Faraz Faruqi

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Summary

I am a PhD Candidate in Computer Science at MIT CSAIL working at the intersection of generative 3D models, physical simulation, and human–AI interaction for extended reality (XR). My research focuses on building physics-driven, human-in-the-loop generative systems that enable intuitive creation and refinement of 3D content, bridging visually compelling AI outputs with physically meaningful, fabrication-ready designs.

I am currently a Student Researcher at Google XR Labs, collaborating with researchers across Google XR and DeepMind, and previously interned at Autodesk Research. My work has been published at CHI, UIST, and SCF and featured by MIT News.

Education

Massachusetts Institute of Technology *Cambridge, MA*

Ph.D. in Computer Science (Concentration: Human-Computer Interaction and AI) *2022 - 2026 (Expected)*

Massachusetts Institute of Technology *Cambridge, MA*

M.S. in Electrical Engineering and Computer Science (Concentration: Artificial Intelligence) *2020 - 2022*

Manipal Institute of Technology *Karnataka, India*

B.Tech. in Computer Science and Engineering (Concentration: Artificial Intelligence) *2015 - 2019*

Research Experience

Google XR Labs / DeepMind (Human–AI Interaction, Generative Systems) *San Francisco, CA*

Student Researcher *2025 – Present*

- **Physics-Driven Human–AI Interaction in XR**: Design and build interactive generative systems that allow users to perceive, steer, and correct AI-generated 3D content in immersive environments.
- Develop XR workflows that integrate physical reasoning, simulation-driven feedback, and multimodal interaction to support controllable and interpretable 3D generation.
- Collaborate in-person with researchers across Google XR Labs and DeepMind on human-centered generative AI and spatial interaction systems.

Google Research (AI, XR, HCI) *Mountain View, CA (Remote)*

Research Collaborator *2024 – Present*

- **Human–AI Interaction for Physics-Aware 3D Generation**: Lead research on interactive generative workflows that enable users to inspect, refine, and correct AI-generated geometry.
- Developed systems including **Style2Fab**, **TactStyle**, **MechStyle**, and **InstructMesh**, combining 3D diffusion models, latent-space editing, multimodal input, and physical-property modeling.
- Designed workflows for region-based editing, tactile texture synthesis, fabrication-aware refinement, and simulation-guided generation.
- Published and submitted multiple first-author papers at CHI, UIST, and SCF in collaboration with Google Research teams.

Autodesk Research (AI Lab & Visualization / HCI Group) *Toronto, Canada (Remote / Hybrid)*

Research Intern *Summer 2025*

- **Interactive Compositional Generative Modeling**: Developed AI-augmented pipelines for part-based and feature-based 3D modeling, enabling user-driven control over generative composition.
- Implemented **latent-tree geometry editing**, semantic part assembly, and preference-guided composition to support interpretable and controllable generative workflows.
- Contributed to an Autodesk patent presented at **TechX** and a UIST 2026 submission on interactive part-based generative modeling interfaces.

Massachusetts Institute of Technology, CSAIL *Cambridge, MA*

PhD Candidate (Advisor: Prof. Stefanie Mueller) *2022 – Present*

- **Human–AI Interaction Research**: Study how users identify, interpret, and correct failures in AI-generated 3D content, informing the design of interactive, physics-aware generative systems.
- **InstructMesh**: Lead researcher on LLM-based, text-guided, local refinement of generative 3D models via latent-space editing.
- Integrated SDF-based transformations, latent voxel editing, and multimodal interaction workflows to support fabrication-aware refinement.
- **MechStyle, TactStyle, Vis2Touch, Compos3D**: Developed systems combining generative AI with mechanical, thermal, and tactile simulation for perceptually grounded and physically meaningful 3D generation.
- Built part-based pipelines, tactile heightfields, and XR interfaces for interactive and fabrication-ready prototyping.
- Published multiple first-author papers at CHI, UIST, and SCF; led collaborations with Google Research and Autodesk Research.

Selected Publications

InstructMesh: Selective Refinement of Generative 3D Models for Fabrication

ACM Symposium on User Interface Software and Technology (UIST 2026) (In submnission)   *2026*

Faruqi F., Katary A., Tas D., Hradilak T., Zhang N., Li J., Manhardt F., Nisser M.,

Phadnis V., Tombari F., Jampani V., Hofmann M., Mueller S.

Compos3D: Interactive Part-Based Composition for Creative Control in Generative 3D Models

ACM Symposium on User Interface Software and Technology (UIST 2026) (In Submission)   *2026*

Faruqi F., Liu S., Fitzmaurice G., Matejka J.,

MechStyle: Augmenting Generative AI with Mechanical Simulation to Create Stylized and Structurally Viable 3D Models

ACM Symposium on Computational Fabrication (SCF 2025)   *2025*

Faruqi F., Abdel-Rahman A., Tejedor L., Nisser M., Li J., Phadnis V., Jampani V., Gershenfeld N., Hofmann M., Mueller S.

TactStyle: Generating Tactile Textures with Generative AI for Digital Fabrication

ACM CHI Conference on Human Factors in Computing Systems (CHI 2025)   *2025*

Faruqi F., Perroni-Scharf M., Walia J., Zhu Y., Feng S., Degraen D. Mueller S.

InteRecon: Towards Reconstructing Interactivity of Personal Memorable Items in Mixed Reality

ACM CHI Conference on Human Factors in Computing Systems (CHI 2025)   *2025*

Li Z., Li J., Xiong Z., Zhang S., **Faruqi F.**, Mueller S., Liang C., Ma X., Fan M.,

Style2Fab: Functionality-Aware Manipulation for Fabricating Personalized 3D Models with Generative AI

ACM Symposium on User Interface Software and Technology (UIST 2023)   *2023*

Faruqi F., Katary A., Hasic A., Abdel-Rahman A., Rahman N., Tejedor L., Hofmann M. Mueller S.

Selective Self-Assembly using Re-Programmable Magnetic Pixels   *2022*

International Conference on Intelligent Robots and Systems (IROS 2022)

Nisser M., Makaram Y., **Faruqi F.**, Suzuki R., Mueller S.

Technical Skills Summary

Programming	Python, C, C++, C#, JavaScript (Node.js, React), MATLAB
Machine Learning	PyTorch, TensorFlow, JAX, NumPy, SciPy, scikit-learn, OpenCV, Diffusers
3D Geometry & Simulation	Trimesh, PyMeshLab, MeshLab, Blender API, Kaolin, Open3D, CUDA, WARP, FEM-style simulation
Generative Models	Diffusion Models, latent editing, 3D diffusion, NeRF/LRM, Gaussian Splatting
Graphics / XR	Unity, Three.js, WebXR, WebGL, OpenGL fundamentals
Fabrication & CAD	Fusion 360, Blender, Cura, PrusaSlicer, Formlabs PreForm
Developer Tools	Git, Docker, Linux Dev, REST APIs, GCP
Databases	SQL, MongoDB
Design / Prototyping	Adobe Suite, Figma, Processing

Invited Talks

Art You Can Touch: 2.5D Tactile Models for Inclusive Engagement   *October, 2025*

(Exhibition) Henry Art Museum, Seattle

Organized an exhibition at the Henry Art Museum showcasing 2.5D tactile modeling system (Vis2Touch/Text2Texture) for tactile artworks.

Shaping Realities: 3D Generative AI Tools for Physically Viable Design   *June, 2025*

(Invited Talk) Google XR Labs

Invited by Google Research (XR) to present Style2Fab, TactStyle, and InstructMesh.

TactStyle for Tactile Interfaces in Robotics   *June, 2025*

(Invited Speaker & Demo) RSS 2025 Workshop: Navigating Contact Dynamics in Robotics

Invited presentation and live demo highlighting tactile texture generation and applications in robotics.