HAATO WATANABE

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RESEARCH INTERESTS

Computer graphics and vision, with a focus on differentiable rendering, neural 3D representations, inverse rendering, and efficient GPU algorithms for 3D reconstruction, relighting, and animation.

EDUCATION

The University of Tokyo *Apr. 2026 – Mar. 2029*
Ph.D. Student, Department of Creative Informatics, Graduate School of Information Science and Technology Tokyo, Japan

- Advisor: Prof. Nobuyuki Umetani
- Expected graduation: March 2029

The University of Tokyo *Apr. 2024 – Mar. 2026*
M.S. in Information Science and Technology, Department of Creative Informatics, Graduate School of Information Science and Technology Tokyo, Japan

- Advisor: Prof. Nobuyuki Umetani
- Thesis: *Augmenting Gaussian Splatting for High-frequency Surface Texture Reconstruction*

Tokyo University of Science *Apr. 2019 – Mar. 2024*
B.S. in Industrial and Systems Engineering Tokyo, Japan

PUBLICATIONS

CONFERENCE PROCEEDINGS

1. **H. Watanabe** and N. Umetani. "Neural Gabor Splatting: Enhanced Gaussian Splatting with Neural Gabor for High-frequency Surface Reconstruction." In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, pp. 4932–4941, 2026. [Project | Paper | Code]
2. **H. Watanabe** and N. Umetani. "SketchRodGS: Sketch-based Extraction of Slender Geometries for Animating Gaussian Splatting Scenes." In *Proceedings of SIGGRAPH Asia 2025 Technical Communications*, Article 29, 2025. **Best Communications Award**. [Project | DOI | Code]
3. **H. Watanabe**, K. Tojo, and N. Umetani. "3D Gabor Splatting: Reconstruction of High-frequency Surface Texture using Gabor Noise." In *Eurographics 2025 Short Papers*, Eurographics Association, 2025. [Project | Paper | Code]

JOURNAL ARTICLE

4. **H. Watanabe**, K. Tojo, and N. Umetani. "3D Gabor Splatting: Reconstruction of High-frequency Surface Texture using Gabor Noise." *IEICE Transactions on Information and Systems (Japanese Edition)*, vol. J108-D, no. 10, pp. 593–597, 2025. (Peer-reviewed; in Japanese.)

REFEREED DOMESTIC CONFERENCE PRESENTATION

5. **H. Watanabe**, K. Tojo, and N. Umetani. "3D Gabor Splatting: Reconstruction of High-frequency Surface Texture using Gabor Noise." *Meeting on Image Recognition and Understanding (MIRU 2025)*, OS1A-01, Kyoto, Japan, July 2025. (Peer-reviewed; selected for oral presentation; in Japanese.)

INVITED ARTICLE

6. **H. Watanabe**. "Neural Gabor Splatting." *Journal of the Imaging Society of Japan*, forthcoming, December 2026. (Invited article; in Japanese.)

AWARDS & FELLOWSHIPS

SPRING GX Fellowship, The University of Tokyo *2026 – Present*
Dean's Award, Graduate School of Information Science and Technology, The University of Tokyo *2026*
Master's Degree Recipient Representative, The University of Tokyo *2026*
Best Communications Award, SIGGRAPH Asia Technical Communications *2025*
Excellent Paper Award, MIRU *2025*
Audience Award, MIRU *2025*

RESEARCH & ENGINEERING EXPERIENCE

Coolant Climate, Inc. *Aug. 2026 – Oct. 2026*
Research Engineering Intern San Francisco, CA
Research focus: Scalable and lighting-aware Gaussian Splatting for large-scale outdoor reconstruction

- Reduced end-to-end runtime by 48% (from 62 to 32 minutes) on a large-scale dataset by optimizing CUDA rasterization kernels and the training pipeline.
- Enabled relighting of large-scale forest scenes reconstructed from aerial imagery by integrating illumination modeling into a differentiable rendering pipeline.
- Integrated camera refinement into the training pipeline to improve reconstruction accuracy.

Huawei Tokyo Research Center *Nov. 2025 – June 2026*
Research Intern Tokyo, Japan
Research focus: Efficient and editable representations for dynamic 3D scenes

- Researched efficient representations and optimization techniques for dynamic Gaussian Splatting.
- Developed differentiable rendering and learned motion-editing methods with an international computer graphics research team.

Preferred Networks, Inc. *Aug. 2024 – Dec. 2024*
R&D Software Engineer Intern Tokyo, Japan
Research focus: Real-time browser rendering of dynamic Gaussian Splatting

- Designed and implemented a WebGL viewer for continuously querying and rendering 4D Gaussian Splatting scenes.
- Achieved real-time browser rendering of 200,000 dynamic Gaussian primitives.
- Published the system on the PFN Tech Blog.

ADDITIONAL ENGINEERING EXPERIENCE

Matsuo Institute Inc. *Feb. 2024 – July 2024*
Software Developer Intern Tokyo, Japan
Developed internal LLM applications using OpenAI APIs.

PLAID Inc. *Mar. 2022 – Jan. 2023*
Software Engineer Intern Tokyo, Japan
Contributed to production frontend and backend systems and automated testing pipelines.

INVITED TALKS & PUBLIC OUTREACH

Meeting on Image Recognition and Understanding (MIRU 2026) *Aug. 2026*
"Neural Gabor Splatting: Enhanced Gaussian Splatting with Neural Gabor for High-frequency Surface Reconstruction." Invited talk, Nagasaki, Japan.

GPU UNITE Radio *June 2026*
"3D Gaussian Splatting: From Basics to Research Frontiers." Guest speaker on a Japanese-language podcast.

GPU UNITE Meetup #4: The State of 3D Gaussian Splatting *May 2026*
"Extending the Representational Power of Gaussian Splatting: Approaches to High-Frequency Reconstruction and Interaction." Invited talk, Tokyo, Japan. Event | Slides

ACADEMIC SERVICE

- Reviewer, IEEE Transactions on Visualization and Computer Graphics (TVCG), 2026
- Reviewer, Pacific Graphics (PG), 2025

TECHNICAL EXPERTISE

CUDA / C++	Custom CUDA kernels, GPU optimization, differentiable rasterization
Python / PyTorch	Neural rendering, automatic differentiation, custom CUDA extensions
Computer Graphics	Gaussian Splatting, differentiable rendering, physically based rendering
WebGL / OpenGL	Real-time rendering and interactive visualization systems