

NTU IOT SLAM team entry for HILTI Challenge 2023

Brief overview of the approach

1. Filter or optimization-based (or else)?

It is hybrid approaches. The odometry is based on filter based. Global bundle adjustment is optimization based.

2. Is the method causal? (i.e., does not use information from the future to predict the pose at a given time).

Non-Causal

3. Is bundle adjustment (BA) used? What type of BA, e.g. full BA or sliding window BA?

Full BA is used.

4. Is loop closing used?

No.

5. Exact sensor modalities used.

LIDAR and IMU

Total processing time for each sequence and the used hardware

Sequence	Total Running Time
Site1_handheld_1	680.0
Site1_handheld_2	556.7
Site1_handheld_3	566.7
Site1_handheld_4	983.3
Site1_handheld_5	530.0
Site2_robot_1	699
Site2_robot_2	305
Site2_robot_3	359
Site3_handheld_1	323.3
Site3_handheld_2	493.3
Site3_handheld_3	630.0
Site3_handheld_4	353.3

Hardware: i9 12900 CPU with 64G RAM

Whether the same set of parameters is used throughout all the sequences

No. All sequences use fast Lio 2 to generate trajectory. However, backend optimization method changes from time to time with none/ICP/BALM.

Whether manual alignment was performed for maps/trajectories in the multi-session submission

No

Reference

[1] Xu, Wei, Yixi Cai, Dongjiao He, Jiarong Lin, and Fu Zhang. "Fast-lio2: Fast direct lidar-inertial odometry." *IEEE Transactions on Robotics* 38, no. 4 (2022): 2053-2073.

[2] Dellenbach, Pierre, Jean-Emmanuel Deschaud, Bastien Jacquet, and François Goulette. "CT-ICP: Real-time elastic LiDAR odometry with loop closure." In *2022 International Conference on Robotics and Automation (ICRA)*, pp. 5580-5586. IEEE, 2022.

[3] Liu, Zheng, Xiyuan Liu, and Fu Zhang. "Efficient and Consistent Bundle Adjustment on Lidar Point Clouds." *ICRA 2023*.