

Jun Gao

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I am interested in computer vision, computer graphics and machine learning. I develop 3D generative AI models to create realistic, high-quality and diverse 3D content for reconstructing, generating and simulating 3D worlds.

EDUCATION

University of Toronto (UofT) Ph.D. Student in Computer Science Advisor: Sanja Fidler	Jan. 2020 - May. 2025
University of Toronto (UofT) Master of Science in Computer Science Advisor: Sanja Fidler	Sept. 2018 - Jan. 2020
Peking University (PKU) Bachelor of Science (Summa Cum Laude) in Computer Science Advisor: Liwei Wang	Sept. 2014 - Jul. 2018

EMPLOYMENT

University of Michigan Assistant Professor	Aug. 2025 - Present Ann Arbor, U.S.
NVIDIA Toronto AI lab Research Scientist, Manager: Sanja Fidler	Nov. 2019 - Present Toronto, Canada
NVIDIA Toronto AI lab Research Intern, Manager: Sanja Fidler	Oct. 2018 - Nov. 2019 Toronto, Canada
Microsoft Research Asia Research Intern, Manager: Di He	Feb. 2018 - May 2018 Beijing, China

SELECTED AWARDS AND HONORS

2023 SIGGRAPH Asia Best Paper Award
2022 NeurIPS Outstanding Reviewer Award
2020 Platform Computing Graduate Fellowship in Computer Science, University of Toronto
2018 Vector Scholarships in Artificial Intelligence, Vector Institute
2018 SUMMA CUM LAUDE, Peking University
2016 Merit Student Award, Peking University
2015 National Scholarship, China

PROFESSIONAL SERVICE

Area Chair

- Program Committee: ACM SIGGRAPH Asia 2024
- Area Chair: Neural Information Processing Systems (NeurIPS) 2023-2025, CVPR 2026

Conference Reviewer

- *Computer Vision*: CVPR, ICCV, ECCV
- *Machine Learning*: NeurIPS, ICML, ICLR
- *Computer Graphics*: SIGGRAPH, SIGGRAPH Asia

PUBLICATIONS

*: Authors with equal contribution. †: Students/Interns who I (co-)mentored.

Journal Publications

1. SpaceMesh: A Continuous Representation for Learning Manifold Surface Meshes
Tianchang Shen[†], Zhaoshuo Li, Marc Law, Matan Atzmon, Sanja Fidler, James Lucas, **Jun Gao**, Nicholas Sharp
ACM Transactions on Graphics (Proc. **SIGGRAPH Asia**), 2024, [Project](#), [Paper](#)
2. Adaptive Shells for Efficient Neural Radiance Field Rendering
Zian Wang^{*,†}, Tianchang Shen^{*,†}, Merlin Nimier-David*, Nicholas Sharp, **Jun Gao**, Alexander Keller, Sanja Fidler, Thomas Müller, Zan Gojcic
ACM Transactions on Graphics (Proc. **SIGGRAPH Asia**), 2023, (**Best Paper Award**), [Project](#), [Paper](#)
3. Flexible Isosurface Extraction for Gradient-Based Mesh Optimization
Tianchang Shen[†], Jacob Munkberg, Jon Hasselgren, Kangxue Yin, Zian Wang, Wenzheng Chen, Zan Gojcic, Sanja Fidler, Nicholas Sharp*, **Jun Gao***
ACM Transactions on Graphics (Proc. **SIGGRAPH**), 2023, [Project](#), [Paper](#), [Code](#)
4. Progressive Learning of 3D Reconstruction Network from 2D GAN Data
Aysegul Dundar, **Jun Gao**, Andrew Tao, Bryan Catanzaro
IEEE Transactions on Pattern Analysis and Machine Intelligence (**T-PAMI**), 2023, [Project](#), [Paper](#)
5. Fine Detailed Texture Learning for 3D Meshes with Generative Models
Aysegul Dundar, **Jun Gao**, Andrew Tao, Bryan Catanzaro
IEEE Transactions on Pattern Analysis and Machine Intelligence (**T-PAMI**), 2023, [Project](#), [Paper](#)

Conference Publications

1. Lyra: Generative 3D Scene Reconstruction via Video Diffusion Model Self-Distillation
Sherwin Bahmani Tianchang Shen, Jiawei Ren, Jiahui Huang, Yifeng Jiang, Haithem Turki, Andrea Tagliasacchi, David B. Lindell, Zan Gojcic, Sanja Fidler, Huan Ling, **Jun Gao***, Xuanchi Ren*
[Project](#), [Paper](#), [Code](#)
2. TeraSim-World: Worldwide Safety-Critical Data Synthesis for End-to-End Autonomous Driving
Jiawei Wang*, Haowei Sun*, Xintao Yan, Shuo Feng, **Jun Gao**, Henry X. Liu
[Project](#), [Paper](#), [Code](#)
3. PartField: Learning 3D Feature Fields for Part Segmentation and Beyond
Minghua Liu^{*,†}, Mikaela Angelina Uy*, Donglai Xiang, Hao Su, Sanja Fidler, Nicholas Sharp, **Jun Gao**
International Conference on Computer Vision (**ICCV**), 2025, [Project](#), [Paper](#), [Code](#)
4. InfiniCube: Unbounded and Controllable Dynamic 3D Driving Scene Generation with World-Guided Video Models
Yifan Lu*, Xuanchi Ren^{*,†}, Jiawei Yang, Tianchang Shen, Zhangjie Wu, **Jun Gao**, Yue Wang, Siheng Chen, Mike Chen, Sanja Fidler, Jiahui Huang
International Conference on Computer Vision (**ICCV**), 2025, [Project](#), [Paper](#)
5. GEN3C: 3D-Informed World-Consistent Video Generation with Precise Camera Control
Xuanchi Ren^{*,†}, Tianchang Shen^{*,†}, Jiahui Huang, Huan Ling, Yifan Lu, Merlin Nimier-David, Thomas Müller, Alexander Keller, Sanja Fidler, **Jun Gao**
Computer Vision and Pattern Recognition (**CVPR**), 2025, (**Highlight**), [Project](#), [Paper](#), [Code](#)
6. Difx3D+: Improving 3D Reconstructions with Single-Step Diffusion Models
Jay Zhangjie Wu*, Yuxuan Zhang*, Haithem Turki, Xuanchi Ren, **Jun Gao**, Mike Zheng Shou, Sanja Fidler, Zan Gojcic†, Huan Ling†
Computer Vision and Pattern Recognition (**CVPR**), 2025, (**Oral, Best Paper Award Candidate**), [Project](#), [Paper](#), [Code](#)
7. DiffusionRenderer: Neural Inverse and Forward Rendering with Video Diffusion Models
Ruofan Liang*, Zan Gojcic, Huan Ling, Jacob Munkberg, Jon Hasselgren, Zhi-Hao Lin, **Jun Gao**, Alexander Keller, Nandita Vijaykumar, Sanja Fidler, Zian Wang*
Computer Vision and Pattern Recognition (**CVPR**), 2025, (**Oral**), [Project](#), [Paper](#), [Code](#)

8. LATTE3D: Large-scale Amortized Text-To-Enhanced 3D Synthesis
Kevin Xie*, Jonathan Lorraine*, Tianshi Cao*, **Jun Gao**, James Lucas, Antonio Torralba, Sanja Fidler, Xiaohui Zeng
European Conference on Computer Vision (**ECCV**), 2024, [Project](#), [Paper](#)
9. WildFusion: Learning 3D-Aware Latent Diffusion Models in View Space
Katja Schwarz, Seung Wook Kim, **Jun Gao**, Sanja Fidler, Andreas Geiger, Karsten Kreis
International Conference on Learning Representations (**ICLR**), 2024, [Project](#), [Paper](#)
10. Neural Fields meet Explicit Geometric Representations for Inverse Rendering of Urban Scenes
Zian Wang[¶], Tianchang Shen, **Jun Gao**, Shengyu Huang, Jacob Munkberg, Jon Hasselgren, Zan Gojcic, Wenzheng Chen, Sanja Fidler
Computer Vision and Pattern Recognition (**CVPR**), 2023, [Project](#), [Paper](#), [Video](#)
11. Magic3D: High-Resolution Text-to-3D Content Creation
Chen-Hsuan Lin*, **Jun Gao***, Luming Tang*, Towaki Takikawa*, Xiaohui Zeng*, Xun Huang, Karsten Kreis, Sanja Fidler*, Ming-Yu Liu*, Tsung-Yi Lin
Computer Vision and Pattern Recognition (**CVPR**), 2023, (**Highlight**), [Project](#), [Paper](#)
12. GET3D: A Generative Model of High Quality 3D Textured Shapes Learned from Images
Jun Gao, Tianchang Shen, Zian Wang, Wenzheng Chen, Kangxue Yin, Daiqing Li, Or Litany, Zan Gojcic, Sanja Fidler
Conference on Neural Information Processing Systems (**NeurIPS**), 2022, (**Spotlight**), [Project](#), [Paper](#), [Code](#)
13. Extracting Triangular 3D Models, Materials, and Lighting from Images
Jacob Munkberg, Jon Hasselgren, Tianchang Shen, **Jun Gao**, Wenzheng Chen, Alex Evans, Thomas Müller, Sanja Fidler
Computer Vision and Pattern Recognition (**CVPR**), 2022, (**Oral**), [Project](#), [Paper](#), [Code](#)
14. Deep Marching Tetrahedra: a Hybrid Representation for High-Resolution 3D Shape Synthesis
Tianchang Shen[¶], **Jun Gao**, Kangxue Yin, Ming-Yu Liu, Sanja Fidler
Conference on Neural Information Processing Systems (**NeurIPS**), 2021, [Project](#), [Paper](#), [Code](#), [Video](#)
15. DIB-R++: Learning to Disentangle Material from Lighting Using a Deferred Image-based Renderer
Wenzheng Chen, Joey Litalien, **Jun Gao**, Zian Wang, Clement Fuji Tsang, Sameh Khamis, Or Litany, Sanja Fidler
Conference on Neural Information Processing Systems (**NeurIPS**), 2021, [Project](#), [Paper](#)
16. 3DStyleNet: Creating 3D Shapes with Geometric and Texture Style Variations
Kangxue Yin, **Jun Gao**, Maria Shugrina, Sameh Khamis, Sanja Fidler
International Conference on Computer Vision (**ICCV**), 2021, (**Oral**), [Project](#), [Paper](#)
17. DatasetGAN: Efficient Labeled Data Factory with Minimal Human Effort
Yuxuan Zhang*[¶], Huan Ling*, **Jun Gao**, Kangxue Yin, Jean-Francois Lafleche, Adela Barriuso, Antonio Torralba, Sanja Fidler
Computer Vision and Pattern Recognition (**CVPR**), 2021, (**Oral**), [Project](#), [Paper](#), [Code](#)
18. Image GANs meet Differentiable Rendering for Inverse Graphics and Interpretable 3D Neural Rendering
Yuxuan Zhang*[¶], Wenzheng Chen*, Huan Ling, **Jun Gao**, Yanan Zhang, Antonio Torralba, Sanja Fidler
International Conference on Learning Representations (**ICLR**), 2021, (**Oral**), [Project](#), [Paper](#)
19. Learning Deformable Tetrahedral Meshes for 3D Reconstruction
Jun Gao, Wenzheng Chen, Tommy Xiang, Alec Jacobson, Morgan McGuire, Sanja Fidler
Conference on Neural Information Processing Systems (**NeurIPS**), 2020, [Project](#), [Paper](#), [Code](#)
20. Beyond Fixed Grid: Learning Geometric Image Representation with a Deformable Grid
Jun Gao, Zian Wang, Jinchen Xuan, Sanja Fidler
European Conference on Computer Vision (**ECCV**), 2020, [Project](#), [Paper](#), [Code](#)
21. Interactive Annotation of 3D Object Geometry using 2D Scribbles
Frank Shen*[¶], **Jun Gao***, Amlan Kar, Sanja Fidler
European Conference on Computer Vision (**ECCV**), 2020, [Project](#), [Paper](#), [Video](#)
22. ScribbleBox: Interactive Annotation Framework for Video Object Segmentation
Bowen Chen*, Huan Ling*, Xiaohui Zeng, **Jun Gao**, Ziyue Xu, Sanja Fidler
European Conference on Computer Vision (**ECCV**), 2020, [Project](#), [Paper](#)
23. Learning to Predict 3D Objects with an Interpolation-based Differentiable Renderer
Wenzheng Chen, **Jun Gao***, Huan Ling*, Edward J. Smith*, Jaakko Lehtinen, Alec Jacobson, Sanja Fidler
Conference on Neural Information Processing Systems (**NeurIPS**), 2019, [Project](#), [Paper](#), [Code](#)

24. Fast Interactive Object Annotation with Curve-GCN
Huan Ling*, **Jun Gao***, Amlan Kar, Wenzheng Chen, Sanja Fidler
Computer Vision and Pattern Recognition (**CVPR**), 2019, [Paper](#), [Code](#), [Video](#)
25. Representation Problem in Training Natural Language Generation Models
Jun Gao*, Di He*, Xu Tan, Tao Qin, Liwei Wang, Tie-Yan Liu
International Conference on Learning Representations (**ICLR**), 2019, [Paper](#), [OpenReview](#)
26. DeepPrimitive: Image Decomposition by Layered Primitive Detection
Jiahui Huang, **Jun Gao**, V. G.Subramanian, Hao Su, Yin Liu, Chengcheng Tang, Shi-Min Hu, Leonidas J. Guibas
Computational Visual Media (**CVM**), 2018, [Paper](#)
27. Learning to Navigate for Fine-grained Classification
Ze Yang, Tiange Luo, Dong Wang, Zhiqiang Hu, **Jun Gao**, Liwei Wang
European Conference on Computer Vision (**ECCV**), 2018, [Paper](#), [Code](#)
28. Dropout Training, Data-dependent Regularization and Excess Risks
Wenlong Mou, Yuchen Zhou, **Jun Gao**, Liwei Wang
International Conference on Machine Learning (**ICML**), 2018, [Paper](#)

Arxiv Publications

1. Cosmos-Drive-Dreams: Scalable Synthetic Driving Data Generation with World Foundation Models
Xuanchi Ren*,[¶] Yifan Lu*, Tianshi Cao*, Ruiyuan Gao, Shengyu Huang, Amirmojtaba Sabour, Tianchang Shen, Tobias Pfaff, Jay Zhangjie Wu, Runjian Chen, Seung Wook Kim, **Jun Gao**, Laura Leal-Taixe, Mike Chen, Sanja Fidler*, Huan Ling*
Arxiv, 2025, [Project](#), [Paper](#), [Code](#)
2. Mimicking the in-camera color pipeline for camera-aware object compositing
Jun Gao, Xiao Li, Liwei Wang, Sanja Fidler, Stephen Lin
Arxiv, 2019, [Paper](#)
3. Deepspine: Data-Driven Reconstruction of Parametric Curves and Surfaces
Jun Gao, Chengcheng Tang, Vignesh Ganapathi-Subramanian, Jiahui Huang, Hao Su, Leonidas J Guibas
Arxiv, 2019, [Paper](#)
4. Improving Semantic Segmentation in Transformers Using Hierarchical Inter-Level Attention
Gary Leung, **Jun Gao**, Xiaohui Zeng, Sanja Fidler
Arxiv, 2022, [Paper](#)

TEACHING EXPERIENCE

Teaching Assistant CSC 420: Introduction to Image Understanding at UofT, website	Winter 2022
Guest Lecturer CSC 420: Introduction to Image Understanding at UofT, website	Winter 2022 & 2023
Guest Lecturer CS 479: Machine Learning for 3D Data at KAIST, website	Fall 2023
Guest Lecturer CSCI 677: Advanced Computer Vision at USC	Fall 2023

RESEARCH MENTORSHIPS

Siyuan Bian, Ph.D. student at the University of Michigan

Zhaoning Wang, Ph.D. student at the University of Michigan

Xuanchi Ren, Ph.D. student at the University of Toronto

Tianchang Shen, Ph.D. student at the University of Toronto

Weiwei Sun, Ph.D. student at the University of British Columbia

Zian Wang, Ph.D. student at the University of Toronto

Gary Leung, Master student at the University of Toronto

Jinchen Xuan, Undergrad student at the Peking University

Yuxuan Zhang, Undergrad student at the University of Waterloo

Yinan Zhang, Undergrad student at the University of Waterloo

INVITED TALKS

- *Generative AI for 3D Content Creation*
 - Stanford University April 2024
 - Purdue University April 2024
 - University of Michigan Mar. 2024
 - University of Waterloo Mar. 2024
- *Revisit Representation, Data and Algorithm for Scaling Up 3D Content Generation*
 - Cornell University: Noah Snavely's research group Sept. 2023
 - MIT: Vision and Graphics Seminar Sept. 2023
 - Max Planck Institute for Intelligent Systems: Michael Black's research group Aug. 2023
 - Waabi: Raquel Urtasun's research group Aug. 2023
- *Towards High-Quality 3D Content Creation with a Hybrid Representation*
 - BIRS Workshop on 3D Generative Models July 2023
- *Machine Learning for 3D Content Generation*
 - CVPR 2023 Workshop: Structural and Compositional Learning on 3D Data, [recording](#) June 2023
 - Tsinghua University: Li Yi's research group May 2023
- *Towards Generative Modeling of 3D Objects Learned from Images*
 - Johns Hopkins University: Alan Yuille's research group Feb. 2023
 - University of Toronto: Toronto AI in Robotics Seminar, [recording](#) Nov. 2022
 - University of Oxford: Visual Geometry Group Sept. 2022
 - Peking University: Baoquan Chen's research group Sept. 2022
- *Learning Geometric Representation for Computer Vision*
 - GAMES: Graphics And Mixed Environment Symposium Nov. 2020
 - University of Alberta: Deep Learning Seminar May 2020

PATENTS

1. Extracting Triangular 3D Models, Materials, and Lighting from Images
Carl Jacob Munkberg, Jon Niklas Theodor Hasselgren, Tianchang Shen, **Jun Gao**, Wenzheng Chen, Alex John Bauld Evans, Thomas Müller-Höhne, Sanja Fidler
U.S. Patent Application 17/827,918
2. Transferring Geometric and Texture Styles in 3D Asset Rendering Using Neural Networks
Kangxue Yin, **Jun Gao**, Masha Shugrina, Sameh Khamis, Sanja Fidler
U.S. Patent Application 17/467,792
3. Synthesizing High Resolution 3D Shapes from Lower Resolution Representations for Synthetic Data Generation Systems and Applications
Tianchang Shen, **Jun Gao**, Kangxue Yin, Ming-Yu Liu, Sanja Fidler
U.S. Patent Application 17/718,172
4. Hybrid Differentiable Rendering for Light Transport Simulation Systems and Applications
Wenzheng Chen, Joey Litalien, **Jun Gao**, Zian Wang, Clement Tse Tsian Christophe Louis Fuji, Sameh Khamis, Or Litany, Sanja Fidler
U.S. Patent Application 17/826,611
5. Neural Rendering for Inverse Graphics Generation
Wenzheng Chen, Yuxuan Zhang, Sanja Fidler, Huan Ling, **Jun Gao**, Antonio Torralba Barriuso
U.S. Patent Application 17/981,770

6. Generating Labels for Synthetic Images Using One or More Neural Networks
Yuxuan Zhang, Huan Ling, **Jun Gao**, Wenzheng Chen, Antonio Torralba Barriuso, Sanja Fidler
U.S. Patent Application 17/020,649
7. Systems and Methods for Polygon Object Annotation and a Method of Training an Object Annotation System
Sanja Fidler, Amlan Kar, Huan Ling, **Jun Gao**, Wenzheng Chen, David Jesus Acuna Marrero
U.S. Patent Application 11/556,797

SELECTED PRESS COVERAGE

- **GET3D: A Generative Model of High Quality 3D Textured Shapes Learned from Images**
[Two Minute Papers](#): NVIDIA's New AI: Generating 3D Models!
[Yahoo](#): NVIDIA's new AI model quickly generates objects and characters for virtual worlds
[Engadget](#): NVIDIA's new AI model quickly generates objects and characters for virtual worlds
[VentureBeat](#): Nvidia CEO Jensen Huang says AI will autopopulate the 3D imagery of the metaverse
[NVIDIA](#): World-Class: NVIDIA Research Builds AI Model to Populate Virtual Worlds With 3D Objects, Characters
- **Magic3D: High-Resolution Text-to-3D Content Creation**
[Two Minute Papers](#): NVIDIA's New AI: Wow, 8x Better Text To 3D!
[Forbes](#): What Nvidia's New Text-To-3D Means For Engineering & Product Design
[Ars Technica](#): 3D for everyone? Nvidia's Magic3D can generate 3D models from text
- **FlexiCubes: Flexible Isosurface Extraction for Gradient-Based Mesh Optimization**
[VectureBeat](#): NVIDIA's FlexiCubes uses generative AI to create 3D meshes
[Two Minute Papers](#): NVIDIA's New AI: 20% Faster Game Graphics!
[NVIDIA](#): Better 3D Meshes, from Reconstruction to Generative AI
- **NVDiffrec: Extracting Triangular 3D Models, Materials, and Lighting From Images**
[Two Minute Papers](#): NVIDIA's New AI Grows Objects Out Of Nothing!
[NVIDIA](#): AI in the Big Easy: NVIDIA Research Lets Content Creators Improvise With 3D Objects
- **DIB-R: Learning to Predict 3D Objects with an Interpolation-based Differentiable Renderer**
[Two Minute Papers](#): This Neural Network Creates 3D Objects From Your Photos