Ziwei Liao

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Research Interests

My long-term goal is to make intelligent robots and machines perceive, understand, and interact with real environments to help human beings in the real world. Specifically, my research interests include Mapping and localization (SLAM), Pose Estimation, 3D Reconstruction, NeRF, Deep Learning, Generative Models, and Uncertainty Modeling.

Education

University of Toronto, Toronto, Canada
Ph.D. Candidate, Institute for Aerospace Study, 2021-Present

Beihang University, Beijing, China
M.Sci., Robotics Institute, 2021
B.Eng., Mechatronics Engineering, 2018

Research Experiences

University of Toronto, Research Assistant, 2021-Present
Toronto Robotics and AI Lab, Advisor: Prof. Steven Waslander
Project: Deep Learning for 3D Objects

Microsoft Research Asia, Research Intern, 2022-2023
Intelligent Multimedia & Visual Computing Group, Mentor: Dr. Chunyu Wang
Project: 3D Human Pose Estimation with Transformers

Beihang University, Research Assistant, 2019-2021
Autonomous Robots Lab, Advisor: Prof. Wang Wei
Project: Object-level SLAM for Indoor Robots

Beihang University, Research Assistant, 2018-2020
Autonomous Robots Lab, Advisor: Prof. Wang Wei
Project: Mapping and Localization with Point, Lines and Planes

Megvii Research (Face++), Research Intern, 2018-2019
SLAM and Robotics Group
Project: Semantic Localization from Monocular Images

Tsukuba University, Japan, Research Assistant, 2017-2018
Intelligent Robot Lab, supervised by Prof. Akihisa Ohya
Project: Semantic Navigation for Indoor Robots

Academic Service	Conference Reviewer: ICRA 2023-2024, CVPR 2023-2024, WACV 2024 Journal Reviewer: RA-L

Publications

7. *Multi-view 3D Object Reconstruction and Uncertainty Modelling with Neural Shape Prior*
Ziwei Liao, Steven L. Waslander
Winter Conference on Applications of Computer Vision (**WACV**), 2024

6. *SO-SLAM: Semantic Object SLAM with Scale Proportional and Symmetrical Texture Constraints*
Ziwei Liao, Yutong Hu, Jiadong Zhang, Xianyu Qi, Xiaoyu Zhang, Wei Wang
IEEE Robotics and Automation Letters (**RA-L**) (presented at **ICRA** 2022)

5. *RGB-D Object SLAM using Quadrics for Indoor Environments*
Ziwei Liao, Wei Wang, Xianyu Qi, Xiaoyu Zhang
Sensors, 2020

4. *Coarse-To-Fine Visual Localization Using Semantic Compact Map*
Ziwei Liao, Jieqi Shi, Xianyu Qi, Xiaoyu Zhang, Wei Wang, Yijia He, Ran Wei, Xiao Liu
International Conference on Control and Robots, 2020, **Best Session Presentation**

3. *Stereo plane slam based on intersecting lines*
Xiaoyu Zhang, Wei Wang, Xianyu Qi, **Ziwei Liao**
International Conference on Intelligent Robots and Systems (**IROS**), 2021

2. *Point-Plane SLAM Using Supposed Planes for Indoor Environments*
Xiaoyu Zhang, Wei Wang, Xianyu Qi, **Ziwei Liao**, Ran Wei
Sensors, 2019

Under review

3. *Uncertainty-aware 3D Object-Level Mapping with Deep Shape Priors*
Ziwei Liao*, Jun Yang*, Jingxing Qian*, Angela P. Schoellig, Steven L. Waslander
International Conference on Robotics and Automation (**ICRA**), 2024, *under review*

2. *Multiple View Transformers for 3D Human Pose Estimation*
Ziwei Liao*, Jialiang Zhu*, Chunyu Wang, Han Hu, Steven Waslander
Computer Vision and Pattern Recognition (**CVPR**), 2024, *under review*

1. *CITI: An Intersection Traffic Dataset for 2D/3D Object Detection and Tracking*
Kartikeya Bhargava, Bardia Esmaeili, Juan Carillo Garcia, Yuqian Hou,
Kumar Vaibhav Jha, **Ziwei Liao**, Sajjad Pakdamansavoji, Trong Thao Tran, Shreejal Trivedi,
Baher abdulhai, James H Elder, Steven L. Waslander
Computer Vision and Pattern Recognition (**CVPR**), 2024, *under review*

Preprints

1. *Object-oriented SLAM using Quadrics and Symmetry Properties for Indoor Environments*
Ziwei Liao, Wei Wang, Xianyu Qi, Xiaoyu Zhang, Lin Xue, Jianzhen Jiao, Ran Wei
arXiv, 2020

Awards

2022	Mary H. Beatty Fellowship, University of Toronto
2021	DiDi Scholarship
2020	National Scholarship, Ministry of Education, China
2018	Chinese National Robocon Robotics Competition (Second Award)
2018	Outstanding Graduate of Beijing, China

Languages and Skills

English, Japanese (N2), Chinese (native)
Python/C++, PyTorch, OpenCV, ROS, Open3D,
Robot platforms (wheeled, rotorcraft),
Sensors (RGB-D, laser/lidar, odometry, IMU)