Aim: Tune the parameters in the relevant configuration files to get Cartographer to work reliably on my data (get the most accurate SLAM and clear pointcloud).

What we have:

1. Rosbag with all topics recorded: 2023-07-21-14-47-00.bag

   Topics: **/bigcircle**: sensor_msgs/LaserScan

        /constraint_list: visualization_msgs/MarkerArray

        /imu: sensor_msgs/Imu

        /landmark_poses_list: visualization_msgs/MarkerArray

        /map: nav_msgs/OccupancyGrid

        /rosout: rosgraph_msgs/Log (3 connections)

        /rosout_agg : rosgraph_msgs/Log

        /scan: sensor_msgs/LaserScan

        /scan_matched_points2: sensor_msgs/PointCloud2

        /smallcircle: sensor_msgs/LaserScan

   **/submap_list**: cartographer_ros_msgs/SubmapList

        /tf: tf2_msgs/TFMessage

        /tf_static: tf2_msgs/TFMessage (4 connections)

        /trajectory_node_list: visualization_msgs/MarkerArray

We've added a mirror at a 45 degree on the side to make the 2D scanning Lidar get information from the third dimension. The /smallcircle topic is the laser reflected by the mirror (frame id: rooflaser), whilst the /bigcircle topic is the rest (frame id: 2Dlaser).
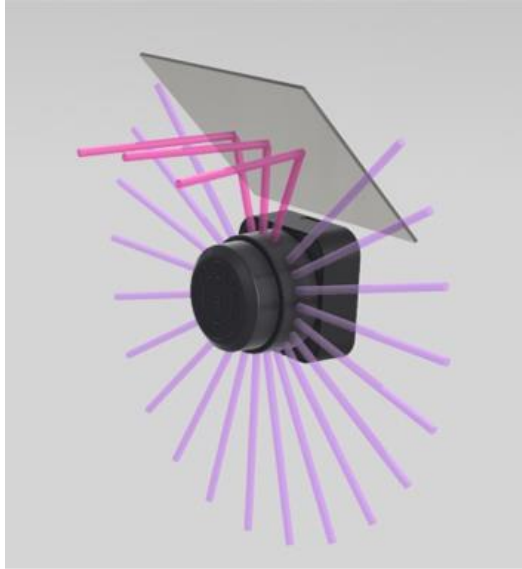
2. The lua files are in: /carto_ws _tune/install_isolated/share/cartographer_ros/configuration_files

3. launch files can be found in: /carto_ws _tune/install_isolated/share/cartographer_ros/launch

Official document can be found: https://google-cartographer-ros.readthedocs.io/en/latest/