Chunhui Zhang, Ph.D. student at Dartmouth

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Research Focus

RL Post-Training and Multimodal Alignment on Language, vision, and audio

Education

Dartmouth College Hanover, NH, USA
Ph.D. candidate in Computer Science Aug. 2023–Feb. 2026 (expected)
Advisor: Professor Soroush Vosoughi

Brandeis University Waltham, MA, USA
M.S. in Computer Science Sep. 2021–Jun. 2023
GSAS Research Fellowship

Northeastern University China
B.S. in Computer Science Sep. 2017–Jun. 2021
Outstanding Honor Thesis Award

Experience

Amazon Seattle, WA, USA
Applied Scientist Intern Sep. 2025 – Dec. 2025
RL Post-Training for Multimodal Computer-Use Agents (CUA) in Rufus (reorganized into Amazon AGI Nova prior to internship end)
Post-trained multimodal LLMs (7–32B) for low-latency Graphical User Interface (GUI) agents via **adaptive reasoning**.
Implemented verl and vLLM to support **on-policy RL** and **SFT** on ground-truth hard trajectories, bridging OOD gaps and stabilizing visual grounding in GUI environments.

Google DeepMind Mountain View, CA, USA
Research Intern Jun. 2025 – Sep. 2025
Gemma 3n Post-Training for Real-Time Interaction (Frontier AI & GenAI)
Developed a synthetic audio–text data framework that eliminates reliance on human-crafted streaming labels while maintaining accuracy within **1%** of non-streaming models and scaling to web-scale data.
Built a **full-stack RL+SFT framework** for audio LLMs, achieving state-of-the-art performance in real-time streaming ASR/AST.
Engineered a high-throughput rollout and training pipeline in PyTorch and SGLang for Gemma 3n, accelerating RL (GRPO, DAPO) by 5×.
Contributed to **Gemma 3n technical report** and open-source support.

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

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

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