# YIBO LIU

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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).

- 2022-2024, I worked on 3D modeling and 3D content (NeRFs/3D Gaussians Splatting) generation. I had one first-author paper, MV-DeepSDF, accepted to ICCV2023 and one co-first authored paper accepted to NeurIPS 2024 Workshop. .

- 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.

- Since 2024, I started to work on embodied AI. I had one first-author paper submitted to CVPR2025.

## 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**),DOI.
  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, pp. 323-340.

[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**)