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**Research Focus**      **RL Multimodal LLMs** on Language, vision, and audio

<b>Education</b>	<b>Dartmouth College</b> Ph.D. candidate in Computer Science Advisor: <a href="#">Professor Soroush Vosoughi</a>	Hanover, NH, USA Aug. 2023–Feb. 2026 (expected)
	<b>Brandeis University</b> M.S. in Computer Science GSAS Research Fellowship	Waltham, MA, USA Sep. 2021–Jun. 2023
	<b>Northeastern University</b> B.S. in Computer Science Outstanding Honor Thesis Award	China Sep. 2017–Jun. 2021
<b>Experience</b>	<b>Amazon</b> Applied Scientist Intern <i>RL Post-Training for Multimodal Computer-Use Agents (CUA) in Rufus (reorganized into Amazon AGI Nova prior to internship end)</i> Post-trained multimodal LLMs (7–32B) for low-latency GUI agents towards <b>adaptive reasoning</b> with reduced token costs. Developed verl and vLLM to enable <b>on-policy RL</b> and <b>SFT</b> on complex trajectories, bridging OOD gaps and stabilizing visual grounding.	Seattle, WA, USA Sep. 2025 – Dec. 2025
	<b>Google DeepMind</b> Research Intern <i>Gemma 3n Post-Training for Real-Time Interaction (Frontier AI &amp; GenAI)</i> Created a synthetic audio–text framework for real-time ASR/AST; eliminated human labeling dependence while keeping WER/BLEU within <b>1%</b> of baselines. Built the <b>full-stack RL+SFT infrastructure</b> for Gemma 3n, enabling PyTorch/SGLang support for the open-source community. Engineered a high-throughput training pipeline for Gemma 3n, accelerating RL (GRPO, DAPO) by 5×. Contributed to the <b>Gemma 3n technical report</b> and open-source development.	Mountain View, CA, USA Jun. 2025 – Sep. 2025

## Selected Publications

<b>Honda Research Institute USA</b>	San Jose, CA, USA
Research Intern	Jun. 2024–Sep. 2024
<i>Multimodal LLM Post-Training (8B–70B) for Social Reasoning</i>	
Published a <i>spotlight</i> 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.	

### **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*

[Paper](#)

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

**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	<b>Program Committee/Reviewer:</b> ICML, ICLR, NeurIPS, ACL, NAACL, EMNLP, UAI, AISTATS, AAAI (2023–2025) <b>Journal Reviewer:</b> TMLR, IEEE TKDE, IEEE TNSE, ACM TIST, Neurocomputing
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