

Zhu Shuyang (朱舒阳)

3D Vision · Geometry Processing · GPU Computing
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Profile

Graduate student at the University of Tokyo researching efficient industrial CT representations under Prof. Yukie Nagai. Interests include **3D reconstruction, computer vision, geometry processing, and high-performance computing**. Develops algorithms and practical tools for Gaussian Splatting, surface reconstruction, volumetric rendering, and GPU memory optimization using **C++, CUDA, Python, and PyTorch**.

Publications

An automatic framework for quadrilateral surface reconstruction with partitions from 3D point clouds

Shuyang Zhu, Youlong Li, Jizhao Liu, Bin Li*.

The Visual Computer.

Proposes a four-step framework inspired by polycube parameterization to reconstruct 3D point clouds into quadrilateral meshes with smooth partitions while preserving geometric features.

CTGS: Hybrid Gaussian Splatting for Compact Industrial CT Representation

Shuyang Zhu*, Yukie Nagai.

Accepted by ICPE 2026.

Converts CT volumes into a compact hybrid representation of surface and bulk Gaussians, preserving material boundaries and internal attenuation for downstream analysis such as surface extraction. Achieves a file size as small as about 1/35 of the original DICOM data, with normalized Chamfer-L1 of 0.23-0.50% for extracted meshes.

Selected Projects

X-ray Projection-to-Mesh

Ongoing

Topology-adaptive surface reconstruction

- Generates watertight surface meshes directly from X-ray projections without intermediate volume reconstruction; topology can adapt through splitting, through-hole formation, and internal cavities.
- Recovers the correct topology on all test shapes, with surface error around 0.1-0.15% of the bounding-box diagonal and fitting in under one minute per shape using native CUDA acceleration.

Adaptive Octree CT Reconstruction from Sparse Projections

Ongoing

Compact projection-domain volume representation

- Reconstructs CT volumes directly from X-ray projections using typed adaptive octree leaves (constant, trilinear, planar step) and exact CUDA ray integration.
- At 8 MB versus a 1.98 GB voxel volume (232x smaller), achieves 37.8 dB volume PSNR and 0.19-voxel mean surface distance; reducing training views from 240 to 64 lowers PSNR by only 0.55 dB.
- Uses held-out views to guide refinement and edge-preserving regularization; one run takes about nine minutes on a laptop GPU.

CT Simulation Software

High-accuracy and customizable CT simulation

- Built software to simulate CT scans from 3D models with physical accuracy.
- Included lattice generation, defect injection, physics-based compression simulation using FEM, and GPU dynamic batching for large-volume processing.

Porous CT Processor

Pore network modeling + 4D CT analysis

- Designed an analysis and visualization suite with GUI for porous CT datasets.
- Integrated rendering, pore network modeling, 4D tracking of pore evolution, and GPU acceleration using CuPy.

STL Processor

DirectX 12 mesh processing and visualization

- Developed a DirectX 12 application for STL mesh repair and visualization.
- Implemented polycube parameterization, hole filling, normal correction, denoising, and smoothing.

Work Experience

Tencent <i>Game Research & Development Intern, Engine Research</i>	Aug 2026 - Present
Developed a new volumetric smoke rendering mode in Unreal Engine 5, enabling efficient smoke volume rendering with global illumination.	
Polyphony Digital <i>Engineer Intern</i>	Jul 2026
Built a FlashSplat-based 3DGS segmentation tool that extracts object-level segments from trained 3D Gaussian Splatting assets within seconds through click selection, without pre-baked segmentation attributes.	
Synesthesia <i>Technical Development Intern</i>	May 2026 - Present
Delivered a wall-surface inclination metrology workflow that achieves stable millimeter-level accuracy on complex wall point clouds with vegetation, protrusions, and other disturbances.	
Fixstars <i>Year-round Intern</i>	Apr 2026 - May 2026
Reduced Open-Sora 2 inference peak VRAM from 39.7 GB to 20.93 GB through lazy loading, unified memory, and cache residency management, enabling efficient execution on 24 GB-class GPUs without quantization.	

Education

The University of Tokyo, Tokyo, Japan <i>M.E. candidate, Nuclear Engineering and Management</i>	Oct 2025 - Present
Hokkaido University, Sapporo, Japan <i>Special Auditor, Department of Electronics and Information Engineering</i>	Oct 2024 - Mar 2025
Lanzhou University, Lanzhou, China <i>B.E. in Digital Media Technology</i>	Sep 2021 - Jul 2025

Awards

- 2025:** The University of Tokyo Fellowship
- 2023:** 9th Internet+ Innovation and Entrepreneurship Competition, Gansu Province Gold Award
- 2022:** 13th BlueBridge Cup, Gansu Province Third Prize
- 2022-2024:** Lanzhou University Scholarship