

# Lingjie Liu

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## WORK EXPERIENCE

<b>Assistant Professor</b> Department of Computer and Information Science (CIS), University of Pennsylvania	March 2023 – Present Philadelphia, US
<b>Postdoctoral Research Fellow</b> Max Planck Institute for Informatics	Oct 2019 – Feb 2023 Saarbruecken, Germany

## EDUCATION

<b>Ph.D in Computer Science</b> The University of Hong Kong	Aug 2014 – Sept 2019 Hong Kong, China
<b>Bachelor in Computer Science</b> Huazhong University of Science and Technology	Sept 2010 – June 2014 Wuhan, China

## RESEARCH INTERESTS

Neural Scene Representations, Neural Rendering, Human Performance Modeling and Capture, 3D Reconstruction.

## AWARDS & HONORS

Best Paper Honorable Mention Award of ACM Symposium on Computer Animation (SCA)	2023
Aravind K. Joshi Assistant Professorship	2023
Best Paper Award of ACM International Conference on Intelligent Virtual Agents (IVA)	2021
Lise Meitner Award Postdoctoral Fellowship	2019
Hong Kong PhD Fellowship	2014
CCF (China Computer Federation) Top 100 Excellent Undergraduates	2014

## PROFESSIONAL SERVICE

### Professional Service

*Associate Editorship:* IEEE TVCG (2023 - present)

*Program Committee member:* ACM SIGGRAPH 2023, ACM SIGGRAPH Asia 2023, Pacific Graphics 2023, ACM SIGGRAPH 2022, Pacific Graphics 2022

*Area Chair:* CVPR 2024, 3DV 2024

### Courses

*Neural Actor: Neural Free-view Synthesis of Human Actors with Pose Control*

Tutorial in 3DV 2021 Course on Advances in Neural Rendering Nov 2021

*Fast Rendering of Neural Radiance Fields*

Tutorial in SIGGRAPH 2021 Course on Advances in Neural Rendering Aug 2021

### Organizer

*Posters Chair, Eurographics'24*

*2nd Workshop on Generative Models for Computer Vision, CVPR'24*

*Workshop on AI for Content Creation Workshop, CVPR'24*

*Workshop on Generative Models for Computer Vision, CVPR'23*

*Workshop on AI for Content Creation Workshop, CVPR'23*

## Panel

Workshop on 3D Neural Scene Representations, Google'22

## Selected Invited Talks

<i>From 3D Reconstruction to 3D Generation</i>	
Keynote at 3DV 2024	March 2024
<i>Reconstruction of 3D Real-world Scenes</i>	
ICCV'23 Workshop on NeRF4ADR: Neural Fields for Autonomous Driving and Robotics	Oct 2023
<i>Neural Representations of 3D Real-world Scenes</i>	
IROS'23 Workshop on Robotic Perception and Mapping	Oct 2023
<i>Neural Scene Representation and Rendering</i>	
AIT Lab, ETH Zürich, hosted by Prof. Otmar Hilliges	July 2022
<i>Neural Representation and Neural Rendering of 3D Real-world Scenes</i>	
USTC Summer School, University of Science and Technology of China	July 2022
Asiagraphics Web Seminar	May 2022
Toronto Geometry Colloquium, University of Toronto	Apr 2022
<i>Neural Scene Representations and Neural Rendering</i>	
Facebook AI Research, hosted by Prof. Devi Parikh	Oct 2021
Google Research, hosted by Dr. Thimo Alldieck	Oct 2021
Siemens Healthineers, hosted by Dr. Daphne Yu	Sept 2021
Peking University, hosted by Prof. Baoquan Chen	Sept 2021
<i>Neural Rendering of Human Actors</i>	
Nanyang Technological University, hosted by Prof. Ziwei Liu	June 2021
<i>Learning Neural Sparse Voxel Fields for Free-viewpoint Rendering</i>	
Visual Computing Summer School, Shandong University	July 2020
<i>Thin Structure Reconstruction and Human Motion Reenactment</i>	
Google Daydream, hosted by Dr. Ricardo Martin-Brualla	May 2019
<i>CurveFusion: RGBD-based Reconstruction of Thin Structures</i>	
Department of Computer Science, University of British Columbia, hosted by Prof. Alla Sheffer	July 2018
Department of Automation, Tsinghua University, hosted by Prof. Yebin Liu	July 2018
Baidu Research, Beijing, hosted by Dr. Ruigang Yang	July 2018
<i>Reconstruction of 3D Thin Structures</i>	
Computational Fabrication Group, MIT CSAIL, hosted by Dr. Petr Kellnhofer	June 2018
Visual Computing Group, Harvard University, hosted by Prof. Hanspeter Pfister and Dr. Ronell Sicat	June 2018
<i>Image-based Reconstruction of Wire Art</i>	
University of Science and Technology of China, hosted by Prof. Ligang Liu	Mar 2017
Department of Computer Science and Technology, Nanjing University, hosted by Prof. Yanwen Guo	Mar 2017

## TEACHING EXPERIENCE

### Instructor

CIS 5800-001 Machine Perception	Spring 2024
CIS 7000-005 Introduction to Neural Scene Representation and Neural Rendering	Fall 2023
University of Pennsylvania, US	

### Mentor

Computer Vision and Machine Learning for Computer Graphics	Summer 2021, 2020
Max Planck Institute for Informatics, Germany	

### Teaching Assistant

Computer Programming and Applications	Fall 2014, 2015
The University of Hong Kong, Hong Kong	

## PUBLICATIONS

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(Notes: 1. \* and † indicate equal contribution; 2. Since 2022, SIGGRAPH has Conference and Journal Tracks)

### JOURNALS

- [1] Y. Liu, P. Wang, C. Lin, X. Long, J. Wang, **L. Liu**, T. Komura, and W. Wang. “NeRO: Neural Geometry and BRDF Reconstruction of Reflective Objects from Multiview Images”. In: *ACM Transactions on Graphics (Proc. SIGGRAPH (Journal Track))* (2023).
- [2] Y. Wang\*, Q. Gao\*, L. Liu†, **L. Liu†**, C. Theobalt, and B. Chen†. “Neural Novel Actor: Learning a Generalized Animatable Neural Representation for Human Actors”. In: *IEEE Transactions on Visualization and Computer Graphics (TVCG)* (2023).
- [3] F. Zhan, Y. Yu, R. Wu, J. Zhang, S. Lu, **L. Liu**, A. Kortylewski, C. Theobalt, and E. Xing. “Multimodal Image Synthesis and Editing: The Generative AI Era”. In: *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)* (2023).
- [4] M. Chu, **L. Liu**, Q. Zheng, E. Franz, H.-P. Seidel, C. Theobalt, and R. Zayer. “Physics Informed Neural Fields for Smoke Reconstruction with Sparse Data”. In: *ACM Transactions on Graphics (Proc. SIGGRAPH (Journal Track))* (2022).
- [5] W. Wan, L. Yang, **L. Liu**, Z. Zhang, R. Jia, Y.-K. Choi, J. Pan, C. Theobalt, T. Komura, and W. Wang. “Learn to predict how humans manipulate large-sized objects from interactive motions”. In: *IEEE Robotics and Automation Letters* 7.2 (2022), pp. 4702–4709.
- [6] M. Habermann, **L. Liu**, W. Xu, M. Zollhoefer, G. Pons-Moll, and C. Theobalt. “Real-time deep dynamic characters”. In: *ACM Transactions on Graphics (Proc. SIGGRAPH)* 40.4 (2021), pp. 1–16.
- [7] **L. Liu**, M. Habermann, V. Rudnev, K. Sarkar, J. Gu, and C. Theobalt. “Neural actor: Neural free-view synthesis of human actors with pose control”. In: *ACM Transactions on Graphics (Proc. SIGGRAPH Asia)* 40.6 (2021), pp. 1–16.
- [8] **L. Liu**, W. Xu, M. Habermann, M. Zollhöfer, F. Bernard, H. Kim, W. Wang, and C. Theobalt. “Learning Dynamic Textures for Neural Rendering of Human Actors”. In: *IEEE Transactions on Visualization and Computer Graphics (TVCG)* (2021).
- [9] C. Lin, **L. Liu**, C. Li, L. Kobbelt, B. Wang, S. Xin, and W. Wang. “Seg-mat: 3d shape segmentation using medial axis transform”. In: *IEEE Transactions on Visualization and Computer Graphics (TVCG)* 28.6 (2020), pp. 2430–2444.
- [10] Z. Su, W. Wan, T. Yu, **L. Liu**, L. Fang, W. Wang, and Y. Liu. “Mulaycap: Multi-layer human performance capture using a monocular video camera”. In: *IEEE Transactions on Visualization and Computer Graphics (TVCG)* 28.4 (2020), pp. 1862–1879.
- [11] P. Wang, **L. Liu**, N. Chen, H.-K. Chu, C. Theobalt, and W. Wang. “Vid2Curve: simultaneous camera motion estimation and thin structure reconstruction from an RGB video”. In: *ACM Transactions on Graphics (Proc. SIGGRAPH)* 39.4 (2020), pp. 132–1.
- [12] **L. Liu**, W. Xu, M. Zollhoefer, H. Kim, F. Bernard, M. Habermann, W. Wang, and C. Theobalt. “Neural rendering and reenactment of human actor videos”. In: *ACM Transactions on Graphics (Proc. SIGGRAPH)* 38.5 (2019), pp. 1–14.
- [13] **L. Liu\***, N. Chen\*, D. Ceylan, C. Theobalt, W. Wang, and N. J. Mitra. “CurveFusion: reconstructing thin structures from RGBD sequences”. In: *ACM Transactions on Graphics (Proc. SIGGRAPH Asia)*. ACM. 2018, p. 218.
- [14] **L. Liu**, D. Ceylan, C. Lin, W. Wang, and N. J. Mitra. “Image-based reconstruction of wire art”. In: *ACM Transactions on Graphics (Proc. SIGGRAPH)* 36.4 (2017), pp. 1–11.
- [15] **L. Liu**, H. Zhang, G. Jing, Y. Guo, Z. Chen, and W. Wang. “Correlation-preserving photo collage”. In: *IEEE Transactions on Visualization and Computer Graphics (TVCG)* 24.6 (2017), pp. 1956–1968.

### CONFERENCES

- [1] Y. Liu, C. Lin, Z. Zeng, X. Long, **L. Liu**, T. Komura, and W. Wang. “SyncDreamer: Generating Multiview-consistent Images from a Single-view Image”. In: *International Conference on Learning Representations (ICLR)*, (*Spotlight*). 2024.

- [2] Z. Xu, Y. Chen, K. Vishniakov, Y. Yin, Z. Shen, T. Darrell, **L. Liu**, and Z. Liu. “Initializing Models with Larger Ones”. In: *International Conference on Learning Representations (ICLR)*, (*Spotlight*). 2024.
- [3] J. Gu, A. Trevithick, K.-E. Lin, J. Susskind, C. Theobalt, **L. Liu**, and R. Ramamoorthi. “NerfDiff: Single-image View Synthesis with NeRF-guided Distillation from 3D-aware Diffusion”. In: *International Conference on Machine Learning (ICML)* (2023).
- [4] X. Long, C. Lin, **L. Liu**, Y. Liu, P. Wang, C. Theobalt, T. Komura, and W. Wang. “NeuralUDF: Learning Unsigned Distance Fields for Multi-view Reconstruction of Surfaces with Arbitrary Topologies”. In: *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)* (2023).
- [5] J. Wang, **L. Liu**, W. Xu, K. Sarkar, D. Luvizon, and C. Theobalt. “Scene-aware Egocentric 3D Human Pose Estimation”. In: *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)* (2023).
- [6] P. Wang\*, Y. Liu\*, Z. Chen, **L. Liu**, Z. Liu, T. Komura, C. Theobalt, and W. Wang. “F2-NeRF: Fast Neural Radiance Field Training with Free Camera Trajectories”. In: *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, (*Highlight*) (2023).
- [7] X. Pan, A. Tewari, T. Leimkuehler, **L. Liu**, A. Meka, and C. Theobalt. “Drag Your GAN: Interactive Point-based Manipulation on the Generative Image Manifold”. In: *ACM SIGGRAPH*. 2023.
- [8] M. Habermann, **L. Liu**, W. Xu, G. Pons-Moll, M. Zollhoefer, and C. Theobalt. “HDHumans: A Hybrid Approach for High-fidelity Digital Humans”. In: *ACM SIGGRAPH / Eurographics Symposium on Computer Animation (SCA)*, (*Best Paper Honorable Mention Award*). 2023.
- [9] H. Chen, J. Gu, A. Chen, W. Tian, Z. Tu, **L. Liu**, and H. Su. “Single-Stage Diffusion NeRF: A Unified Approach to 3D Generation and Reconstruction”. In: *IEEE International Conference on Computer Vision (ICCV)*. 2023.
- [10] Y. Wang\*, Q. Han\*, M. Habermann, K. Daniilidis, C. Theobalt, and **L. Liu**. “NeuS2: Fast Learning of Neural Implicit Surfaces for Multi-view Reconstruction”. In: *IEEE International Conference on Computer Vision (ICCV)*. 2023.
- [11] J. Gu, Q. Gao, S. Zhai, B. Chen, **L. Liu**, and J. Susskind. “Learning Controllable 3D Diffusion Models from Single-view Images”. In: *International Conference on 3D Vision (3DV)*. 2023.
- [12] F. Zhan, **L. Liu**, A. Kortylewski, and C. Theobalt. “General Neural Gauge Fields”. In: *International Conference on Learning Representations (ICLR)*. 2023.
- [13] Y. Kwon, **L. Liu**, H. Fuchs, M. Habermann, and C. Theobalt. “Deliffas: Deformable light fields for fast avatar synthesis”. In: *Neural Information Processing Systems (NeurIPS)*. 2023.
- [14] J. Zhuang\*, C. Wang\*, L. Lin†, **L. Liu†**, and G. Li†. “Dreameditor: Text-driven 3d scene editing with neural fields”. In: *SIGGRAPH Asia 2023 Conference Papers*. 2023, pp. 1–10.
- [15] J. Gu, **L. Liu**, P. Wang, and C. Theobalt. “Stylenerf: A style-based 3d-aware generator for high-resolution image synthesis”. In: *International Conference on Learning Representations (ICLR)* (2022).
- [16] X. Pan, A. Tewari, **L. Liu**, and C. Theobalt. “GAN2X: Non-Lambertian Inverse Rendering of Image GANs”. In: *International Conference on 3D Vision (3DV)* (2022).
- [17] V. Rudnev, M. Elgharib, W. Smith, **L. Liu**, V. Golyanik, and C. Theobalt. “Nerf for outdoor scene relighting”. In: *European Conference on Computer Vision (ECCV)*. Springer Nature Switzerland Cham. 2022, pp. 615–631.
- [18] J. Wang, P. Wang, X. Long, C. Theobalt, T. Komura, **L. Liu**, and W. Wang. “NeuRIS: Neural reconstruction of indoor scenes using normal priors”. In: *European Conference on Computer Vision (ECCV)*. Springer Nature Switzerland Cham. 2022, pp. 139–155.
- [19] Y. Liu, S. Peng, **L. Liu**, Q. Wang, P. Wang, C. Theobalt, X. Zhou, and W. Wang. “Neural rays for occlusion-aware image-based rendering”. In: *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*. 2022, pp. 7824–7833.
- [20] J. Wang, **L. Liu**, W. Xu, K. Sarkar, D. Luvizon, and C. Theobalt. “Estimating Egocentric 3D Human Pose in the Wild with External Weak Supervision”. In: *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, (*Oral*). 2022, pp. 13157–13166.
- [21] P. Wang, **L. Liu†**, Y. Liu, C. Theobalt, T. Komura, and W. Wang†. “Neus: Learning neural implicit surfaces by volume rendering for multi-view reconstruction”. In: *Neural Information Processing Systems (NeurIPS)*, (*Spotlight*) (2021).

- [22] I. Habibie, W. Xu, D. Mehta, **L. Liu**, H.-P. Seidel, G. Pons-Moll, M. Elgharib, and C. Theobalt. “Learning speech-driven 3d conversational gestures from video”. In: *ACM International Conference on Intelligent Virtual Agents*, (*Best Paper Award*). 2021, pp. 101–108.
- [23] Y. Liu, **L. Liu**, C. Lin, Z. Dong, and W. Wang. “Learnable motion coherence for correspondence pruning”. In: *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*. 2021, pp. 3237–3246.
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- [25] J. S. Yoon, **L. Liu**, V. Golyanik, K. Sarkar, H. S. Park, and C. Theobalt. “Pose-guided human animation from a single image in the wild”. In: *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*. 2021, pp. 15039–15048.
- [26] T. Hu, K. Sarkar, **L. Liu**, M. Zwicker, and C. Theobalt. “Egorenderer: Rendering human avatars from egocentric camera images”. In: *IEEE International Conference on Computer Vision (ICCV)*. 2021, pp. 14528–14538.
- [27] X. Long, C. Lin, **L. Liu**, W. Li, C. Theobalt, R. Yang, and W. Wang. “Adaptive surface normal constraint for depth estimation”. In: *IEEE International Conference on Computer Vision (ICCV)*. 2021, pp. 12849–12858.
- [28] L. Lyu, M. Habermann, **L. Liu**, A. Tewari, C. Theobalt, et al. “Efficient and differentiable shadow computation for inverse problems”. In: *IEEE International Conference on Computer Vision (ICCV)*. 2021, pp. 13107–13116.
- [29] J. Wang, **L. Liu**, W. Xu, K. Sarkar, and C. Theobalt. “Estimating egocentric 3d human pose in global space”. In: *IEEE International Conference on Computer Vision (ICCV)*. 2021, pp. 11500–11509.
- [30] L. Ma, **L. Liu**, C. Theobalt, and L. Van Gool. “Direct Dense Pose Estimation”. In: *International Conference on 3D Vision (3DV)*. IEEE. 2021, pp. 721–730.
- [31] K. Sarkar, **L. Liu**, V. Golyanik, and C. Theobalt. “Humangan: A generative model of human images”. In: *International Conference on 3D Vision (3DV)*, (*Oral*). IEEE. 2021, pp. 258–267.
- [32] **L. Liu\***, J. Gu\*, K. Z. Lin, T.-S. Chua, and C. Theobalt. “Neural sparse voxel fields”. In: *Neural Information Processing Systems (NeurIPS)*, (*Spotlight*) (2020).
- [33] X. Long, **L. Liu**, C. Theobalt, and W. Wang. “Occlusion-aware depth estimation with adaptive normal constraints”. In: *European Conference on Computer Vision (ECCV)*. Springer International Publishing. 2020, pp. 640–657.
- [34] N. Chen, **L. Liu**, Z. Cui, R. Chen, D. Ceylan, C. Tu, and W. Wang. “Unsupervised learning of intrinsic structural representation points”. In: *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*. 2020, pp. 9121–9130.
- [35] J. Hu, B. Wang, L. Qian, Y. Pan, X. Guo, **L. Liu**, and W. Wang. “MAT-Net: Medial Axis Transform Network for 3D Object Recognition.” In: *International Joint Conferences on Artificial Intelligence (IJCAI)*. 2019, pp. 774–781.

#### PREPRINTS

- [1] J. Lei, Y. Wang, G. Pavlakos, **L. Liu**, and K. Daniilidis. “Gart: Gaussian articulated template models”. In: *arXiv preprint arXiv:2311.16099* (2023).
- [2] X. Long\*, Y.-C. Guo\*, C. Lin, Y. Liu, Z. Dou, **L. Liu**, Y. Ma, S.-H. Zhang, M. Habermann, C. Theobalt, et al. “Wonder3d: Single image to 3d using cross-domain diffusion”. In: *arXiv preprint arXiv:2310.15008* (2023).
- [3] R. Po\*, Y. Wang\*, V. Golyanik\*, K. Aberman, J. T. Barron, A. H. Bermano, E. R. Chan, T. Dekel, A. Holynski, A. Kanazawa, C. K. Liu, **L. Liu**, B. Mildenhall, M. Nießner, B. Ommer, C. Theobalt, P. Wonka, and G. Wetzstein. *State of the Art on Diffusion Models for Visual Computing*. 2023. arXiv: 2310.07204 [cs . AI].
- [4] W. Wan, Z. Dou, T. Komura, W. Wang, D. Jayaraman†, and **L. Liu†**. “Tlcontrol: Trajectory and language control for human motion synthesis”. In: *arXiv preprint arXiv:2311.17135* (2023).
- [5] W. Wan\*, Y. Huang\*, S. Wu, T. Komura, W. Wang, D. Jayaraman, and **L. Liu**. “DiffusionPhase: Motion Diffusion in Frequency Domain”. In: *arXiv preprint arXiv:2312.04036* (2023).
- [6] J. Wang, Z. Cao, D. Luvizon, **L. Liu**, K. Sarkar, D. Tang, T. Beeler, and C. Theobalt. “Egocentric Whole-Body Motion Capture with FisheyeViT and Diffusion-Based Motion Refinement”. In: *arXiv preprint arXiv:2311.16495* (2023).
- [7] Y. Yang, F.-Y. Sun, L. Weihs, E. VanderBilt, A. Herrasti, W. Han, J. Wu, N. Haber, R. Krishna, **L. Liu**, C. Callison-Burch, M. Yatskar, A. Kembhavi, and C. Clark. “Holodeck: Language Guided Generation of 3D Embodied AI Environments”. In: *arXiv preprint arXiv:2312.09067* (2023).

- [8] W. Zhou, Z. Dou, Z. Cao, Z. Liao, J. Wang, W. Wang, Y. Liu, T. Komura, W. Wang, and **L. Liu**. “EMDM: Efficient Motion Diffusion Model for Fast, High-Quality Motion Generation”. In: *arXiv preprint arXiv:2312.02256* (2023).
- [9] P. Wang, Y. Liu, G. Lin, J. Gu, **L. Liu**, T. Komura, and W. Wang. “Progressively-connected Light Field Network for Efficient View Synthesis”. In: *arXiv preprint arXiv:2207.04465* (2022).
- [10] K. Sarkar, V. Golyanik, **L. Liu**, and C. Theobalt. “Style and pose control for image synthesis of humans from a single monocular view”. In: *arXiv preprint arXiv:2102.11263* (2021).