Lu Dong

(716) 730-0429; Buffalo, NY
ludong@buffalo.edu
3D Generative AI | Computer Vision Researcher | World & Motion Models
Personal Homepage
LinkedIn: Lu Dong

I am a Ph.D. candidate in Computer Science at the University at Buffalo (SUNY), specializing in 3D generative models and world-modeling for human motion, interaction, and scene understanding. My work builds scalable 2D/3D generative systems that integrate vision, language, and learning, spanning human motion generation and human–object / human–scene / human–robot interaction in embodied settings. I enjoy translating research into efficient, deployable pipelines that can run reliably in real-world products.

Research Experience

Human Behavior Modeling Lab (HBML), University at Buffalo (SUNY) | National AI Institute for Exceptional Education
Position: Research Assistant | Advisor: Ifeoma Nwogu | Buffalo, NY, USA. *08/2021 – Present*

- **Research Focus: Human-Centered 3D Generative Models and Interactive Behavior Modeling**
  - **Agentic LLM Frameworks for Socially Intelligent Human–Robot Interaction** [AutoMisty-IROS'25, MistyPilot]
    Built an agentic LLM-based human–social robot interaction framework integrating perception, dialogue, and action; Implemented multi-agent orchestration, fast–slow reasoning, and stateful memory updates for world-model-inspired state tracking and language-grounded tool/action execution, enabling multi-turn, socially intelligent, goal-directed interactions.
  - **Open-Domain Text-Driven Synthesis of Multi-Person Motions** [Multi-Person Motion- ECCV'24]
    Built an open-domain, text-conditioned multi-person motion synthesis framework; trained a two-stage diffusion model on 3D motion data aggregated from both images and videos, released a large-scale multi-person interaction dataset, and enabled controllable generation with a variable number of people exhibiting realistic motion behaviors.
  - **3D American Sign Language Motion Reconstruction and Generation** [SignAvatar-FG'24, wSignGen-EMNLP'24]
    Developed word-conditioned 3D ASL motion generation and reconstruction pipelines using a progressive modeling approach, advancing from cVAE to diffusion-based models—on noisy video-derived motion data; released the ASL3DWord dataset, enabling realistic and linguistically plausible ASL motion synthesis to improve accessibility for deaf and hard-of-hearing students.
  - **Language-Guided Human Motion Synthesis with Atomic Actions** [ATOM- ACM MM'23]
    Proposed an atomic-action motion generation pipeline that learns a decoder-side atomic-action codebook for language-guided compositional control; achieved strong performance across multiple datasets and generated more realistic motions.
  - **Spatial Reasoning for Human–Scene Interaction** [CoT-HSI]
    Built a motionGPT style human–scene–object interaction framework that disentangles spatial plans (translation trajectories) from motion tokens (3DMM-based motion) for fine-grained, interpretable control; trained a VQ-VAE motion codebook and performed LLM fine-tuning and instruction tuning. *Manuscript in preparation*.
  - **LLM-Driven Interpretation of Students' Learning Cognitive States from Subtle Facial Cues** [SCOPE]
    Introduced ROIL (Relative Ordinal Intensity Learning) to model online learning states (boredom, engagement, confusion, frustration) as *relative, ordered intensity* under ambiguous ordinal labels; integrated frames, facial Action Units (AUs), valence–arousal (VA), gaze, and eye blinks, with LLM-based explanations for interpretable feedback. *Manuscript in preparation*.

YLAB, Xi'an Jiaotong University, Xi'an, Shaanxi, China
Research Assistant | Advisor: Xinyu Yang *08/2013–06/2016*

- **Research Focus: Musical Machine Learning for Traditional Folk Song Understanding**
  - **Melody Pattern Discovery in Chinese Folk Songs** [XinTianYou-SMC'15]
    Developed a pattern-mining framework to uncover distinctive melodic motifs and structural regularities in traditional folk songs.
  - **Benchmarking and Classification of Traditional Chinese Folk Songs** [Chinese Folk Songs]
    Built a systematic taxonomy and benchmarking framework for large-scale folk song analysis, supporting robust cross-region comparison and retrieval.

Industry Experience

NEC Laboratories America, Princeton, NJ
Research Intern (In-Person) | Mentors: Deep Patel, Iain Melvin, Martin Renqiang Min *05/2025–08/2025*

- Built an LLM-driven 3D interaction planner that follows a **plan-then-act** pipeline, fine-tuned to generate translation trajectories (plans) and 3D motion tokens (actions) for language-conditioned human–scene–object interaction.

InnoPeak Technology (OPPO US Research), Seattle, WA
Research Intern (In-Person) | Mentors: Mitch Hill, Guo-Jun Qi *06/2023–08/2023*

- Built a **diffusion-based**, open-domain **multi-person motion synthesis** framework that enables text-driven generation with a **variable number of** interacting 3D participants.

InnoPeak Technology (OPPO US Research), Palo Alto, CA
Research Intern (In-Person) | Mentors: Xun Xu, Shuxue Quan *05/2022–08/2022*

- Developed **robust human pose estimation** framework for home fitness scenarios under **severe self-occlusion**, improving stability and usability in real-world settings.

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Shaanxi Haina Electronic Technology Co., Ltd., Xi'an, China
Principal Data Scientist *09/2016–04/2020*

- **Led** a 6-person cross-functional information retrieval and data intelligence team, improving operational efficiency by **20%**.
- **Mentored data analysts and engineers** on recommendation systems and data-driven product design, improving user experience and engagement.
- **Drove revenue growth** through data-driven strategy and analytics, increasing client conversion by **30%** and doubling team revenue within two years.

Education

University at Buffalo- State University of New York (UB), USA
Ph.D. in Computer Science and Engineering. 08/2021- Present
Rochester Institute of Technology, USA
Ph.D. in Computing and Information Sciences. (GPA 4.0; transferred with advisor) 08/2020-05/2021
Xi'an Jiaotong University (XJTU), CHINA
M.S. in Computer Science and Technology 08/2013-05/2016
Northeast Electric Power University, CHINA
B.S. in Computer Science and Technology 08/2007-05/2011

Selected Research Systems & Prototypes

Information Retrieval Project - Covid19 & Vaccine Analysis Search Engine [Page Link] **09/2021-12/2021 @UB**

- Scraped 50,000 tweets using Tweepy on COVID-19 and vaccines from diverse languages, countries, public, and authorities.
- Designed a full-stack web application with a Google-like front end and a flask-based backend, integrating deep learning models.
- Provided trend analysis of public and authoritative attitudes toward vaccines, along with fake news detection.

Natural Language Processing Project - Medical Tutoring ChatBot [Page Link] **09/2021-12/2021 @UB**

- Curated structured dialogue datasets from raw files such as HTML, PDF, and text documents.
- Developed a full-stack medical tutoring chatbot to improve medical literacy in underdeveloped regions of India.
- Proposed a framework for smoother dialogue transitions to enhance user attention and engagement.

Academic Service

IEEE Conference Organization: Local Student Chair, IJCB Conference 2024 @ Buffalo, NY.
Academic Reviewer: **Conference**: ACL Rolling Review (ARR), February & July 2025;
ACM Multimedia (MM), 2023 & 2024;
Journal: Computer Vision and Image Understanding (CVIU), 2025;
Machine Vision and Applications (Nature MVA), 2024, 2025;
IEEE Transactions on Affective Computing (TAFFC), 2024;
Professional Competition: Invited Judge for UB Hacking Competition (2022).
Invited Talk: Invited talk at Women in Tech Western New York, 2025;
Invited talk on 'AI Research and Career Development' 2024;
Academic Membership: ACL Member, IEEE Biometrics Council Member, IEEE Student Member.

Awards & Honor

- PhD Research Award, University at Buffalo, 2025;
- Best AI Project Award, University at Buffalo, 2024;
- IJCB Conference Leadership Award, 2024;
- ECCV Conference Travel Grant, 2024;
- Outstanding Graduate Student Award, 2014 and 2015;
- National Graduate Academic Scholarship, 2013–2016;
- National Endeavor Scholarship for Outstanding Undergraduates, 2010;
- Outstanding Undergraduate Student Award, 2010.

Skills

Programming & Tools: Python, PyTorch, R (Statistical Modeling & Data Analysis), C++, Linux, Slurm, Blender.
Specialized Skills: Large-scale Data Cleaning and Analysis, Multimodal Foundation Models, LLM Post-training, 3D Computer Vision, Affective Computing, Human Behavior Modeling and Interaction, Human-Robot Interaction, Cross-disciplinary Team Leadership.

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Selected Papers

1. **Lu Dong***, Xiao Wang*, Jingchen Sun, Ifeoma Nwogu, Srirangaraj Setlur, Venu Govindaraju."MistyPilot: An Agentic Fast–Slow Thinking LLM Framework for Misty Social Robots" *under review*.
2. **Lu Dong***, Xiao Wang*, Sahana Rangasrinivasan, Ifeoma Nwogu, Srirangaraj Setlur, Venu Govindaraju."AutoMisty: A Multi-Agent LLM Framework for Automated Code Generation in the Misty Social Robot." *International Conference on Intelligent Robots and Systems (IROS 2025)*.
3. **Lu Dong**, Xiao Wang, Ifeoma Nwogu. "Word-Conditioned 3D American Sign Language Motion Generation" *The 2024 Conference on Empirical Methods in Natural Language Processing (EMNLP 2024)*.
4. **Lu Dong***, Xiao Wang*, Srirangaraj Setlur, Venu Govindaraju, Ifeoma Nwogu."Ig3D: Integrating 3D Face Representations in Facial Expression Inference" *The 18th European Conference on Computer Vision, ECCVW 2024*.
5. Mengyi Shan, **Lu Dong**, Yutao Han, Yuan Yao, Tao Liu, Ifeoma Nwogu, Guo-Jun Qi, Mitch Hill. "Towards Open Domain Text-Driven Synthesis of Multi-Person Motions." *The 18th European Conference on Computer Vision, ECCV 2024*.
6. **Lu Dong**, Lipisha Nitin Chaudhary, Fei Xu, Xiao Wang, Mason Lary, Ifeoma Nwogu. "SignAvatar: Sign Language 3D Motion Reconstruction and Generation." *The 18th IEEE International Conference on Automatic Face and Gesture Recognition (FG 2024)*.
7. Fei Xu, Lipisha Nitin Chaudhary, **Lu Dong**, Srirangaraj Setlur, Venu Govindaraju, Ifeoma Nwogu. "A Study of Video-based Human Representation for American Sign Language Alphabet Generation." *(FG 2024)*.
8. Yuanhao Zhai, Mingzhen Huang, Tianyu Luan, **Lu Dong**, Ifeoma Nwogu, Siwei Lyu, David Doermann, Junsong Yuan. “Language-guided Human Motion Synthesis with Atomic Actions." *The 31st ACM International Conference on Multimedia, 2023(ACM MM’23)*.