Xin Li

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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

Sep. 2021 - Present **Visiting Research Fellow, supervisor: Prof. Chau Yuen, IEEE Fellow**, *Singapore University of Technology and Design (SUTD)*, Singapore.
- Research how to use multiple sensors (camera, IMU, lidar, etc.) in UGV to improve localization accuracy.

Sep. 2020 - Mar.2021 **Research Intern, supervisor: Dr. Yang Liu & Dr. Yizhong Zhang**, *Microsoft Research Asia(MSRA)*, Beijing, China.
- Research how to use IMU information in visual SfM system and integrate it with visual information. Design a multi-sensor vector reconstruction system, which can reconstruct a large supermarket using single camera and IMU of the mobile phone.

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:** IROS2021, TAROS 2021, 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**