JINRUI ZHANG

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EDUCATION

University of Electronic Science and Technology of China (UESTC) Chengdu, China
Bachelor of Science in Computer Science and Technology Sep 2022-Jun 2026
- GPA: 3.97/4.0 (Rank: 5/137)
- Scholarship: First-Class Student Scholarship by UESTC (Twice, Top 10%)

Massachusetts Institute of Technology(MIT) Jan 2024-Feb 2024
MIT xPRO Technology and Innovation Acceleration Program

University of California at San Diego (UCSD) Sep 2025-Dec 2025
Exchanged Student

RESEARCH INTERESTS

3D Reconstruction, 3D Representation, Differentiable Rendering, Novel View Synthesis (Intersection of Computer Graphics, Computer Vision and AI)

RESEARCH EXPERIENCES

The University of Texas at Dallas--Department of Computer Science Feb 2025-Sep 2025
Research Assistant, Supervisor: Prof. Xiaohu Guo
3D Reconstruction Research: Cardiac Structure Reconstruction [In progress, preparing for CVPR 2025]
- Developed a novel training methodology for 3D cardiac structure reconstruction from multi-view light-sheet microscopy data, significantly improving clarity and spatial resolution.
- Implemented a specialized multi-view PSF-aware supervision strategy, to address optical imaging inaccuracies and anisotropic resolution challenges.

MIT--Computer Science & Artificial Intelligence Laboratory (CSAIL) Jun 2025-Sep 2025
Research Assistant, Supervisor: Dr.Minghao Guo
Procedural Modeling: Parts-Based Kitbashing for 3D Model Generation [In progress, plan for SIGGRAPH]
- Developed an innovative pipeline for generating complex 3D models using a parts-based kitbashing approach, increasing efficiency and creative potential in 3D design.
- Designed a novel method combining probabilistic programming for coarse shape generation with neural networks for fine-detail refinement.
- Explored and integrated advanced geometric primitives, such as superquadrics, to enable versatile shape control and seamless integration of learned features onto model surfaces.

Nanjing University--Graphics Lab Aug 2024-Feb 2025
Research Assistant, Supervisor: Prof. Beibei Wang
3D Reconstruction Research: Trans-GS: High Quality 3D Reconstruction of Transparent Objects [poster]
- Conducted a comparative analysis demonstrating that tile-based rasterizers and **CUDA** kernels achieved approximately 10x speedup in rendering efficiency compared to NeRF, primarily due to parallel computation.
- Developed a novel method combining **differentiable ray tracing** with **2D Gaussian Splatting**, effectively capturing secondary-ray effects such as refraction, resulting in 2-3 PSNR improvement.
- Implemented an efficient regularization term for smoothness, reducing computational overhead by 30% while shortening training time by 15%, validated through experiments on custom dataset.

MIT--Computer Science & Artificial Intelligence Laboratory (CSAIL) Jan 2024-Feb 2024
Research Assistant, Supervisor: Dr. Yifei Li
3D Reconstruction Research: Optimization of Instant-NGP: A Video-to-Mesh Pipeline [poster]
- Optimized the Instant-NGP pipeline for converting video into high-quality 3D mesh models, achieving a 10% improvement in reconstruction accuracy through image filtering, mesh smoothing (Laplacian smoothing), and comparative analysis of 3D reconstruction models--traditional NeRF versus Instant-NGP.
- Led the implementation of **NeRF** technology in artistic model creation, replicating the **Instant-NGP** pipeline and managing custom datasets for training and validation, while employing Python to automate image processing and optimize rendering speed through multi-scale hash tables.

Alibaba DAMO Academy Sep 2024-Feb 2025

Research Assistant, Supervisor: Dr. Wotao Yin

LLM Research: A Plug-and-Play Stepwise Verification and Self-Correction Pipeline [paper]

- Built a "verify-then-self-correct" pipeline that can be applied to any math reasoning large language model (**LLM**) at inference time without additional training. This framework aims to fully harness the model's step-by-step self-refinement capability, guided by a pretrained verifier that evaluates and explains detected errors to identify and mitigate hallucination at each reasoning step.
- Achieved improved verification f1-score of 25% with Gemma2-9b model towards mathematical problems and solutions in MATH and GSM8K dataset, and accomplished a paper.

PRACTICAL PROJECTS

Physics-Based OpenGL Renderer Aug 2024-Sep 2024

- Developed a real-time physically-based rendering pipeline using **OpenGL**, implementing the Cook-Torrance BRDF model for realistic light reflection and scattering.
- Supported the metallic-roughness workflow by optimizing shader performance and implementing advanced OpenGL 4.5 features, such as Shader Storage Buffer Objects, Generated pre-filtered environment maps for image-based lighting to handle specular reflections at varying roughness levels.

C++-based Ray Tracing Renderer Mar 2024-May 2024

- Designed and optimized a ray tracing renderer without using any Graphics Library, implementing multi-resolution rendering, reflective and transparent materials, and environment mapping.
- Utilized Bounding Volume Hierarchy (BVH) data structures to accelerate ray-object intersection tests, optimizing with the Surface Area Heuristic (SAH) to minimize the cost of traversing the tree, ensuring both performance and accuracy in scene management and light interaction.

INTERNSHIPS

RootGame Studio Oct 2022-Dec 2023

Technical Art Department Intern

- Collaborated on commercial projects for Tencent's Intelligent Transportation System and GAC Group's racing game, contributing to real-time large-scale agent interactions and facilitating large-volume video playback in Unreal Engine.
- Supported project planning and task coordination for both technical and art teams, optimizing engine performance and animation production, and improving animation import efficiency by 30% through the use of AI motion capture.

SKILLS AND LANGUAGES

- Programming: C/C++ (2+ years), Python (1+ year), GLSL (6+ months), OpenGL (1+ year), PyTorch/TensorFlow (6+ months).
- Software: Unreal Engine 5 (2+ years), Blender (2+ years), MATLAB (1+ year), JabRef (1+ year).
- Systems: Linux, Windows, MacOS
- Languages: Chinese (native), English (proficient, TOEFL 104).