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## Research Focus

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

**Multimodal Training:** Language, vision, and audio

**Core Passion:** Building scalable RL training systems for (multimodal) LLMs to acquire metacognition and long-term memory.

## 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

**Amazon Science** (Rufus Shopping LLM Team)

Seattle, WA, USA

Applied Scientist Intern

Present

*RL Post-Training for Computer-Use Agents*

Training and scaling vision–language–action models (7B→32B) for adaptive-thinking computer-use agents, enabling low-latency inference and long-context memory through RL.

**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](#)

**Learning Musical Representations for Music Performance Question Answering**

Xingjian Diao, **Chunhui Zhang**, Tingxuan Wu, Ming Cheng, Zhongyu Ouyang, Weiyi Wu, Jiang Gui

*EMNLP findings 2024*

**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%)*

**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.*

**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*

**Look Twice as Much as You Say: Scene Graph Contrastive Learning for Self-Supervised Image Caption Generation**

**Chunhui Zhang**, Chao Huang, Youhuan Li, Xiangliang Zhang, Yanfang Ye, et al.

*CIKM, 2022.*

***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](https://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