Hongjia Liu

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Education

KTH Royal Institute of Technology **Sep 2025 – Jul 2026**
MSc in autonomous systems and intelligent robots (Double Degree)

Aalto University **Sep 2024 – Jul 2026**
MSc in autonomous systems and intelligent robots (Double Degree)
GPA: 4.31/5
Relevant Courses: Reinforcement Learning, Digital and Optimal Control, Robotic Manipulation, Probabilistic Machine Learning, Dynamic System Modeling & Analysis, Robotics, Supervised Machine Learning.

Jiangnan University (Project 211) **Sep 2019 – Jul 2023**
BEng in Computer Science and Technology
GPA: 3.54/4 — Rank: 17/216 (Top 10%)
Relevant Courses: Advanced Mathematics (95), Probability and Statistics (99), Machine Learning (A), Algorithm Analysis & Design (97), Image Processing Techniques (A).

Honors & Awards

Erasmus Scholarship	2025
Master's Scholarship: 50% Tuition Waiver	2024
Excellent Bachelor Thesis, Jiangnan University	2023
Mathematical Contest in Modeling (MCM), Finalist	2022
Second-Class Scholarship, Jiangnan University	2022
Lanqiao Cup (Third Prize, C/C++ Programming)	2021
Certified Software Engineer (Top 7.88%)	2020

Internships

Astribot (Stardust Intelligence), Robotics Learning Algorithm Engineer **May 2025 – Present**

- Investigate integration of RSSM-based world models (DreamerV2/V3, TD-MPC2) with state-of-the-art imitation learning algorithms (ACT, Diffusion Policy) and vision-language-action models (OpenPi, OpenVLA).
- Conduct advanced research on multi-task scenarios, proposing solutions for state confusion issues caused by insufficient long-horizon memory in current imitation learning (e.g., same observation and action under different latent states). Studied structural optimization of world model latent space using object-centric learning for more effective long-term, multi-object relational reasoning.

Zhejiang Lab, Research Assistant **2024**

- Researched 3D Gaussian Splatting and its application in high-quality scene reconstruction, with a focus on reflective surfaces (e.g., automotive glass).
- Collaborated with interdisciplinary teams to explore scalable and performant methods for 3D scene reconstruction frameworks.

Research Experience

Object-Centric Learning Research, First Author NeurIPS 2025 Poster **Dec 2024 – May 2025**
Advisor: Joni Pajarinen, Aalto University Robot Learning Lab

- Conducted an extensive review of ∼70 papers on object-centric learning (OCL), with a focus on applications in computer vision, reinforcement learning, and robotics.

- Reproduced and validated results from several influential OCL methods to ensure a strong empirical foundation.
- Proposed **MetaSlot**, a Slot Attention variant that dynamically adapts to varying object counts using a VQ-prototype codebook, pruning redundant slots and providing semantically meaningful initialization—enhancing representation accuracy, interpretability, and ease of integration into existing OCL frameworks.
- **First author** of the paper "MetaSlot: Break Through the Fixed Number of Slots in Object-Centric Learning," accepted to **NeurIPS 2025**.

Gaze Estimation Research **Sep 2024 – May 2025**

Advisor: Shiyong Lan, Institute of Image and Graphics, Sichuan University

- Developed **DMAGaze**, a novel gaze estimation framework integrating feature disentanglement and multi-scale attention for high-accuracy gaze direction prediction.
- **Second author** of "DMAGaze: Gaze Estimation Based on Feature Disentanglement and Multi-Scale Attention," submitted to **Pattern Recognition Letters**.
- Proposed **DCDNet** (Differential Capsule Disentanglement Network), which introduces structural constraints and differential operations to suppress noise and extract robust gaze-relevant features under complex conditions.
- **Second author** of "DCDNet: Differential Capsule Disentanglement Network for Gaze Estimation," submitted to **IEEE Transactions on Instrumentation & Measurement**.
- Conducted extensive evaluations on public benchmarks, achieving **state-of-the-art** performance in gaze estimation.

Fast Style Transfer Based on AdaIN **2023**

Advisor: Hui Li, Jiangsu Provincial Engineering Laboratory for Pattern Recognition and Computational Intelligence, Jiangnan University

- Proposed GuideAST, a novel fast arbitrary style transfer model combining sketch and correction networks.
- Enhanced global style feature transfer in super-resolution images via multi-layer AdaIN skip connections and Gaussian noise.
- Incorporated guided filtering into the correction network to improve preservation of high-frequency details.

Projects

Quantitative Investment Strategies for Gold and Bitcoin **2022**

- Designed a hybrid model combining Random Forest and BiLSTM for purchase pattern and price trend prediction.
- Proposed a daily trading ratio strategy based on portfolio theory.
- Performed sensitivity analysis to validate the robustness of the strategy to trading cost variations.

Mainboard Quality Inspection System based on Faster RCNN **2021**

- Developed a defect inspection system for mainboard production lines in cooperation with a local enterprise.
- Conducted data annotation, Faster RCNN training and tuning to achieve reliable defect identification.

Organizer, ACM Algorithm Design Club / Hengwei Cup Programming Competition, Jiangnan University **2020**

- Participated in daily training, competitions, and discussions of challenging algorithmic problems.
- Designed competition problems focusing on dynamic programming, topological sorting, union-find, and other classical algorithms; emphasized innovation and practical skills to enhance participants' problem-solving and coding abilities.

Skills

Languages: Excellent English reading, writing, and speaking (IELTS 6.5); native Mandarin Chinese

Programming: Python, C/C++, Matlab, LaTeX, SQL, Java, R, C#

Deep Learning and ML:

- Proficient in PyTorch, PyTorch Lightning (CV, NLP)
- Skilled in model training and inference on GPU clusters

Robotics: ROS (Robot Operating System), Linux, reinforcement learning, optimal control

Database Skills: OLTP/OLAP data modeling and schema design

Software Engineering: Git version control, DevSecOps, agile development

Other: Unity game development, OOP, mathematical modeling, design patterns and principles