# Haotian Lin

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## EDUCATION

### TSINGHUA UNIVERSITY — Beijing
*B.S. in Mechanics & B.E. in Vehicle Engineering* — 9/2020 – 6/2024

- GPA: 3.6/4.0
- Visiting research intern at University of California, Berkeley

### CARGENIE MELLON UNIVERSITY — Pittsburgh
*M.S. in Robotics* — *8*/2024– now

- GPA: 4.0/4.0
- Related Courses: Anvanced Mechine Learning(A), Optimal Control & RL(A), Introduction to Robot Learning(A)

## RESEARCH EXPERIENCE

### LeCAR Lab & Auton Lab (Carnegie Mellon University) — Pittsburgh, PA
Research Assistant (MSR)
Advisor: Guanya Shi (*guanyas@andrew.cmu.edu*) , Jeff Schneider (*jeff4@andrew.cmu.edu*)

***Improving Model-Based RL for Continuous Control*** — 10/2024 –3/2024

- Uncover and study structural off-policy issue in plan-based MBRL.
- Propose a minimalist fix to mitigate value oversetivate in TD-MPC family and boost performance for high-dimensional continuous control tasks.

***Self-improving Foundation Models via Residual RL*** — 5/2025 –10/2025

- Develop data-efficient on-device RL pipeline that improves base model performance without human guidance. Leverage expressive policy prior (VLA) to warm-start exploration and probing using a residual RL.
- Employ a hybrid rollout scheme to collect diverse recovery behavior and distilled these curated behavior back into the generalist via SFT.

***Multi-task RL for Robotics in Parallel Simulation*** — 5/2025–Now

- Study gradient conflict and task representation learning for value-based on-policy algorithm in multi-task learning.

### Mechanical System Control Lab (University of California, Berkeley) — Berkeley, CA
Research Assistant
Advisor: Masayoshi Tomizuka (*tomizuka@berkeley.edu*)

***Diffusion Model for Multi-Agent Pedestrian Trajectory Prediction*** — 10/2023 – 4/2024

- Leverage latent diffusion to model complex social interaction between agents. Propose a novel trajectory prediction scheme that consider trajectory prediction as inpainting problem and solved through posterior sampling provide
- Contribute to conference papers admitted to IROS 2024.

***Prediction Benchmark*** — 7/2023 –11/2023

- Evaluate prediction model's ability of interaction modeling and map representation, bridging the gap of concept interpretation and model performance by Shapley Value-based contribution metrics.

### THICV (Tsinghua University) — Beijing
Research Assistant
Advisor: Jianqiang Wang (*wjqlws@tsinghua.edu.cn*) , Shaobing Xu (*shaobxu@tsinghua.edu.cn*)

***GNN-based prediction framework for generalizable scene understanding*** 10/2022 – 6/2023

- Designing social interaction aware backbone leveraging prior knowledge for autonomous driving, adaptable to downstream tasks including trajectory prediction and intention detection.
- Designing conditional diffusion-based traffic simulator that integrates natural language commands.
- Contribute to conference papers admitted to IEEE IV 2023 and IROS 2025.

**iDLab (Tsinghua University)** Beijing

Research Assistant

(Students Research Training Program)

Advisor: Shengbo Li (*lishbo@tsinghua.edu.cn*)

***DRL Algorithm Development for Integrated Decision-Making & Control*** 10/2022 – 6/2023

- Testing and verification of **GOPS** toolkit in driving scenario.
- Develop offline RL algorithm for diffusion and flow policy using Q-score alignment.

## PUBLICATIONS

- Wenli Xiao, **Haotian Lin,** Haoru Xue, Tairan He, Zhengyi Luo, Yuqi Xie, Fengyuan Hu, Andy Peng, Guanya Shi, Jim Fan, Yuke Zhu. "Self-Improving Vision-Language-Action Models with Data Generation via Residual RL" (In Submission)
- **Haotian Lin**, Pengcheng Wang, Jeff Schneider, Guanya Shi. "TD-M (PC) $^ 2$: Improving Temporal Difference MPC Through Policy Constraint". arXiv preprint arXiv:2502.03550. (In Submission)
- **Haotian Lin**, Yixiao Wang, Mingxiao Huo, Chensheng Peng, Zhiyuan Liu, Masayoshi Tomizuka. "Joint Pedestrian Trajectory Prediction through Posterior Sampling". 2024 IEEE/RSJ International Conference on Intelligent Robots and Systems.
- Zhiyuan Liu, Leheng Li, Yuning Wang, **Haotian Lin**, Hao Cheng, Zhizhe Liu, Lei He, Jianqiang Wang. "Controllable traffic simulation through llm-guided hierarchical chain-of-thought reasoning". 2025 IEEE/RSJ International Conference on Intelligent Robots and Systems.
- Yuning Wang, Zhiyuan Liu, **Haotian Lin**, Jinhao Li, Ruochen Li, Jianqiang Wang. "Vif-gnn: A novel agent trajectory prediction model based on virtual interaction force and gnn". 2023 IEEE Intelligent Vehicles Symposium (IV). IEEE, 2023.

## SKILLS & INTERESTS

- Strong interest in **data-driven reinforcement learning**, **generative models for control.**
- Coding skills: Python (PyTorch, JAX), C++, Matlab.
- Robotic Physical Simulator: IsaacSim, IsaacGym, Mujoco
- Software: SolidWorks, Abaqus

## HONOR

***Xingjian Yingcai Scholarship, Tsinghua University*** 2022

***Xingjian Yingcai Scholarship, Tsinghua University*** 2021

## EXTRACURRICULAR EXPERIENCES

***Secondary Award in Xindong Project (Intelligent vehicle design contest, Tsinghua University)*** 1/2021

***Member of Tsinghua Photography Team (official art group in Tsinghua University)*** 9/2021 – 6/2024

***Committee Member of Tsinghua Photography Team*** 9/2022 – 6/2023

***Member of Student Union (Department Of Art) of Xingjian College*** 9/2021 – 6/2022