Jianheng Liu

+86 15625293598 • liujianhengchris@qq.com
https://github.com/jianhengLiu • https://jianhengliu.github.io

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 interest lies at **Robotics and Autonomous Systems, Localization and Mapping, Motion Planning** and **NeRF**.
Check out more information and multimedia of my research experiences at https://jianhengliu.github.io.

Education

- **Harbin Institute of Technology (Shenzhnen)** — **Recommended exemption Graduate**
  Control Science and Engineering (Master degree), — *2021/09–Present*
- **Harbin Institute of Technology (Shenzhnen)** — **Rank: 15/70**
  Automation (Bachelor degree), — *2017/09–2021/06*

Publications

- **Active Implicit Reconstruction for Unknown Objects**
  Jianheng Liu*, Dongyu Yan* and Haoyao Chen. **Submitted to ICRA, 2023**
- **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**
- **Sampling-Based View Planning for MAVs in Active Visual-inertial State Estimation**
  Zhengyu Hua, Jiabi Sun, Fengyu Quan, Haoyao Chen, **Jianheng Liu**, Yunhui Liu. **IROS, 2022**
- **Vision-encoder-based Payload State Estimation for Autonomous MAV With a Suspended Payload**
  Jianheng Liu*, Yunfan Ren*, Haoyao Chen and Yunhui Liu. **IROS, 2021**
  * equal contribution

Honor & Awards

- Graduate Academic Scholarship of First-class (2021-2022), Undergraduate Academic Scholarship of First-class (2019-2020), Third-class (2018-2019), Second-class (2017-2018)
- National ROBOCON competition of First Price (2020), Second Price (2019)
- 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)
- the Second Prize for 2018 National English Competition for College Students
- the Grand Prize for the second International Youth Drone Competition

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. The metric is also differentiable, resulting in smoother and better view selection. An implicit reconstruction method for bounded objects considering free space is also proposed to use information fully.
- **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 (VIO) system for resource-restricted robots in dynamic environments. It is extended based on VINS-Mono. It combines object detection and RGB-D cameras for dynamic feature recognition to reduce the computational cost, achieving an effect comparable to semantic segmentation. It adopts grid-based feature detection and proposes a fast and efficient method to extract high-quality FAST feature points. A competitive localization accuracy and robustness in dynamic environments are shown in a real-time application on resource-restricted platforms.
- **VINS-RGBD-FAST:** VINS-RGBD-FAST is a SLAM system based on VINS-RGBD. I do refinements both in frontend and backend to improve the system's efficiency in resource-constrained embedded paltform, like HUAWEI Atlas 200DK, Raspberry Pi. Furthermore, we made this system as a module and applied it into UAV as a state feedback to track a generative trajectory stably.
- **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 a 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 extreme 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.
- **quad-controller-SE3 & FlightController:** quadrotor controller based on PX4/mavros and SE3 geometric control. And a simulation based on CoppeliaSim software to compute the desired thrust and torque of quadroter according to dynamic modelling, and use distribution matrix to decide the motor's speed.
- **BezierTrajGenerator & MinimumSnapTrajGenerator & MapManager:** Trajectory Generator based on Bezier Curve and Minimum Snap for autonomous robot. And I develop a 2D Map Manager for the verification and visualization for different algorithms.