

Jianheng Liu

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I am currently a postgraduate in Harbin Institute of Technology (Shenzhen), China, supervised by **Prof. Haoyao Chen**. I obtained my bachelor degree at Harbin Institute of Technology (Shenzhen), China in 2021. My research interests lie in **Robotics and Autonomous Systems, Localization and Mapping and NeRF**.

Education

- **Harbin Institute of Technology (Shenzhen)** **Recommended exemption Graduate**
Control Science and Engineering (Master degree), 2021/09–Present
GPA: 3.27/4, Ranking: 19/31
- **Harbin Institute of Technology (Shenzhen)**
Automation (Bachelor degree), 2017/09–2021/06
GPA: 85.73/100, Ranking: 24/70

Publications

- **Active Implicit Object Reconstruction using Uncertainty-guided Next-Best-View Optimziation**
Jianheng Liu*, Dongyu Yan* and Haoyao Chen. (Under Review)
2023 IEEE International Conference on Robotics and Automation (ICRA), **CiteScore: 6.4**.
- **RGB-D Inertial Odometry for a Resource-restricted Robot in Dynamic Environments**
Jianheng Liu, XuanFu Li, Yueqian Liu and Haoyao Chen.
2022 IEEE Robotics and Automation Letters (RAL), **CiteScore: 8.0**.
- **Vision-Inertial-based Adaptive State Estimation of Hexacopter with a Cable-Suspended Load**
Siqiang Wang, **Jianheng Liu**, Xin Jiang and Haoyao Chen.
2022 IEEE International Conference on Real-time Computing and Robotics (RCAR)
- **Sampling-Based View Planning for MAVs in Active Visual-inertial State Estimation**
Zhengyu Hua, Jiabi Sun, Fengyu Quan, Haoyao Chen, **Jianheng Liu**, Yunhui Liu.
2022 IEEE International Conference on Intelligent Robots and Systems (IROS), **CiteScore: 3.9**.
- **Vision-encoder-based Payload State Estimation for Autonomous MAV With a Suspended Payload**
Jianheng Liu*, Yunfan Ren*, Haoyao Chen and Yunhui Liu.
2021 IEEE International Conference on Intelligent Robots and Systems (IROS), **CiteScore: 3.9**.

* equal contribution

Patents

- **Vision-encoder-based Suspended Payload State Estimator and Estimation Method**
CN112991443A, 2021.

Honors & Awards

- **2022 Postgraduate National Scholarship**
- **Postgraduate Academic Scholarships** of First-class (2021-2022), First-class (2022-2023)
- **2021-2022 Excellent Student Award**
- **Undergraduate Academic Scholarships** of First-class (2019-2020), Third-class (2018-2019), Second-class (2017-2018)
- the First Price for **2020 National ROBOCON Competition**; the Second Price for **2020 National Quadruped Simulation Competition**
- the Best Design Award for **2020 Smart C-end Technology Innovation Training Camp**
- the Second Price for **2019 National ROBOCON Competition**
- the Third Prize for **2019 National Challenge Cup**
- the Bronze Prize for **2019 Internet plus of Heilongjiang Province**
- the Golden Price for **2019 ZuGuang Cup of Harbin Institute of Technology (Shenzhen)**
- **2018-2019 Excellent Student Leader Award** (Undergraduate Monoitor)
- the Second Prize for **2018 National English Competition for College Strudents**
- **2017-2018 Excellent Student Award**
- the Grand Prize for **the second International Youth Drone Competition**

Intern Experiences

- Shenzhen InnoX Academy, Intelligent Driving Center
I was mainly responsible for research of collaborative semantic visual-lidar structure mapping. Further, I developed deep-learning-based visual SLAM for robust feature tracking and depth estimation.
- Narwal, Department of Perception
I was mainly responsible for research of high-resolution visual-lidar mapping in a clustering room. Further, I developed a overlapping calculation algorithm between two given images with the aforehand high-resolution map for the training of re-location.
- Tencent, Robotics X
I was mainly responsible for research of real-time high-resolution elevation mapping for legged robots' planning. It was a robot-centric elevation map that enable fast foothold planning.

Research Experiences

- **Active Implicit Reconstruction for Unknown Objects:**
Jianheng Liu, Dongyu Yan and Haoyao Chen. Submitted to ICRA, 2023

We manage to transplant active reconstruction methods into implicit representation, which has advantages over traditional explicit representation in resolution, model size, and continuity. Our proposed information gain metric is based on spatial point sampling rather than voxel traversing, which can be seamlessly integrated into the implicit model. An implicit reconstruction method for bounded objects considering free space is also proposed to use information fully.

- **LVI-SAM-LIVOX:** Easy-to-run LVI-SAM and its application in simulator together with motion planner.
- **RGB-D Inertial Odometry for a Resource-restricted Robot in Dynamic Environments:**
Jianheng Liu, XuanFu Li, Yueqian Liu and Haoyao Chen. RA-L and IROS, 2022
Dynamic-VINS is a real-time RGB-D Visual Inertial Odometry system for resource-restricted robots in dynamic environments. It combines object detection and RGB-D cameras for dynamic feature recognition to reduce the computational cost, achieving an effect comparable to semantic segmentation. A competitive localization accuracy and robustness in dynamic environments are shown in a real-time application on resource-restricted platforms, like **HUAWEI Atlas 200DK**.
- **VINS-RGBD-FAST:** Refined version of VINS-RGBD to improve the system's efficiency in resource-constrained embedded platform.
- **SemanticLineRecon:** Semantic line reconstruction with colmap and line3d++.
- **Vision-encoder-based Payload State Estimation for Autonomous MAV With a Suspended Payload:**
Jianheng Liu, Yunfan Ren, Haoyao Chen and Yunhui Liu. IROS, 2021
A novel real-time system for estimating the payload position; the system consists of a monocular fisheye camera and an encoder-based device. A Gaussian fusion-based estimation algorithm is developed to obtain the payload state estimation. Based on the robust payload position estimation, a payload controller is presented to ensure the reliable tracking performance on aggressive trajectories.
- **MatRix:** A extremely interesting prototype developed in 2020 XBOT PARK Smart Product Innovation Boot Camp. An interactive smart carpet, which can achieve infinite splicing through the magnetic suction connector with anti-dull design. MatRix can be used as your home intelligent terminal, game console, decoration and so on. (**Best Design Award**)
- **quad-controller-SE3 & FlightController:** quadrotor controller based on PX4/mavros and SE3 geometric control. And a simulation based on CoppeliaSim.
- **BezierTrajGenerator & MinimumSnapTrajGenerator & MapManager:** Trajectory Generator based on Bezier Curve and Minimum Snap. And a 2D Map Manager for the verification and visualization.