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Research Focus

RL Training: vLLM/SGLang acceleration, VERL, GRPO, PPO

Multimodal Training: Language, vision, and audio (speech/music)

Core Passion: Building fast, scalable RL training systems for multi-modal LLMs to learn metacognition.

Education

Dartmouth College

Hanover, NH, USA

Ph.D. candidate in Computer Science Aug. 2023–Mar. 2026 (expected)

Advisor: [Professor Soroush Vosoughi](#)

Brandeis University

Waltham, MA, USA

M.S. in Computer Science

Sep. 2021–Jun. 2023

GSAS Research Fellowship Recipient

Northeastern University

China

B.S. in Computer Science

Sep. 2017–Jun. 2021

Outstanding Honor Thesis Award

Experience

Google DeepMind

Mountain View, CA, USA

Research Intern

Jun. 2025–Sep. 2025

Audio LLM Post-Training (SFT + RL) for Real-time Streaming

Developed a data-efficient framework that eliminates reliance on human-crafted streaming labels while maintaining near-identical accuracy to non-streaming models. Proud achievement: built a **full-stack RL+SFT framework** for audio LLMs that achieves SOTA in real-time streaming ASR/AST.

Engineered a high-throughput training pipeline in PyTorch and SGLang for Gemma-3n family, accelerating RL training by 5× via KV-cache reuse in audio-text long-context scenarios.

Honda Research Institute USA

San Jose, CA, USA

Research Intern

Jun. 2024–Sep. 2024

Multimodal LLM Post-Training (8B–70B) for Social Reasoning

Published a *spotlight* paper at ICML 2025 (Top 2.59%). Filed a US patent.

Developed long-context multimodal LLMs and accelerated inference-time scaling using vLLM framework. Enabled long-context modeling of human behavior and autonomous driving in multimodal environments; scalable to LLMs up to 70B/405B parameters.

Selected Publications

Overcoming Multi-step Complexity in Theory-of-Mind Reasoning: A Scalable Bayesian Planner

Chunhui Zhang, Zhongyu Ouyang, Sean Dae Houlihan, Kwonjoon Lee, Nakul Agarwal, Soroush Vosoughi, Shao-Yuan Lo
ICML 2025 (Spotlight, Top 2.59%)

[Paper](#) | [Code](#)

First scalable solution for multi-step Theory-of-Mind reasoning. Uses Bayesian inverse planning for global planning, then lets LLMs focus on local reasoning. Works on 70B+ models where others fail.

Growing Through Experience: Scaling Episodic Grounding in Language Models

Chunhui Zhang, Elsie Wang, Zhongyu Ouyang, Xiangchi Yuan, Soroush Vosoughi
ACL 2025 Main Conference (Oral Presentation, Top 3.24%)

[Paper](#) | [Code](#)

Post-trained reasoning LLMs (across 3B, 8B, 70B) on MCTS-sampled data from physical simulators.

Pretrained Image-Text Models are Secretly Video Captioners

Chunhui Zhang*, Yiren Jian*, Zhongyu Ouyang, Soroush Vosoughi
NAACL 2025 Main Conference (Oral Presentation, Top 2.88%)

[Paper](#) | [Code](#)

RL post-training recipe that achieved **Top-2** on PapersWithCode video captioning leaderboard, outperforming industry MLLM captioners.

Knowing More, Acting Better: Hierarchical Representation for Embodied Decision-Making

Chunhui Zhang, Zhongyu Ouyang, Zheyuan Liu, Soroush Vosoughi
EMNLP 2025 Findings

Refines vision-language-action LLM representations to enable more effective PPO-based RL training in embodied AI.

Working Memory Identifies Reasoning Limits in Language Models

Chunhui Zhang, Yiren Jian, Zhongyu Ouyang, Soroush Vosoughi

EMNLP 2024 Main Conference | [Paper](#) | [Code](#)

Introduced working memory as a diagnostic tool for LLM reasoning limits. This work inspired a follow-up NAACL paper on long-context multimodal understanding.

Temporal Working Memory: Query-Guided Segment Refinement for Enhanced Multimodal Understanding

Xingjian Diao*, **Chunhui Zhang***, Weiyi Wu, Zhongyu Ouyang, Peijun Qing, Ming Cheng, Soroush Vosoughi, Jiang Gui

NAACL 2025 Findings | [Paper](#) | [Code](#)

Inspired by working memory in my EMNLP 2024 paper, this work is a follow-up study on long-context video-language understanding.

Under Review

Model Priors Shape Experience: RL for Complex Audio Long-form Reasoners

Chunhui Zhang

[Code](#)

First to implement Qwen2.5-Omni and vLLM for faster RL reasoning across audio and other unified modalities.

Selected Collaborations

Superficial Self-Improved Reasoners Benefit from Model Merging

Xiangchi Yuan, **Chunhui Zhang**, Zheyuan Liu, Dachuan Shi, Soroush Vosoughi, Wenke Lee

EMNLP 2025 | [Paper](#) | [Code](#)

SoundMind: RL-Incentivized Logic Reasoning for Audio-Language Models

Xingjian Diao, **Chunhui Zhang**, Keyi Kong, Weiyi Wu, Chiyu Ma, Zhongyu Ouyang, Peijun Qing, Soroush Vosoughi, Jiang Gui

EMNLP 2025 (*Oral Presentation*)

Is It Navajo? Accurate Language Detection in Endangered Athabaskan Languages

Ivory Yang, Weicheng Ma, **Chunhui Zhang**, Soroush Vosoughi

NAACL 2025 (*Oral Presentation, Top 2.88%*) | [Paper](#) | [Code](#)

Expedited Training of Visual Conditioned Language Generation via Redundancy Reduction

Yiren Jian, Tingkai Liu, Yunzhe Tao, **Chunhui Zhang**, Soroush Vosoughi, Hongxia Yang

ACL 2024 (Oral Presentation, Top 3.10%)

When Sparsity Meets Contrastive Models: Less Data Can Bring Better Class-Balanced Representations

Chunhui Zhang, Chao Huang, Yijun Tian, Qianlong Wen, et al.

ICML 2023 – AAAI-DCAA 2023 Best Paper Runner-up Award

Chasing All-Round Graph Representation Robustness: Model, Training, and Optimization

Chunhui Zhang, Yijun Tian, Mingxuan Ju, Zheyuan Liu, et al.

ICLR 2023

Aligning Relational Learning with Lipschitz Fairness

Yaning Jia*, **Chunhui Zhang***, Soroush Vosoughi

ICLR 2024 – Note: Co-first author Jia was a master student I mentored.

Mitigating Emergent Robustness Degradation on Graphs while Scaling-up

Xiangchi Yuan*, **Chunhui Zhang***, Yijun Tian, Yanfang Ye, et al.

ICLR 2024 – Note: Co-first author Yuan was a master student I mentored.

Full publication list includeing 30+ papers at *ICML, NeurIPS, ICLR, ACL, NAACL, EMNLP, WWW (TheWebConf), KDD, CIKM, ICDM, ICWSM, etc.* available at chunhuizng.github.io

Honors and Awards

ICML Spotlight Recognition (Top 2.59%)	2025
ACL Oral Presentation Award (Top 3.24%)	2024, 2025
NAACL Oral Presentation Award (Top 2.88%)	2025
AAAI-DCAA Best Paper Runner-up Award	2023
Graduate School of Arts and Sciences Fellowship	2021–2023

Service

Program Committee/Reviewer: ICML, ICLR, NeurIPS, ACL, NAACL, EMNLP, UAI, AISTATS, AAAI (2023–2025)

Journal Reviewer: TMLR, IEEE TKDE, IEEE TNSE, ACM TIST, Neurocomputing