# Jinrui Zhang

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## Education

**University of Electronic Science and Technology of China** (UESTC) 09/2022-06/2026

- B.S. in *Computer Science and Technology* | GPA: 3.94/4.0
- Scholarship: Outstanding Student Scholarship by UESTC (Top 15%, 12/2023)

## Research

**Tumor Detection Based on Image Segmentation Algorithms** 02/2024-07/2024

*Advised by Mr. Yong Tang | UESTC AI Lab*

- Developed a tumor detection system employing image segmentation algorithms to enhance accuracy and efficiency in medical imaging analysis. This involved processing and standardizing medical image datasets through advanced denoising and enhancement techniques to improve data quality, along with implementing five-fold cross-validation for robust model evaluation.
- Trained and evaluated deep learning models (ResNet, CNN, U-Net) utilizing CUDA for GPU-based parallel processing. Conducted multiple iterations to optimize hyperparameters and compared model performance based on accuracy and F1 score, ensuring high precision in tumor detection outcomes.

**Optimization of Instant-NGP: A Video-to-Mesh Pipeline** 01/2024-02/2024

*Advised by Dr. Yifei Li | MIT CSAIL*

- Optimized the Instant-NGP pipeline to convert video into high-quality 3D mesh models, enhancing speed and accuracy through improvements in image filtering, mesh smoothing (Laplacian smoothing), and comparative analysis of 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 utilizing Python to automate image processing and optimize rendering speed through multi-scale hash tables.

## Course Projects

**Physics-Based OpenGL Renderer** 08/2024-09/2024

*Instructor: Prof. Rui Wang*

- Developed a real-time Physically-Based Rendering (PBR) 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 (IBL) to handle specular reflections at varying roughness levels.

**Ray Tracing Renderer with Bare C++** 03/2024-05/2024

*Instructor: Prof. Hua Yan*

- 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.

## Internship

**RootGame Studio** 10/2022-12/2023

*Technical Art Department*

- 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 enabling 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% using AI motion capture.

## Additional Information

**Certificates:** 2024 Winter MIT xPRO TechXcelerate Program (01/2024), College English Test 4 & College English Test 6 (08/2023), University-Level Social Practice Excellent Team (03/2023).

**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).

**Languages:** Chinese (native), English (proficient).