

Runlin Duan

📍 West Lafayette, IN, United States ✉️ duan92@purdue.edu 📞 +1 7657756926 🌐 runlinduan.com

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Education

Ph.D. Purdue University , Mechanical Engineering Supervisor: Prof. Karthik Ramani , C Design Lab	West Lafayette, US May 2020 – Present
M.S. Carnegie Mellon University , Mechanical Engineering Supervisor: Prof. Kenji Shimada , CER Lab	Pittsburgh, US Aug 2017 – Dec 2018
B.S. Xi'an Jiaotong University , Aircraft Design and Engineering	Xi'an, China Aug 2013 – June 2017

Working and Teaching Experience

Carnegie Mellon University , Research Assistant, supervised by Prof. Kenji Shimada and Prof. Levent Burak Kara <ul style="list-style-type: none">Recognizing the detected engineering drawing parameters using a <u>modified ResNet</u>Set up a <u>ROS system</u> and a <u>Turtlebot</u> to simulate and deploy a <u>SLAM algorithm</u> (sampling-based path planning and gradient-based path optimization) for experiments. Published on [C.1]	Pittsburgh, US Jan 2019 - Mar 2020
Purdue University , Teaching Assistant <ul style="list-style-type: none">ME553:Product and Process DesignME444:Computer-Aided Design and Prototyping	West Lafayette , US Jan 2023 - Present

Selected Project

JustShape: Exploring Co-Speech Gestures for Multimodal LLM-Empowered Generative Parametric Modeling [C.6] <ul style="list-style-type: none">Proposed a multimodal fusion pipeline that augments language prompts with numerical parameters derived from gesture recognition.Developed a generative parametric modeling workflow leveraging multimodal large language models.Designed and implemented an AR interface using Unity, enabling natural gestural and speech interaction for 3D modeling with a GenAI agent.	Oct 2024 - April 2026 Leader
DesignFromX: Supporting GenAI-Empowered Design Space Exploration by Feature Composition of Existing Products - Published on [C.4] <ul style="list-style-type: none">Designed a pipeline that adopts an <u>image segmentation model</u> and a <u>vision-language model</u> to analyze the features of an existing product.Developed a system that integrates the proposed pipeline with an <u>image generation model</u> to explore different features of the target product.	Mar 2024 - Jun 2025 Leader
Dynamic-eDiTor: Training-Free Text-Driven 4D Scene Editing with Multimodal Diffusion Transformer - Published on [C.6] <ul style="list-style-type: none">Deployed baseline methods for comparison and adapted them to the 4D scene editing task.Conducted experiments to evaluate the video editing capabilities of baseline models and supported the empirical validation of the proposed method.	Sep 2025 - Jan 2026 Co-Author

Publications

C = Conference Paper, J = Journal Paper, PP = Preprint, P = Patent

[C.6] Dynamic-eDiTor: Training-Free Text-Driven 4D Scene Editing with Multimodal Diffusion Transformer. 🔗 Dong In Lee*, Hyungjun Doh*, Seunggeun Chi, Runlin Duan , Sangpil Kim, Karthik Ramani, <i>Conference on Computer Vision and Pattern Recognition 2026 (CVPR 2026)</i> .	April 2026 (Accepted)
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<p>[C.6] JustShape: Exploring Co-Speech Gestures for Multimodal LLM-Powered Generative Parametric Modeling. 🔗 Runlin Duan*, Yuzhao Chen*, Yichen Hu, Ziyi Liu, Chenfei Zhu, Xiyun Hu, Dizhi Ma, Xinyi Wang, Karthik Ramani, Submitted to The ACM CHI conference on Human Factors in Computing Systems 2025 (CHI26).</p>	<p>April 2026 (Published) Honorable Mentioned Award</p>
<p>[C.5] AmlWrite: Enabling Scalable One-on-One Handwriting-Based STEM Tutoring with an LLM-Powered AI Tutor. 🔗 Ziyi Liu, Yuzhao Chen, Haoyu Ji, Runlin Duan, Xiyun Hu, Zhengzhe Zhu, Karthik Ramani, Submitted to The ACM CHI conference on Human Factors in Computing Systems 2025 (CHI26).</p>	<p>April 2026 (Published)</p>
<p>[PP.4] SketchConcept: Sketching-based Concept Recomposition for Product Design using Generative AI. 🔗 Runlin Duan*, Chenfei Zhu*, Yuzhao Chen, Dizhi Ma, Jingyu Shi, Ziyi Liu, Karthik Ramani, ACM SIGCHI Conference on Designing Interactive Systems 2026 (DIS'26).</p>	<p>March 2026 (Accepted)</p>
<p>[C.4] DesignFromX: Empowering Consumer-Driven Design Space Exploration by Structuring Feature Composition of Existing Products. 🔗 Runlin Duan*, Chenfei Zhu*, Yuzhao Chen, Yichen Hu, Jingyu Shi, Karthik Ramani, ACM SIGCHI Conference on Designing Interactive Systems 2025 (DIS'25).</p>	<p>July 2025 (Published)</p>
<p>[PP.3] Canvas3D: Empowering Precise Spatial Control for Image Generation with Constraints from a 3D Virtual Canvas. 🔗 Runlin Duan*, Yuzhao Chen*, Rahul Jain, Yichen Hu, Jingyu Shi, Karthik Ramani, The 2026 ACM Conference on Intelligent User Interfaces (ACM IUI 26).</p>	<p>April 2025 (Published)</p>
<p>[J.4] Virtual Reality in Manufacturing Education: A Scoping Review Indicating State-of-the-Art, Benefits, and Challenges Across Domains, Levels, and Entities. 🔗 Ananya Ipsita, Ramesh Kaki, Ziyi Liu, Mayank Patel, Runlin Duan, Lakshmi Deshpande, Lin-Ping Yuan, Victoria Lowell, Dr. Ashok Maharaj, Kylie Pepler, Steven Feiner, Karthik Ramani, Computers in Industry</p>	<p>April 2025 (Submitted Pre-Print)</p>
<p>[PP.2] Investigating Creativity in Humans and Generative AI Through Circles Exercises. 🔗 Runlin Duan, Shao-Kang Hsia, Yuzhao Chen, Yichen Hu, Ming Yin, Karthik Ramani, arXiv preprint.</p>	<p>Mar 2025 (Pre-print)</p>
<p>[J.3] pARametric: Empowering In-Situ Parametric Modeling in Augmented Reality for Personal Fabrication. 🔗 Runlin Duan* Xiyun Hu*, Min Liu, Jingyu Shi, Karthik Ramani, The ASME Journal of Computing and Information Science in Engineering (JCISE).</p>	<p>Aug 2024 (Published)</p>
<p>[J.2] ConceptVIS: Generating and Exploring Design Concepts for Early-stage Ideation using Large Language Model. 🔗 Runlin Duan, Nachiketh Karthik, Jingyu Shi, Rahul Jain, Maria C. Yang, and Karthik Ramani, The ASME Journal of Computing and Information Science in Engineering (JCISE).</p>	<p>Aug 2024 (Published)</p>
<p>[PP.1] Understanding Generative AI in Art: An Interview Study with Artists on G-AI from an HCI Perspective. 🔗 Jingyu Shi, Rahul Jain, Runlin Duan, Karthik Ramani arXiv preprint.</p>	<p>Oct 2023 (Pre-print)</p>
<p>[J.1] The Design of a Virtual Prototyping System for Authoring Interactive Virtual Reality Environments From Real-World Scans. 🔗 Ananya Ipsita*, Runlin Duan*, Hao Li*, Subramanian Chidambaram, Yuanzhi Cao, Min Liu, Alex Quinn, Karthik Ramani, The ASME Journal of Computing and Information Science in Engineering (JCISE)</p>	<p>June 2023 (Published)</p>
<p>[C.3] Ubi-TOUCH: Ubiquitous Tangible Object Utilization through Consistent Hand-object Interaction in Augmented Reality. 🔗 Rahul Jain*, Jingyu Shi*, Runlin Duan, Zhengzhe zhu, Xun Qian, Karthik Ramani, The ACM Symposium on User Interface Software and Technology (UIST)</p>	<p>May 2023 (Published)</p>
<p>[C.2] VRFromX: from scanned reality to interactive virtual experience with human-in-the-loop 🔗 Ananya Ipsita, Hao Li, Runlin Duan, Yuanzhi Cao, Subramanian Chidambaram, Min Liu, Karthik Ramani, Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems</p>	<p>May 2021 (Published)</p>
<p>[C.1] Robotic Exploration of Unknown 2D Environment Using a Frontier-based Automatic-Differentiable Information Gain Measure. 🔗 Di Deng, Runlin Duan, Jiahong Liu, Kuangjie Sheng, Kenji Shimada, 2020 IEEE/ASME (AIM) International Conference on Advanced Intelligent Mechatronics</p>	<p>July 2020 (Published)</p>