Quanxiang Liu (刘权祥)

Email: immortalqx@gmail.com   Mobile: +86 151 1585 2131

Website: immortalqx.github.io   GitHub: github.com/Immortalqx

Supervisor: Prof. Yuchao Dai (戴玉超)

Research Interests: SLAM, 3D Reconstruction, 3D Gaussian Splatting, 3D Foundation Model

Education

Northwestern Polytechnical University   Bachelor

Software Engineering; GPA: 3.57/4.0, Rank: 21/299 (first six semesters)   *Sep. 2019 – Jun. 2023*

Northwestern Polytechnical University   Master

Information and Communication Engineering; Average Score: 91.23/100   *Sep. 2023 – Present*

Projects and Experience

Autonomous Logistics Drone   *Sep. 2020 – May 2022*

UAV Challenge at the China Robotics Competition in 2020 and 2021

Key Contributions: To address the demand for high-precision, real-time pose estimation in autonomous logistics drones, Open-VINS was deployed on UAVs for precise indoor localization; containerized the system using Docker to simplify environment setup; developed a ROS node called "pose-remap" to convert Open-VINS outputs into the coordinate frame used by the drone system. For more details, see our videos from the 2020 and 2021 competitions.

RoboMaster University AI Challenge   *Sep. 2023 – Nov. 2023*

Intelligent Perception Technology Competition for Unmanned Aerial Vehicles

Key Contributions: Responsible for project scheduling and task allocation; built a physical platform for the drone. Designed and validated algorithms using the official AirSim simulator. Implemented drone control via cascaded PID controller, a decision and planning module splitting tasks into stages and finite state machines, and high-speed robust stereo depth estimation based on Correlate-and-Excite (CoEx). Packaged and deployed competition code using Docker; wrote technical reports and edited video presentations. For more details, visit our technical report video.

Teaching Assistant for CVlife Course Platform   *Dec. 2023 – Present*

Courses on NeRF-based SLAM, 3DGS-based SLAM, and Hands-on 3DGS SLAM Implementation

Key Contributions: Assisted instructors with Q&A support, assignment design and grading, and course material improvements. Familiar with NeRF and 3DGS codebases, as well as SLAM algorithms based on NeRF and 3DGS, including NICE-SLAM, Co-SLAM, and MonoGS.

Pose Estimation with Combined 2D and 3D Information   *Aug. 2024 – Dec. 2024*

Lab Project (High-Precision Mapping under Depth Uncertainty)

Key Contributions: For a set of unordered images, established overlapping relationships by extracting and matching features to generate associated image pairs. Leveraged the 3D Foundation Model (MASt3R) to produce dense point clouds and extract image features without requiring accurate camera intrinsics. Robustly estimated relative poses between image pairs using PnP+RANSAC. Finally, recovered global poses from relative ones via global alignment.

3D Reconstruction Internship   *Dec. 2024 – Present*

KIRI Innovations (Shenzhen) Co., Ltd.

Key Contributions: Addressed the high memory consumption issue in large-scale 3D reconstruction by designing a precise and robust scene partitioning strategy inspired by VastGaussian, which utilizes camera poses to divide and merge sub-scenes, significantly improving reconstruction efficiency and scalability. Enhanced RGB-D reconstruction quality by introducing Prompt Depth Anything to refine noisy and low-quality depth maps, particularly improving the results on data captured by iPhone sensors. In scenarios with limited depth information, combined Structure-from-Motion (SfM) with the 3D foundation model VGGT, using SfM-derived poses and matches to guide and optimize model outputs, achieving dense RGB reconstruction quality comparable to RGB-D pipelines. For more details, visit GeoMaster.

Honors and Awards

- Second Class Scholarship of Northwestern Polytechnical University   Sep. 2024
- First Class Scholarship of Northwestern Polytechnical University   Sep. 2023
- Second Prize in 2023 Unmanned Aerial Vehicle Intelligent Perception Technology Competition (Online)   Dec. 2023
- Second Prize in the 2021 China Robotics Competition Drone Challenge   Apr. 2022
- Guangdong-Hong Kong-Macao Scholarship of Northwestern Polytechnical University   Sep. 2021
- First Class Scholarship of Northwestern Polytechnical University   Sep. 2021
- First Prize of the 22nd National Robotics Championship in the category of practical application of aerial flying robots   Dec. 2020
- Second Prize in the 2020 China Robotics Competition Drone Challenge   Nov. 2020
- Second Class Scholarship of Northwestern Polytechnical University   Sep. 2020

Selected Coursework

Matrix Theory (100)	Computer Vision (100)
Linear Algebra (96)	Machine Learning (99)
Numerical Analysis (95)	Deep Learning and Machine Vision (96)
Mathematical Statistics (94)	Natural Language Processing (90)
Complex Function and Integral Transformation (96)	Software Engineering Document Writing (94)
Engineering Mathematics Analysis I (93)	Software Project Organization and Management (90)
Engineering Mathematics Analysis II (92)	Fundamentals of Compilers (94)
Programming in C (97)	Object-Oriented Software Development (90)
Programming in Python (98)	C Language Programming Experiment (99)

Open-source Contribution

awesome-NeRF-and-3DGS-SLAM   Contributor
A curated collection of resources and implementations for NeRF and 3DGS-SLAM.   **Stars: 1.4k**
Key Contributions: Identified a documentation error and submitted a pull request to correct it.

GeoMaster   Contributor
Advanced geometry enhancement tools for high-resolution 3D modeling.   **Stars: 83**
Key Contributions: Extended the initialization pipeline by adding TSDF-Fusion support to generate improved initial meshes from depth data; integrated Prompt Depth Anything to refine noisy sensor depth and implemented depth alignment to compute scale and shift; incorporated depth-based supervision into the mesh refinement pipeline, replacing NCC with depth as the supervision signal for mesh refinement.

RANSAC   Owner
A RANSAC-based random sampling framework for plane fitting in point clouds.   **Stars: 35**
Key Contributions: Developed the RANSAC framework in C++ and Python, demonstrating 2D line fitting and 3D plane fitting with corresponding test datasets.

Qt-based-LIDAR-mapping-simulator   Owner
A Qt-based simulator for 2D mobile robot mapping using LiDAR.   **Stars: 22**
Key Contributions: Designed and implemented a Qt-based interface to visualize 2D LiDAR scanning and mapping; decoupled logic from the UI for modularity; integrated interactive obstacle insertion and removal for demonstrations.

Skills

Dev Languages: C/C++, Python, Maple

Frameworks: PyTorch, CUDA, ROS, OpenCV, Qt

Tools: Git, Docker, Conda, CMake