

Jingyu Shi

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EDUCATION

Purdue University

Ph.D. Electrical and Computer Engineering
Supervisor: Prof. Karthik Ramani

West Lafayette, IN
2021-2025 (expected)

Georgia Institute of Technology

M.S. in Electrical and Computer Engineering

Atlanta, GA

2019-2020

Beihang University

B.Eng. Instrument Science and Technology

Beijing, China

2015-2019

RESEARCH EXPERIENCE

Topic I: AI-Driven Authoring of Mixed Reality Applications

Ubi-TOUCH: Ubiquitous Tangible Object Utilization through Consistent Hand-object interaction in Augmented Reality [C.1]

Co-Lead

- Proposed a comprehensive vision-based workflow that assists AR users in finding everyday objects as opportunistic tangible proxies based on hand-object interaction constraints.
- Developed a contact-point-based **optimization technique to render hand-object interaction with consistency** among different objects.
- Implemented an AR interface that enables **hand-object interaction with tangible proxies** for virtual objects, incorporating real-time virtual interaction blending.

Ubi Edge: Authoring Edge-Based Opportunistic Tangible User Interfaces in Augmented Reality [C.2]

Co-Author

- Implemented a point-cloud feature-based algorithm for **edge detection and tracking** in the 3D space, which was utilized in authoring tangible user interfaces for AR applications

CARING-AI: Towards Authoring Context-aware Augmented Reality INstruction through Generative Artificial Intelligence

Co-Lead

- Designed a code-less and Mocap-free workflow for authoring animated humanoid avatar instructions in AR with Generative-AI that is contextually aware of the human, environment, and system.
- Implemented a **diffusion-model-based algorithm** to temporally smooth sequences of individually generated **humanoid motions**.
- Designed and developed an AR interface for **authoring AR instructions from textual input** describing the tasks, avatars' trajectory, and directional vision.

Topic II: Human-AI Interaction: Designs and Systems

An HCI-Centric Survey and Taxonomy of Human-Generative-AI Interactions [P.3]

Co-Lead

- Reviewed a corpus of literature consisting of **291 papers on Generative AI applications**
- Summarized and presented a comprehensive overview of recent developments in and research on GenAI-based systems.
- Synthesized a **taxonomy of human-GenAI interactions** for future design in the field

An Exploratory Study on Multi-modal Generative AI in AR Storytelling

Co-Lead

- Summarized a design space of multi-modal AR Storytelling and a cognitive model of the author and the audience in the storytelling process.
- Implemented an AR test-bed for Storytelling with AI-generated multi-modal content, integrated with **multiple state-of-the-art generative AI models**.
- Conducted an exploratory study on the effects of AI-generated multi-modal content on the expression and perception of AR Storytelling.

Understanding Generative AI in Art: An Interview Study with Artists on G-AI from an HCI Perspective [P.1]

Lead

- Undertook a series of in-depth interviews and conducted qualitative analyses with artists representing various disciplines on the changes in the art industry by Generative AI.
- Concluded future opportunities and challenges for both developers of G-AI for art and art participants, derived from the interview analyses.

Topic III: Computationally Understanding People

Visualizing Causality in Mixed Reality for Manual Task Learning: An Exploratory Study [P.2]

Co-Lead

- Implemented an MR test-bed for learning an assembly task with visualization of causality in the task.
- Conducted a study on the effects of visualizations of diverse levels of causality in manual task learning in MR.

Interacting Objects: A dataset of object-object interactions for richer dynamic scene representations [J.1]

Co-Author

- Implemented PyTorch codes for **extracting motion features and geometric features** from video sequences of object motions, which are used for constructing and benchmarking a video dataset of object-object interactions.

WWWi: A Deep-Learning-Aided, Video-based Visual Analytics System for Industrial and Manufacturing Work-Worker-Workflow insights

Lead

- Developed a QT-based platform with an action-level comparison of work, editable hierarchical workflow graph, and ergonomic risk assessment from videos, which provided insight related to the productivity and safety of workers performing manufacturing operations.
- Finetuned a **2D human pose estimator** and a regression network that **lift 2D human pose into 3D space** on the data of three assembly scenarios.

PROFESSIONAL EXPERIENCE	<p>Futurewei Technologies Inc. <i>Santa Clara, CA</i></p> <p><i>Research Intern</i> May - Dec. 2024</p> <ul style="list-style-type: none">• Developed an algorithm for view-consistent 3D NeRF editing via diffusion prior.• Integrated multi-view information through a spatial channel in the conditional UNet within the diffusion model SDS.• Modified and fine-tuned Stable Diffusion model for view-consistent 2D image inpainting task• Outperformed state-of-the-art methods in multiple removal tasks, achieving superior results in both FID and LPIPS metrics. <p>Hikvision Digital Technology Co., Ltd. <i>Hangzhou, China</i></p> <p><i>Multi-media Software Intern</i> Jan. - Mar., 2018</p> <ul style="list-style-type: none">• Developed a QT-based front-end software for editing, viewing, and annotating videos.• Independently completed over 4K lines of codes of a dynamic link library for video processing.
AWARDS	<p>Chinese Scholarship Council (CSC) Scholarship for Distinguished Undergraduate International Exchange Program 2018</p>
SERVICES	<p>Reviewer CHI 2024, IEEE VR 2024, CHI 2024 LBW, CSCW 2024, DIS 2024</p>
COMPETENCES	<p>Languages English, Chinese Mandarin</p> <p>Programming C++, Python, C#, Matlab</p> <p>Platforms and Frameworks PyTorch, Unity3D, Tensorflow, Caffe, ROS</p>

- PUBLICATIONS [C.1] Jain, R.*, **Shi, J.***, Duan, R., Zhu, Z., Qian, X., & Ramani, K. (2023, October). Ubi-TOUCH: Ubiquitous Tangible Object Utilization through Consistent Hand-object interaction in Augmented Reality. *In Proceedings of the 36th Annual ACM Symposium on User Interface Software and Technology* (pp. 1-18). doi: 10.1145/3586183.3606793
- [C.2] He, F.*, Hu, X.*, **Shi, J.**, Qian, X., Wang, T., & Ramani, K. (2023, April). Ubi Edge: Authoring Edge-Based Opportunistic Tangible User Interfaces in Augmented Reality. *In Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems* (pp. 1-14). doi: 10.1145/3544548.3580704
- [C.3] Ma, D., Hu, X., **Shi, J.**, Pate, M., Jain, R., Liu, Z., Zhu, Z., & Ramani, K. (2024, October). avaT-TAR: Table Tennis Stroke Training with On-body and Detached Visualization in Augmented Reality. *In Proceedings of the 37th Annual ACM Symposium on User Interface Software and Technology*.
- [J.1] Unmesh, A., Jain, R., **Shi, J.**, Manam, V., Chi H., Chidambaram, S., Quinn, A., & Ramani, K. (2023). Interacting Objects: A Dataset of Object-Object Interactions for Richer Dynamic Scene Representations. *IEEE Robotics and Automation Letters*, 9(1), 451-458.
- PREPRINTS [P.1] **Shi, J.**, Jain, R., Duan, R., & Ramani, K. (2023). Understanding Generative AI in Art: An Interview Study with Artists on G-AI from an HCI Perspective. *arXiv preprint*. arXiv: <http://arxiv.org/abs/2310.13149>
- [P.2] Jain, R.*, **Shi, J.***, Benton, A., Rasheed, M., Chidambaram, S., & Ramani, K. (2023). Visualizing Causality in Mixed Reality for Manual Task Learning: An Exploratory Study. *arXiv preprint*. arXiv: <http://arxiv.org/abs/2310.13167>
- [P.3] **Shi, J.***, Jain, R.*, Doh, H., Suzuki, R., & Ramani, K. (2023). An HCI-Centric Survey and Taxonomy of Human-Generative-AI Interactions. *arXiv preprint*. arXiv: <http://arxiv.org/abs/2310.07127>