

Lingjie Liu

Aravind K. Joshi Assistant Professor, Computer and Information Science Department, University of Pennsylvania
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WORK EXPERIENCE

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

EDUCATION

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

RESEARCH INTERESTS

My research interests are at the interface of Computer Graphics, Computer Vision, and AI, with a focus on Neural Scene Representations, Neural Rendering, Human Performance Modeling and Capture, and 3D Reconstruction.

PROFESSIONAL SERVICE

Professional Service

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

Reviewer: ACM SIGGRAPH, ACM SIGGRAPH Asia, IEEE Transactions on Visualization and Computer Graphics (TVCG), Eurographics, Pacific Graphics, NeurIPS, ICLR, AAAI, IEEE CVPR, IEEE ICCV, IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), etc.

Courses

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| <i>Neural Actor: Neural Free-view Synthesis of Human Actors with Pose Control</i> Tutorial in 3DV 2021 Course on Advances in Neural Rendering | Nov 2021 |
| <i>Fast Rendering of Neural Radiance Fields</i> Tutorial in SIGGRAPH 2021 Course on Advances in Neural Rendering | Aug 2021 |

Organizer

Workshop on Generative Models for Computer Vision, CVPR'23
Workshop on AI for Content Creation Workshop, CVPR'23
Workshop on 3D Generative Models, Banff International Research Station for Mathematical Innovation and Discovery (BIRS)'23

Panel

Workshop on 3D Neural Scene Representations, Google'22

Selected Invited Talks

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| <i>Efficient and Versatile Neural Scene Representation Learning</i> China3DV | April 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 |

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| 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. Thiemo 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 |

AWARDS & HONORS

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| 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 |

TEACHING EXPERIENCE

Mentor

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|---|-------------------|
| <i>Computer Vision and Machine Learning for Computer Graphics</i> | Summer 2021, 2020 |
| Max Planck Institute for Informatics, Germany | |

Teaching Assistant

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| <i>Computer Programming and Applications</i> | Fall 2014, 2015 |
| The University of Hong Kong, Hong Kong | |

PUBLICATIONS

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)* (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)* (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] 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).
- [2] 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).
- [3] 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).
- [4] 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)* (2023).
- [5] 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.
- [6] 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)*. 2023.

- [7] 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.
- [8] 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.
- [9] F. Zhan, **L. Liu**, A. Kortylewski, and C. Theobalt. “General Neural Gauge Fields”. In: *International Conference on Learning Representations (ICLR)*. 2023.
- [10] 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).
- [11] 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).
- [12] 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.
- [13] 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.
- [14] 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.
- [15] 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)*. 2022, pp. 13157–13166.
- [16] 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)* (2021).
- [17] 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*. 2021, pp. 101–108.
- [18] 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.
- [19] X. Long, **L. Liu**, W. Li, C. Theobalt, and W. Wang. “Multi-view depth estimation using epipolar spatio-temporal networks”. In: *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*. 2021, pp. 8258–8267.
- [20] 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.
- [21] 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.
- [22] 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.
- [23] 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.
- [24] 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.
- [25] 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.
- [26] K. Sarkar, **L. Liu**, V. Golyanik, and C. Theobalt. “Humangan: A generative model of human images”. In: *International Conference on 3D Vision (3DV)*. IEEE. 2021, pp. 258–267.
- [27] **L. Liu**, J. Gu, K. Z. Lin, T.-S. Chua, and C. Theobalt. “Neural sparse voxel fields”. In: *Neural Information Processing Systems (NeurIPS)* (2020).
- [28] 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.

- [29] 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.
- [30] 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. Gu, Q. Gao, S. Zhai, B. Chen, L. Liu, and J. Susskind. *Learning Controllable 3D Diffusion Models from Single-view Images*. 2023. arXiv: 2304.06700 [cs.CV].
- [2] J. Zhuang, C. Wang, **L. Liu**, L. Lin, and G. Li. *DreamEditor: Text-Driven 3D Scene Editing with Neural Fields*. 2023. arXiv: 2306.13455 [cs.CV].
- [3] 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).
- [4] 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).