feb 2025 - Apr 2025*
Independent Project

- Trained neural encoders for SE(2), SE(3), SO(3), SL(2,R) using supervised MLPs on Lie group trajectories
- Visualized manifold embeddings and benchmarked robustness under noise and rapid angular shifts with gradient-weighted loss functions; averaging 0.03 of prediction error

On-Device Vision-Language Assistant for the Visually Impaired *Aug 2025 - Present*
Undergraduate Researcher, Supervised by A/Prof. Lim Li Hong Idris, National University of Singapore

- Designed and implemented an edge-based multimodal perception pipeline integrating quantized Vision–Language Models (VILA1.5-3B, Qwen2.5-VL-3B) on Jetson Orin Nano Super for offline assistive vision
- Benchmarked latency, memory footprint, and throughput across multiple VLM architectures and quantization schemes (q4f16_ft, q4), achieving stable on-device inference under 10–12 s latency at 640×480 resolution

LLM Fusion *Jan 2026 - Present*
Research Assistant, Supervised by Prof. He Bingsheng, National University of Singapore

OTHER EXPERIENCE

National University of Singapore, Lead Developer *Jan 2025 - May 2025*

- Designed an autonomous mobile robot with ROS2, SLAM, and AMG8833 thermal imaging; navigated complex indoor environments and executed heat-targeted projectile firing with >90% directional accuracy

- Engineered multi-pass exploration logic (random walk → frontier-based → validation) and integrated A* pathfinding with real-time LiDAR-based obstacle avoidance, improving map coverage efficiency by ~35%

National University of Singapore, Robotics Group Leader *Feb 2025 - Apr 2025*

- Developed a C++ serial communication interface on Raspberry Pi for teleoperation and claw actuation
- Synthesized infra-red sensing, ultrasonic braking, and servo-based multi-fingered claw control

NUS Astronomy Society, Member *Oct 2024 - Present*

- Planned and co-led AstroBash – a university-wide stargazing expedition to Langkawi, Malaysia
- Organized logistics and guided sky observation sessions for 30+ participants

Awards & Certificates

- **Worldquant BRAIN Challenge** - Silver Medal, Worldquant *Feb 2025*
- **2025 Mathematical Contest In Modelling** - Meritorious Winner, COMAP *May 2025*

SKILLS

- Languages: *Chinese (Native), English (Proficient), Japanese (Intermediate), German (Basic)*
- Frameworks: *ROS2, OpenCV, PyTorch, SuperSuit, PettingZoo, RLlib*
- Hardware: *Raspberry Pi 4, Arduino Mega, AMG8833, LiDAR, Servo Motors*
- Web & UI: *React, Tailwind CSS, Vite, Figma*
- Programming Languages: *Python, C/C++, JavaScript*
- Machine Learning: *Reinforcement learning, graph neural networks, transformers*