YIBO LIU

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Personal Webpage | Google Scholar
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Research Interest

My research interest lies in the domain of computer vision and generative AI.

- I began pursuing a Ph.D. degree in January 2020 with a focus on robotic vision, and during that time, my research centered on the localization and navigation of robots (RA-L2022, IROS2022, TIM2024).
- Since 2022, my research primarily involved in-the-wild object 3D reconstruction and 3D content (NeRFs/3D Gaussians Splatting) generation, which provides objects for the simulation in autonomous driving. I had one first-author paper, MV-DeepSDF, accepted to ICCV2023. Moreover, I was the Top-3 winner of OmniObject3D challenge at ICCV2023 [report] .
- Since mid-2023, I have been conducting research on LLM, Vision Question Answering (VQA), and Diffusion Models intending to generate photorealistic 2D/3D assets. I had one first-author paper, VQA-Diff, accepted to ECCV2024.

Research Experience

Noah's Ark Lab, Huawei Canada Feb 2022 - present
Part-time Research Intern. Mentor: Yuan Ren *Toronto, Canada*

- Focused on in-the-wild object reconstruction and image/text-to-3D content generation under the background of simulation in the autonomous driving industry. My research involved Visual Question Answering models, Diffusion models, NeRFs, and Gaussian Splatting.
- Contribution:

  VQA-Diff: Exploiting VQA and Diffusion for Zero-Shot Image-to-3D Vehicle Asset Generation in Autonomous Driving **(first author, ECCV2024)**.

  MV-DeepSDF: Implicit Modeling with Multi-Sweep Point Clouds for 3D Vehicle Reconstruction in Autonomous Driving (**first author**, **ICCV2023**, DOI).

  Top-3 winner of OmniObject3D challenge (Co-first author, ArXiv, **NeurIPS 2024 Workshop on Symmetry and Geometry in Neural Representations**).

York University Jan 2020 – present
Research Assistant. Supervisor: Prof. Jinjun Shan. *Toronto, Canada*

- Focused on robotic vision which involved camera/LiDAR-based perception, SLAM, and navigation.
- Contribution:

  Intensity Image-based LiDAR Fiducial Marker System (first author, **RA-L2022**, DOI, Github **55** stars) .
  Application of Ghost-DeblurGAN to Fiducial Marker Detection (first author, **IROS2022**, DOI, Github **31** stars).
  Mapping and Localization using LiDAR Fiducial Markers (first author, submitted to **TIM**, Github **110** stars).

Education

York University, Lassonde School of Engineering Toronto, Canada
Ph.D. Student. Supervisor:Prof. Jinjun Shan. *Jan 2020-present*

- Scholarship:
  Academic Excellence Fund (maximum amount, 2022, 2023).
  York Graduate Scholarship (2020).

BeiHang University, School of Aeronautic Science and Engineering Beijing, China
Master *Sep 2017-Jan 2020*

- Scholarship:
  First-class Academic Merit (Top 3%).
  Outstanding Science and Technology Competition Medal of May 4th (5 out of 22,000).
  Ministry of Industry and Information Technology Innovation and Entrepreneurship (10 out of 40,000)

BeiHang University, School of Aeronautic Science and Engineering Beijing, China
Bachelor *Sep 2013-June 2017*

- Scholarship:
  Outstanding Graduate (Top 5%);
  Outstanding Student Cadres

Selected Publication & Award List

Publication

[1]**Liu Y***, Yang Z*, Wu G, Ren Y, Lin K, Liu B, Liu Y, Shan J. "VQA-Diff: Exploiting VQA and Diffusion for Zero-Shot Image-to-3D Vehicle Asset Generation in Autonomous Driving", in Proc. European Conference on Computer Vision (**ECCV**), 2024.

[2]**Liu Y**, Zhu K, Wu G, Ren Y, Liu B, Liu Y, Shan J. "MV-DeepSDF: Implicit Modeling with Multi-Sweep Point Clouds for 3D Vehicle Reconstruction in Autonomous Driving", in Proc. IEEE/CVF International Conference on Computer Vision (**ICCV**), 2023, pp. 8306-8316.

[3]Yang Z*, **Liu Y***, Wu G, Cao T, Ren Y, Liu Y, Liu B. "Learning Effective NeRFs and SDFs Representations with 3D Generative Adversarial Networks for 3D Object Generation". **NeurIPS 2024** Workshop on Symmetry and Geometry in Neural Representations. Top-3 winner of **ICCV 2023** OmniObject3D Challenge.

[4]**Liu Y**, Schofield H, Shan J. "Intensity Image-Based LiDAR Fiducial Marker System", in IEEE Robotics and Automation Letters (**RA-L**), vol. 7, no. 3, pp. 6542-6549, July 2022, doi: 10.1109/LRA.2022.3174971.

[5]**Liu Y**, Schofield H, Shan J. "Application of Ghost-DeblurGAN to Fiducial Marker Detection", in Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS**), 2022, pp. 6827-6832, doi: 10.1109/IROS47612.2022.9981701.

[6]**Liu Y**, Schofield H, Shan J. "Navigation of a Self-Driving Vehicle Using One Fiducial Marker", in Proc. IEEE International Conference on Multisensor Fusion and Integration for Intelligent Systems (MFI), 2021, pp. 1-6, doi: 10.1109/MFI52462.2021.9591194.

[7]Zhang S, Shan J and **Liu Y** "Approximate Inference Particle Filtering for Mobile Robot SLAM," in IEEE Transactions on Automation Science and Engineering, doi: 10.1109/**TASE**.2024.3475735

[8]Zhang S, Shan J and **Liu Y**. "Variational Bayesian Estimator for Mobile Robot Localization With Unknown Noise Covariance," in IEEE/ASME Transactions on Mechatronics, vol. 27, no. 4, pp. 2185-2193, Aug. 2022, doi: 10.1109/**T-MECH**.2022.3161591.

Award

[1]**Top-3 winner** of OmniObject3D Challenge at **ICCV2023** (3D Object Generation Task).

[2]The first prize, 15th 'Challenge Cup' National Science and Technology College of extra-curricular academic competition works, second author

[3]Excellent Grade, 9th National College Students Innovation and Entrepreneurship Training Plan, initiator

Technical Reviewer

- International Conference on Learning Representations (**ICLR**), Neural Information Processing Systems (**NeurIPS**)
- IEEE Robotics and Automation Letters (**RA-L**), IEEE Robotics and Automation Magazine (**RA-M**)
- IEEE International Conference on Robotics and Automation (**ICRA**), IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS**), Artificial Intelligence and Statistics (**AISTATS**), IEEE/ASME International Conference on Advanced Intelligent Mechatronics (**AIM**)
- IEEE Transactions on Instrumentation and Measurement (**TIM**)
- IEEE Transactions on Industrial Electronics (**TIE**)