Ruoyu Zhao

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Education

B.Eng **Tsinghua University**, Department of Electronic Engineering — *Beijing, China*, Sept 2020 – Present
- Major degree: Electronic Information Science and Technology

B.Sc **Tsinghua University**, Department of Statistics and Data Science — *Beijing, China*, Sept 2023 – Jun 2024
- Minor degree: Statistics
- Completed all 10 degree courses in just one year.

Experience

Tsinghua University (THU), Research Assistant (RA) — *Beijing, China*, Sept 2024 – Present
Advisor: Assis.Prof. Yali Li and Prof. Shengjin Wang
- Explored Continual Lifelong Learning based on Diffusion generative models.
- Diploma Project Dissertation

City University of Hong Kong (CityU), Research Assistant (RA) — *Hong Kong, China*, Aug 2024 – Nov 2024
Advisor: Assis.Prof. Zhichao Lu
- Explored on efficient brain-like network architecture and non-Backpropagation algorithm based on the brain's sparse, local, and dynamic characteristics.
- Proposed and implemented a parallel computing method based on soft-reset LIF, with richer neural dynamics and verification on SMMs for long sequence learning.

Qingguang Innovation Technology Ltd. (startup), Lead Developer — *Beijing, China*, Jan 2024 – Present
- Aimed to enhance capabilities of the visually impaired through artificial intelligence and technology.
- Developed a comprehensive technical roadmap encompassing the integration of hardware components and the implementation of software algorithms.
- Amassed valuable engineering expertise and coding experience, offering a distinct perspective out of my research-centric backgrounds and enhancing my understanding of doing research.

University of Illinois Urbana-Champaign (UIUC), Research Assistant (RA) — *Illinois, U.S. (remote)*, Oct 2023 – Jan 2024
Advisor: Assis.Prof. Yuxiong Wang
- Introduced a unified, versatile, diffusion-based framework to simultaneously handle both multi-modal data generation and dense visual perception.
- Conducted several experimental procedures and curated data to derive actionable insights and drive scientific inquiry.

National University of Singapore (NUS), Research Assistant (RA) — *Singapore*, Aug 2023 – Nov 2023
Advisor: Assoc.Prof. Wei Tsang Ooi
- Explored Neural Radiance Fields as a method for volumetric video representation.
- Integrated NeRF with fine-tuning pipeline and LC-checkpoint algorithm, reached a better compression of volumetric video for stream media system.

Publications/Manuscripts

* stands for equal contribution, ✉ stands for corresponding author.

[1] SPikE-SSM: A Sparse, Precise, and Efficient Spiking State Space Model for Long Sequences Learning Oct 2024

Yan Zhong*, ***Ruoyu Zhao****, Chao Wang, Qinghui Guo, Jianguo Zhang, Zhichao Lu, Luziwei Leng✉
arXiv preprint (2024), in submission to ACL 2025

[2] Diff-2-in-1: Bridging Generation and Dense Perception with Diffusion Models Oct 2024

Shuhong Zheng, Zhipeng Bao, ***Ruoyu Zhao***, Martial Hebert, Martial Hebert, Yu-Xiong Wang✉
arXiv preprint (2024), in submission to ICLR 2025

[3] Volumetric Video Compression Through Neural-based Representation Apr 2024

Yuang Shi, ***Ruoyu Zhao***, Simone Gasparini, Géraldine Morin, Wei Tsang Ooi✉
MMVE '24

[4] Optimization of Layer Skipping and Frequency Scaling for Convolutional Neural Networks under Latency Constraint Jun 2024

Minh David Thao Chan*, ***Ruoyu Zhao****, Yukuan Jia, Ruiqing Mao, Sheng Zhou✉
1st Workshop on Cooperative Intelligence for Embodied AI, ECCV 2024 (Poster)

[5] Manifold Similarity Learning for Multi-label Feature Selection with Space Consistency Aug 2024

Dongjie Yuan, Li Zhang, Guangzhi Zhao, ***Ruoyu Zhao***, Yulong Huang, Zhisong Du, Lei Shi, Yukang Huo, Rohit Agarwal, Bohua Chen, Bin Yuan, Yan Zhong✉
In submission to ICASSP2025

[6] Semi-Supervised Multi-Label Feature Selection with Consistent Sparse Graph Learning Jul 2024

Yan Zhong, Xingyu Wu, Xinping Zhao, Likang Wu, ***Ruoyu Zhao***, Xinyuan Song, Zhaolong Ling, Jiejiang Chen✉, Bingbing Jiang✉
In submission to Information Processing & Management

[7] CTD-inpainting: Towards the Coherence of Text-driven Image Inpainting in Social Media Sept 2024

Yan Zhong, Xinping Zhao, Guangzhi Zhao, Bohua Chen, ***Ruoyu Zhao***, Fei Hao, Lei Shi✉, Li Zhang✉
In submission to IEEE Transactions on Big Data

Projects

AI Copilot for the Visually Impaired Jan 2024 - Jun 2024

- Developed AI-assisted glasses for the visually impaired, based on Nvidia Jetson Orin Nano, integrating algorithms and different hardware components.
- Utilized autonomous driving methods, semantic segmentation model, perspective transformation, and A* algorithm to enable terminal assisted navigation.
- Selected for the 3rd iStar Program (top 11 teams in THU). Won the third prize in the 2024 China-U.S. Young Maker Competition (Beijing Division).

Efficient 2D Line Clipping via Hough Transform Apr 2023 - May 2023

- Proposed and implemented a more efficient method based on Hough Transform for 2D line clipping using rectangular windows, independently.

Graphene Artificial Throat May 2022 - Sept 2022

- Participated in the fabrication and data acquisition of graphene artificial throat. Used machine learning method for pattern recognition based on vibration signals.
- Participated in Student Research Training Program (SRT) in THU, and got Grade A.

Scholarships and Awards

Award for Outstanding Scientific and Technological Innovation, Tsinghua Univ.	2024
Selected for the 3rd iStar Program, Tsinghua Univ. (top 11 teams school-wide)	2024
The third prize in the 2024 China-U.S. Young Maker Competition (Beijing Division)	2024
Super Dream Award by Dongguan Science Promotion Association	2023
Zheng Gang Overseas Study Scholarship (4/250), Dept. EE	2023
Award for Fine Arts Excellence, Tsinghua Univ.	2022
Award for Voluntary and Public Welfare Excellence, Tsinghua Univ.	2021
Award for Social Work Excellence, Tsinghua Univ.	2021

Teaching

Course-40231212: Design and Practice of Intelligent Robot, Teaching Assistant (TA) — *Dept.EE, Tsinghua University*
Advisor: Assoc.Prof. Miling Zhang — 2024 Fall

- Led the experimental design and instructional material creation for the "Path Planning" topic. Responsible for guiding students, conducting experiment assessments, and grading assignments.

Leadership

Secretary of Youth League Branch — Sept 2020 - Jul 2021

- Best of Show Award, 2021, Dept. EE

Member of the Student Union of Tsinghua Univ. — Sept 2021 - Jul 2022

Deputy Team Leader of the Organization Group of Dept. EE — Sept 2022 - Jul 2023

Academic Service

Reviewer: ICLR 2025

Technologies

Programming: Python, Pytorch, R, C/C++, MATLAB, Verilog, LaTeX

Miscellaneous: Badminton (PB: rank 1 department-wide in mixed doubles)