

Yuan Gao

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🌐 Homepage | 🎓 Google Scholar | 🏠 GitHub | 🏛️ Tsinghua University

I am Yuan Gao, a Ph.D. student at **Tsinghua University**, with a **GPA of 4.0/4.0 and ranked first** in my program. I have published **15+ papers**, including five first/co-first/corresponding-author papers at **ICML, AAAI, KDD, and ECCV**. My work has received **800+ Google Scholar citations** and **700+ GitHub stars**, and I have experience with large-scale model pretraining using up to **128 NVIDIA A100 GPUs**. I serve as a reviewer for **ICLR, NeurIPS, ICML, CVPR, KDD, AAAI, ECCV**, etc.

Research Interests: My research focuses on (1) **Robot Video Generation & World Models**; (2) **Multimodal Large Language Models & Agent Systems**; (3) **Large-scale Spatiotemporal Forecasting**; and (4) **Computer Vision**. My representative recent work, **RoboAlign-R1**, studies distilled multimodal reward alignment for robot video world models, aiming to make generated rollouts physically plausible, temporally coherent, task-relevant, and useful for perception, planning, and action evaluation. Broadly, my research aims to build intelligent systems that can understand, predict, and reason about the physical world across space, time, and modalities.

Selected Awards & Honors

Comprehensive Scholarship of Tsinghua University	2025.10
National Scholarship (Top 1% in China)	2023.09
Top Grade Scholarship (the highest scholarship for undergraduate students)	2022.09
National Scholarship (Top 1% in China)	2021.09

Publications

Full list on Google Scholar.

Robot Video Generation & World Models

RoboAlign-R1: Distilled Multimodal Reward Alignment for Robot Video World Models *arXiv*, 2026
Hao Wu, Yuqi Li, **Yuan Gao**, Fan Xu, Fan Zhang, Kun Wang, Penghao Zhao, Qiufeng Wang, Yizhou Zhao, Weiyan Wang, Yingli Tian, Xian Wu, Xiaomeng Huang
arXiv, 2026. (Co-first author)

OneRestore: A Universal Restoration Framework for Composite Degradation *ECCV*, 2024
Yu Guo, **Yuan Gao**, Yuxu Lu, Huilin Zhu, Ryan Wen Liu, Shengfeng He
European Conference on Computer Vision (ECCV), 2024. (Co-first author)

Spatiotemporal Forecasting as Planning: A Model-Based Reinforcement Learning Approach with Generative World Models *arXiv*, 2025
Hao Wu, **Yuan Gao**, Xingjian Shi, Shuaipeng Li, Fan Xu, Fan Zhang, Zhihong Zhu, Weiyan Wang, Xiao Luo, Kun Wang, Xian Wu, Xiaomeng Huang
arXiv, 2025. (Co-first author)

Multimodal Large Language Models & Agent Systems

OMNIFLOW: A Physics-Grounded Multimodal Agent for Generalized Scientific Reasoning *arXiv*, 2026
Hao Wu, Yongheng Zhang, **Yuan Gao**, Fan Xu, Fan Zhang, Ruobing Xie, Ruijian Gou, Yuxuan Liang, Xiaomeng Huang, Xian Wu
arXiv, 2026. (Co-first author)

Rethinking Facial Expression Recognition in the Era of Multimodal Large Language Models: Benchmark, Datasets, and Beyond *arXiv*, 2025
Fan Zhang, Haoxuan Li, Shengju Qian, Xin Wang, Zheng Lian, Hao Wu, Zhihong Zhu, **Yuan Gao**, Qiankun Li, Yefeng Zheng, Zhouchen Lin, Pheng-Ann Heng
arXiv, 2025.

Struct-Searcher: Agentic Structural Thinking Advances Multimodal Deep Information Seeking *COLM*, 2026
Fan Zhang, Vireo Zhang, Shengju Qian, Haoxuan Li, Zheng Lian, Hao Wu, **Yuan Gao**, Xinyu Geng, Xin Wang, Pheng-Ann Heng
COLM, 2026.

Large-scale Spatiotemporal Forecasting

OneForecast: A Universal Framework for Global and Regional Weather Forecasting *ICML*, 2025
Yuan Gao, Hao Wu, Ruiqi Shu, Huanshuo Dong, Fan Xu, Rui Chen, Yibo Yan, Qingsong Wen, Xuming Hu, Kun Wang, Jiahao Wu, Qing Li, Hui Xiong, Xiaomeng Huang

International Conference on Machine Learning (ICML), 2025. **(First author)**

NeuralOM: Neural Ocean Model for Subseasonal-to-Seasonal Simulation

AAAI, 2025

Yuan Gao, Hao Wu, Fan Xu, Yanfei Xiang, Ruijian Gou, Qingsong Wen, Xian Wu, Kun Wang, Xiaomeng Huang
AAAI Conference on Artificial Intelligence (AAAI), 2025. **(First author)**

PnP-Corrector: A Universal Correction Framework for Coupled Spatiotemporal Forecasting

ICML, 2026

Hao Wu, Fan Xu, Yuxu Lu, Penghao Zhao, Fan Zhang, Hao Jia, Yuxuan Liang, Ruijian Gou, Qingsong Wen, Xian Wu, Xiaomeng Huang, *Yuan Gao*

International Conference on Machine Learning (ICML), 2026. **(Corresponding author)**

Advanced Long-term Earth System Forecasting

arXiv, 2025

Hao Wu, *Yuan Gao*, Ruijian Gou, Xian Wu, Chuhan Wu, Huahui Yi, Johannes Brandstetter, Fan Xu, Kun Wang, Penghao Zhao, Hao Jia, Qi Song, Xinliang Liu, Juncai He, Shuhao Cao, Huanshuo Dong, Yanfei Xiang, Fan Zhang, Haixin Wang, Xingjian Shi, Qiufeng Wang, Shuaipeng Li, Ruobing Xie, Feng Tao, Yuxu Lu, Yu Guo, Yuntian Chen, Yuxuan Liang, Qingsong Wen, Wanli Ouyang, Deliang Chen, Niklas Boers, Xiaomeng Huang
arXiv, 2025. **(Corresponding author, Co-first author, Under Review at Science Advances)**

An Exterior-Embedding Neural Operator Framework for Preserving Conservation Laws

KDD, 2026

Huanshuo Dong, Hong Wang, Hao Wu, Zhiwei Zhuang, Xuanze Yang, Ruiqi Shu, *Yuan Gao*, Xiaomeng Huang
ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD), 2026.

Tyche: One Step Flow for Efficient Probabilistic Weather Forecasting

arXiv, 2026

Fan Xu, *Yuan Gao*, Kun Wang, Rui Su, Fenghua Ling, Hao Wu, Wanli Ouyang
arXiv, 2026. **(Co-first author)**

Learning from History: A Retrieval-Augmented Framework for Spatiotemporal Prediction

arXiv, 2025

Hao Jia, Penghao Zhao, Hao Wu, *Yuan Gao*, Yangyu Tao, Bin Cui
arXiv, 2025.

Differential-Integral Neural Operator for Long-Term Turbulence Forecasting

KDD, 2026

Hao Wu, *Yuan Gao*, Fan Xu, Fan Zhang, Qingsong Wen, Kun Wang, Xiaomeng Huang, Xian Wu
ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD), 2026. **(Co-first author)**

Turb-L1: Achieving Long-term Turbulence Tracing By Tackling Spectral Bias

arXiv, 2025

Hao Wu, *Yuan Gao*, Ruiqi Shu, Zean Han, Fan Xu, Zhihong Zhu, Qingsong Wen, Xian Wu, Kun Wang, Xiaomeng Huang
arXiv, 2025. **(Co-first author)**

Computer Vision

Let You See in Haze and Sandstorm: Two-in-One Low-visibility Enhancement Network

IEEE TIM, 2023

Yuan Gao, Wenyu Xu, and Yuxu Lu

IEEE Transactions on Instrumentation and Measurement. (SCI, IF. 7.0, JCR Q1)

Deep learning-driven surveillance quality enhancement for maritime management promotion under low-visibility weathers

OCMA, 2023

Jingxiang Qu, *Yuan Gao*, Yuxu Lu, Wenyu Xu, and Ryan Wen Liu
Ocean & Coastal Management, 2023. (SCI, IF. 5.9, JCR Q1) **(Co-first author)**

AoSRNet: All-in-One Scene Recovery Networks via Multi-knowledge Integration

KBS, 2024

Dong Yang, Yuxu Lu, *Yuan Gao*, Ryan Wen Liu, Jun Liu, and Yu Guo
Knowledge-Based Systems, 2024. (SCI, IF. 8.0, JCR Q1)

MvKSR: Multi-view Knowledge-guided Scene Recovery for Hazy and Rainy Degradation

IEEE TIM, 2024

Wenyu Xu, Dong Yang, *Yuan Gao*, Yuxu Lu, Jingming Zhang, Yu Guo
IEEE Transactions on Instrumentation and Measurement. (SCI, IF. 7.0, JCR Q1)

SCANet: Self-Paced Semi-Curricular Attention Network for Non-Homogeneous Image Dehazing

CVPR Workshops, 2023

Yu Guo, *Yuan Gao*, Ryan Wen Liu, Yuxu Lu, Jingxiang Qu, Shengfeng He, and Wenqi Ren
Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops.

Double Domain Guided Real-Time Low-Light Image Enhancement for Ultra-High-Definition Transportation Surveillance

IEEE TITS, 2024

Jingxiang Qu, Ryan Wen Liu, *Yuan Gao*, Yu Guo, Fenghua Zhu, and Fei-Yue Wang
IEEE Transactions on Intelligent Transportation Systems. (SCI, IF. 9.1, JCR Q1)

Real-Time Multi-Scene Visibility Enhancement for Promoting Navigational Safety of Vessels Under Complex Weather Conditions

IEEE TITS, 2024

Ryan Wen Liu, Yuxu Lu, *Yuan Gao*, Yu Guo, Wenqi Ren, Fenghua Zhu, Fei-Yue Wang
IEEE Transactions on Intelligent Transportation Systems. (SCI, IF. 9.1, JCR Q1)

Attention-oriented Residual Block for Real-time Low-light Image Enhancement in Smart Ports

CEE, 2024

Lu Li, Yuxu Lu, *Yuan Gao*, Ryan Wen Liu, and Dong Yang
Computers and Electrical Engineering, 2024. (SCI, IF. 5.5, JCR Q1)

**Towards a physical imaging-driven sparse attention dehazer for Internet of Things-aided Maritime
Intelligent Transportation**

CEE, 2025

Yuxuan Tian, Yu Guo, Yuxu Lu, *Yuan Gao*, Ryan Wen Liu
Computers and Electrical Engineering, 2025. (SCI, IF. 5.5, JCR Q1)

Academic Service

Reviewer: ICLR, NeurIPS, ICML, CVPR, KDD, AAAI, ECCV, etc.

Technical Skills

Programming Languages: Python, C++, C, Java

Frameworks & Tools: PyTorch, TensorFlow, DeepSpeed, Megatron, Git, Linux, LaTeX