Zirui Wu

Personal Information

Name:	Zirui Wu (武子睿)
Gender:	Male
Place and Date of Birth:	Beijing, China | 22 May 2001
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Education

09/2023–Now	Ph.D. in Robotics and Autonomous Systems System Thrust, HKUST (Guangzhou Campus) Supervisor: Jie Song
09/2019–06/2023	Bachelor of Science in Computer Science and Technology Beijing Institute of Technology (BIT), China GPA: 3.8/4.0

Research Experience

05/2022–09/2023	Research Intern at DISCOVER Lab Institute for AI Industry Research, Tsinghua University Neural 3D Representation, 3D Computer Vision Co-advised by Yongling Shi, Hao Zhao, and Guyue Zhou

Selected Publications

Conference Proceedings

[1] J. Shen, B. Song, Z. Wu, and Y. Xu, "OmniNeRF: Hybriding Omnidirectional Distance and Radiance fields for Neural Surface Reconstruction," in *International Conference on Computational Modeling, Simulation and Data Analysis (CMSDA)*, Sep. 2022. arXiv: 2209.13433 [cs].

[2] Z. Zhu, Y. Chen, Z. Wu, C. Hou, *et al.*, "LATITUDE: Robotic Global Localization with Truncated Dynamic Low-pass Filter in City-scale NeRF," in *2023 IEEE Conference on Robotics and Automation (ICRA 2023)*, Sep. 2022. arXiv: 2209.08498 [cs].

Preprints

[3] J. Zhang, Z. Zhong, Z. Wu, Y. Chen, *et al.*, *Being friends with floaters: Learning radiance fields from hazy images*, Mar. 2023.

[4] Z. Wu, Y. Chen, R. Yang, Z. Zhu, *et al.*, *AsyncNeRF: Learning Large-scale Radiance Fields from Asynchronous RGB-D Sequences with Time-Pose Function*, Nov. 2022. arXiv: 2211.07459 [cs].

Thesis

[5] Z. Wu, *Multi-sensororial Scene Representation Learning with Hybrid Neural Implicit Fields*, (Undergraduate Thesis). Beijing Institute of Technology, Jun. 2023. URL: https://github.com/wuzirui/undergrad_thesis.

Selected Projects

1 NeRF-based Simulator for Complex Dynamic Outdoor Driving Scene

- Proposed a state-of-the-art solution for reconstructing complex dynamic outdoor driving scenes using compositional neural radiance fields.
- Implemented an agile code framework that built upon NeRFStudio as tech leader.
- Completed a paper (TBA) as the first author.

2 Multiview Image Dehazing with NeRF

- Proposed a novel depth re-weighting function to dehaze a trained hazy neural radiance field and a depth-radiance covariance loss to decouple view-dependency and hazy effects.
- Proposed the initial idea, engaged in paper writing and experiments.
- Completed a paper [3] as the third author (Under review).

3 Learning Large-scale Neural Implicit Fields from Asynchronous RGB-D Sequence

- Proposed the first solution to self-calibrate the mismatch between RGB and depth frames by leveraging the implicit trajectory prior with a time-pose function.
- Proposed the initial idea, directed the system design, conducted main experiments, and finished paper writing.
- Completed a paper [4] as the co-first author (Under review).

4 Neural Implicit City-scale Scene Mapping and Localization

- Represented large-scale city scenes with neural implicit fields and proposed a two-stage state-of-the-art method for pose estimation.
- Engaged in the system design, responsible for the 3D implicit scene reconstruction, and helped with several technical problems in pose optimization.
- Published a conference paper [2] as the third author (Under review).

5 Hybrid Implicit Fields for Surface Reconstruction

- Addressed two systematic errors in the existing hybrid implicit fields with Signed Distance Fields and Neural Radiance Fields for reconstructing 3D geometry. Our method achieved improved reconstruction results on surface edges than the existing methods.
- Completed a conference paper [1] as the co-first and corresponding author.

6 Compiler Design for Machine Learning Applications

- Implemented a computer programming language for developing machine learning applications from scratch. (Github Profile).
- Encapsulated some widely used machine learning applications with API interfaces to enable users to utilize machine learning models simply by invoking functions.

Extracurricular Activities

- Team Captain, BIT Kunpeng Baseball Team 05/2021-06/2022
- Manager, School Coffee House 03/2021-06/2022
- Co-Founder, BIT Intelligent Game Confrontation Association 09/2020-06/2022

HONORS & Awards

- **The China Century Scholarship** 12/2022
- **First Prize** in the 23rd China Robotics and Artificial Intelligence Competition National Finals 12/2021
- Software Copyright: BICQ Nano Developer Online Office Automation Suite 09/2021
- Software Copyright: Commander Intelligent Agent Confrontation Platform 05/2021

Skills & Interests

Languages:	Chinese (native), English (fluent, TOEFL 108)
Programming Languages:	C/C++, Python, Java, Dart, C#, Go, JavaScript
Toolchains:	Markdown, LaTeX, NeRFStudio, PyTorch
Operating Systems:	Linux, Windows
Hobbies:	Baseball