Xin Li

+65 86243893
lixin.1997.lixin@gmail.com
lixin97.github.io

Education

Sept. 2018 - Jul. 2021 **Master in Electronics and Communication Engineering**, *Peking University*, Beijing, China.

Sept. 2014 - Jun. 2018 **Bachelor in Measurement and Control Technology and Instruments**, *Northeastern University(CN)*, Qinhuangdao, China.

Experience

Mar. 2021 - Present **SLAM algorithm engineer**, *Gausium Robotics (alias "Gaussian Robotics")*, Singapore.

- Build a robust, efficient, hierarchical vision localization system for robots operating in a large shopping mall from scratch. The system uses a single small network to obtain global and local features of the image, which is also quantized and deployed on the robot. At the same time, the system does not need to build maps in advance. The system updates the map in real-time, eliminating spending time scanning the scene and processing the map in advance. At the same time, the system provides several different geometric pose solutions to provide robust continuous localization results.

Sep. 2021 - Feb. 2022 **Visiting Research , supervisor: Prof. Yuen Chau, IEEE Fellow**, *Singapore University of Technology and Design (SUTD)*, Singapore.

- To improve the localization capability of indoor robots, build a tightly coupled Lidar-Visual-Inertial Odometry that uses multi-sensor data from cameras, IMUs, and lidars, as well as indoor structured plane information.

Sep. 2020 - Mar.2021 **Research Intern, supervisor: Dr. Yang Liu & Dr. Yizhong Zhang**, *Microsoft Research Asia(MSRA)*, Beijing, China.

- Investigate using and integrating IMU information with visual information in the visual SfM system. Build a multi-sensor reconstruction system, and use a single camera and IMU of a mobile phone to reconstruct a supermarket. Finally, output the vectorized map of the supermarket shelves.

Feb. 2019 - Mar. 2020 **Research Intern, supervisor: Dr. Yijia He**, *MEGVII*, Beijing, China.

- Studies the use of geometric features in visual SLAM. Studies the influence of different parameters of 3D point, line and plane features in slam system. Studies how to parameterize RPR (ray point ray) structure in space, and how to construct and optimize the projection error. Designed a tightly-coupled monocular VIO system that utilizes heterogeneous visual features, include points, lines, and planes, as well as their co-planarity constraints. The system can real-time generate semi-dense 3D mesh of the scene at the same time.

Publications

IEEE RA-L 2020 **Co-Planar Parametrization for Stereo-SLAM and VIO**.

Proposed a novel parametrization for co-planar points and lines that unifies the parameters, resulting in an efficient bundle adjustment optimization through the smaller and sparser Hessian matrix. Compared with the traditional method, the proposed method achieves the same accuracy and reduces the time by 30% at the maximum.

Proposed a novel two-stage 3D plane detection strategy only from RGB images, leveraging a neural network based plane segmentation and a robust outlier filtering.

- **Xin Li***, Yanyan Li*, Evin Pinar Örnek, Jinlong Lin and Federico Tombari. "Co-Planar Parametrization for Stereo-SLAM and VIO", IEEE Robotics and Automation Letters (**IEEE RA-L**), 2020. (* equal

contribution)

IROS 2020 **Leveraging Planar Regularities for Point Line Visual-Inertial Odometry**.
Propose a non-iterative plane detection method and a 3D mesh generation method based on sparse points and spatial lines for monocular VIO. Proposed method utilizes structural line to improves the correctness and robustness of plane detection and mesh generation compared to previous methods. Develop a tightly-coupled monocular VIO system that utilizes heterogeneous visual features, include points, lines, and planes, as well as their co-planarity constraints. The richer visual information and spatial constraints between landmarks improve the estimator accuracy and robust.

- **Xin Li***, Yijia He*, Jinlong Lin, Xiao Liu, "Leveraging Planar Regularities for Point Line Visual-Inertial Odometry", IEEE/RSJ international conference on intelligent robots and systems (**IROS**), 2020. (* equal contribution)

Academic Service

- **Reviewer:** ICRA, IROS, IEEE TIM, IEEE RA-L

Research Intersects

- SLAM (Simultaneous Localization and Mapping), 3D Reconstruction, and Scene Understanding

Skills

- **Programming:** C++, Python
- **Library:** PyTorch, ROS
- **Languages:** English(Conversational), Chinese(Native)

References

- **Yijia He** Email: **heyijia2016@gmail.com**
- **Federico Tombari** Email: **tombari@in.tum.de**
- **Yang Liu** Email: **yangliu@microsoft.com**
- **Yuen Chau** Email: **yuenchau@sutd.edu.sg**