## 3.1\_b 3D SLAM task

In this task, we use the **A-LOAM** (3D LiDAR) Algorithm to complete a 3D SLAM Task on the given rosbag *‘<3dlidar.bag>’*. Here we refer this repo[1] to help do the task and directly generate odometry file for **EVO** evaluation.

The process of algorithm implementation can be concluded as:

1. Confirm system requirements: Ubuntu 20.04, ROS Noetic, C++14, CMake: 3.0.2 and above.
2. Install libraries required: Eigen3, PCL1.10, Ceres, evo.
3. Develop the Aloam from repo into catkin\_ws (some modifications are needed which can be found in the [1] *‘README.md’*).
4. Create a folder named *‘txt’*, then copy the ground truth file ‘*00.txt’* into folder and create a empty txt file *‘aloam.txt’* in folder.
5. Launch the Aloam and then play the rosbag *‘<3dlidar.bag>’* at the same time. The *‘aloam.txt’* in the txt file will store the Aloam lidar odometry result after finishing the Aloam algorithm.
6. In *‘txt’* folder, evaluate the performance of the algorithm using EVO command *"evo\_ape kitti 00.txt aloam.txt -r full -va --plot --plot\_mode xz".*

Then, the result of the EVO evaluation of this 3D SLAM task is shown in Figure 3.1.b.

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| Figure 3.1.b 3D SLAM task result |

Notice that in step 3, there are some modifications we did which the README.md do not mention.

* Firstly, it is needed to uncomment the *“//generate the KITTI format trajectory result”* part in the *laserMapping.cpp,* so that theAloam lidar odometry result will be stored in *‘aloam.txt’.*
* Secondly, the ‘*ceres::LocalParameterization’* and ‘*ceres::EigenQuaternionParameterization’* are deprecated in the latest release of Ceres Solver (v 2.1.0) and need to be replaced to *‘ceres::Manifold’* and *‘ceres::QuaternionManifold()‘.*

From the result, it can be seen that the max error value is , the mean error value is and the min error value is . Thus, the performance of this algorithm is not bad.

## Reference

[1] nuslde (2023) aloam\_lidar\_odom\_result\_generate [Source Code] https://github.com/nuslde/aloam\_lidar\_odom\_result\_generate