Haiyang Ying

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Research Interests

My research interests broadly lie in 3D Vision & Graphics, Neural Rendering, 3D/4D Reconstruction and Generation, Structural 3D Modeling, CAD/B-Rep Generation. My long-term goal is to build vision systems with high-level spatial intelligence that bridge the gap between human and machine perception, enabling more immersive and effective 3D understanding and interaction.

Education

University of Maryland, College Park, MD *Fall 2024 – Present*

- Ph.D. in Computer Science, (Advisor: Prof. Matthias Zwicker)

Tsinghua University, Beijing, China *Fall 2021 – Spring 2024*

- M.S. in Data Science and Information Technology

Sun Yat-Sen University, Guangzhou, China *Fall 2017 – Spring 2021*

- B.Eng. in Electronic Information Science and Technology

Publications

- **Haiyang Ying**, M. Zwicker. "SketchSplat: 3D Edge Reconstruction via Differentiable Multi-view Sketch Splatting". (***ICCV 2025***) [ArXiv Paper] [Project Page]
- **Haiyang Ying**, Y. Yin, J. Zhang, F. Wang, T. Yu, R. Huang, L. Fang. "OmniSeg3D: Omniversal 3D Segmentation via Hierarchical Contrastive Learning". In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (***CVPR 2024***) [Project Page][Paper].
- **Haiyang Ying**, B. Jiang, J. Zhang, D. Xu, T. Yu, Q. Dai, L. Fang. "PARF: Primitive-Aware Radiance Fusion for Indoor Scene Novel View Synthesis". In Proceedings of the IEEE/CVF International Conference on Computer Vision (***ICCV 2023***) [Project Page][Paper].
- **Haiyang Ying***, J. Zhang*, Y. Chen, Z. Cao, J. Xiao, R. Huang, L. Fang. "ParseMVS: Learning Primitive-aware Surface Representations for Sparse Multi-view Stereopsis". In Proceedings of the 30th ACM International Conference on Multimedia (***ACM MM 2022***) [Paper].
- A. Tu*, **Haiyang Ying***, A. Hanson, Y. Lee, T. Goldstein, M. Zwicker. "Speedy Deformable 3D Gaussian Splatting: Fast Rendering and Compression of Dynamic Scenes".[Under Review] [Project Page]

Research Experience

University of Maryland Institute of Advanced Computer Studies – Research Assistance

High-Quality CAD Model Generation (On Going) *June 2025 – Nov 2025*

- Developing a new framework for high-quality B-rep 3D model generation, with a strong emphasis on geometric validity and watertightness.
- Building on recent advances in 3D generative modeling while focusing on producing editable objects with sharp, well-defined geometric boundaries.
- Advisor: Prof. Matthias Zwicker.

4D Gaussian Splatting Compression based on GroupFlow *Mar 2025 – June 2025*

- Developed a framework for fast rendering and efficient compression of 4D Gaussian Splatting.
- Introduced a two-part compression pipeline: spatial–temporal Gaussian reduction and a motion-aware grouping strategy that clusters Gaussians based on trajectory similarity.
- Advisor: Prof. Matthias Zwicker.

Differentiable Multi-view 3D Parametric Edge Reconstruction *Sep 2024 – Mar 2025*

- Built SketchSplat, a differentiable multi-view 3D edge optimization pipeline achieving state-of-the-art CAD reconstruction results.
- Designed topological refinement operations and an improved 2D edge detector, enhancing edge continuity, reducing redundancy, and substantially improving reconstruction quality.
- Advisor: Prof. Matthias Zwicker.

Tsinghua University – Research Assistance

Omniversal 3D Segmentation and Reconstruction *Apr 2023 – Mar 2024*

- Developed a unified 3D segmentation and reconstruction framework that handles arbitrary objects in a single forward pass.
- Introduced a hierarchical structural representation for modeling part-level dependencies, along with a hierarchical contrastive learning scheme that enforces global 3D feature consistency.
- Demonstrated state-of-the-art accuracy in hierarchical 3D segmentation and enabled intuitive, interactive object segmentation capabilities.
- Advisor: Prof. Lu Fang and Prof. Qionghai Dai.

Semantic-Aware Indoor Scene Reconstruction and Rendering *Sep 2022 – Mar 2023*

- Proposed a semantic-aware hybrid representation for indoor scene modeling and developed a fast RGB-D–based framework for indoor scene reconstruction and rendering.
- Built the system on Instant-NGP, achieving state-of-the-art rendering quality and efficiency.
- Advisor: Prof. Lu Fang and Prof. Qionghai Dai.

Semantic-Aware Sparse View 3D reconstruction *Sep 2021 – Aug 2022*

- Proposed a semantic-based representation to encode geometry, texture, and visibility of primitives. Based on that, I designed a pipeline for multi-view 3D reconstruction under sparse observations.
- The proposed method achieved SOTA performance on DTU dataset under sparse-view setting.
- Advisor: Prof. Lu Fang and Prof. Ruqi Huang

Dynamic Vascular 3D Reconstruction (B.S. Thesis) *Oct 2020 – Aug 2021*

- Proposed to model human tissue with implicit representation and decomposed dynamic information.
- Co-designed a pipeline for 3D reconstruction with asynchronous multi-view cone-beam CT images.
- Our method achieved decoupling of human body movement and contrast agent flow, which enables high-quality novel view synthesis at different motion state and time stamps.
- Advisor: Prof. Lu Fang

Services

Journal Reviewer: TIP, TCSVT, RAL

Conference Reviewer: ICCV'23, NeurIPS'24, ICCV'25, NeurIPS'25, CVPR'26

Skills

- Machine Learning / Vision: C / C++, Python, PyTorch, CUDA, NeRF / 3DGS, 3D Reconstruction, Multi-view Geometry, Differentiable Rendering, Geometry Processing, CGAL, OpenCascade,

- Systems / Tools: Python, C++, Linux, Slurm, Multi-GPU Training (DDP), Git, Docker, Airflow

Honors and Awards

Dean's Fellowship, University of Maryland	2024
Second Prize of School-Level Comprehensive Excellent Scholarship, Tsinghua University	2023
Outstanding Graduate of Sun Yat-sen University	2021
Chinese National Scholarship, by Minister of Education of China (**top 2**% of the Grade)	2019, 2020
The First-class Scholarship for Outstanding students of SYSU	2018, 2019, 2020
Honorable Mention of Interdisciplinary Contest in Modeling (ICM)	2019, 2020
The First Prize of Guangdong Province Electronic Design Competition	2018