# Creating a Lanelet

At this page, we will explain how to create a simple lanelet on your point cloud map. If you didn't have a point cloud map before, please check and follow the steps on the LIO-SAM mapping page for how to create a point cloud map for Autoware.

Creating a Lanelet2

Firstly, we need to import our pointcloud map to Vector Map Builder tool:

1. Please click `File`.

2. Then, click `Import PCD`.

3. Click `Browse` and select your .pcd file.

You will display the point cloud on your Vector Map Builder tool after the upload is complete:
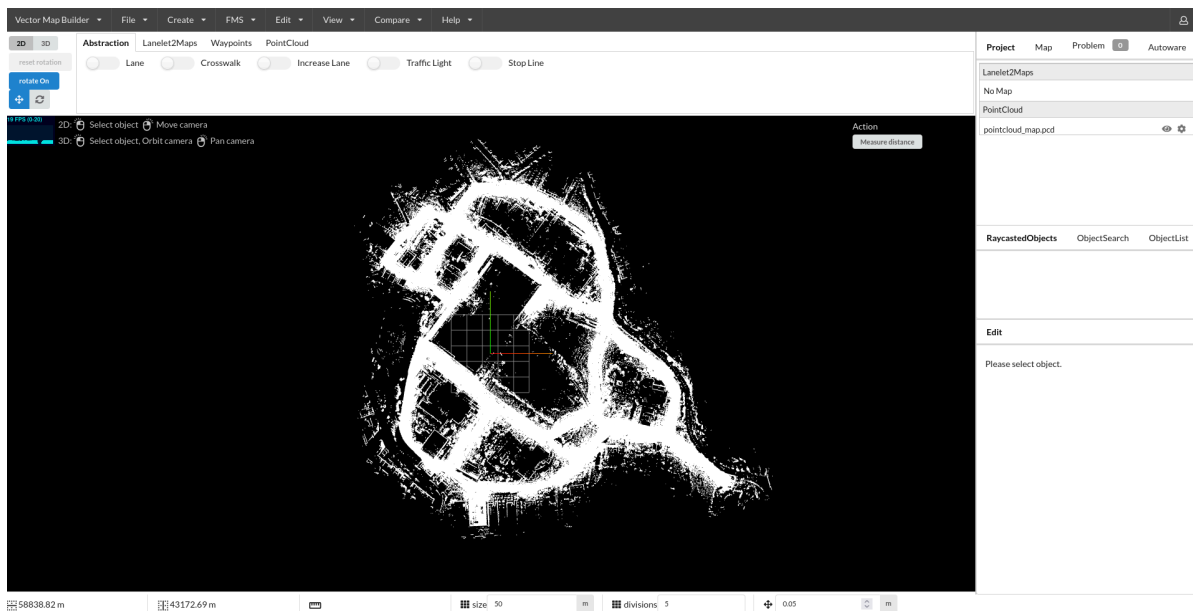
Uploaded pointcloud map file on Vector Map Builder

Now, we are ready to create lanelet2 map on our pointcloud map:

1. Please click `Create`.

2. Then, click `Create Lanelet2Maps` .

3. Please fill your map name

4. Please fill your MGRS zone. (At tutorial_vehicle, MGRS grid zone: 35T - MGRS 100,000-meter square: PF)

5. Click `Create` .

Creating a simple lanelet

In order to create a simple lanelet on your map, please follow these steps:

1. CLick `Lanelet2Maps` on the bar

2. Enable Lanelet mode via selecting `Lanelet` .

3. Then, you can click the pointcloud map to create lanelet.

4. If your lanelet is finished, you can disable `Lanelet` .

5. If you want to change your lanelet width, click `lanelet` --> `Change Lanelet Width` , then you can enter the lanelet width.

Video Demonstration:

TIER IV's Vector Map Builder - Creating a Simple Lanelet - 01

Join two lanelets

In order to join two lanelets, please follow these steps:

1. Please create two distinct lanelet.

2. Select a Lanelet, then press `Shift` and select other lanelet.

3. Now, you can see `Join Lanelets` button, just press it.

4. These lanelets will be joined.

Video Demonstration:

TIER IV's Vector Map Builder - Join Lanelets - 02

Join Multiple lanelets

In order to add (join) two or more lanelets to another lanelet, please follow these steps:

1. Create multiple lanelets.

2. You can join the first two lanelets like the steps before.

3. Please check end points ids of first lanelet.

4. Then you need to change these ids with third lanelet's start point. (Please change with selecting linestring of lanelet)

5. You will see two next lanes of the first lanelet will be appeared.

Video Demonstration:

TIER IV's Vector Map Builder - Join Multiple Lanelets - 03

Change Speed Limit Of Lanelet

In order to change the speed limit of lanelet, please follow these steps:

1. Select the lanelet where the speed limit will be changed

2. Set `speed limit` on the right panel.

Test lanelets with planning simulator

After the completing of creating lanelets, we need to save it. To that please click `File` --> `Export Lanelet2Maps` then download.

After the download is finished, we need to put lanelet2 map and pointcloud map on the same location. The directory structure should be like this:

```
<YOUR-MAP-DIRECTORY>/
 ├ pointcloud_map.pcd
 └ lanelet2_map.osm
```

If your .osm or .pcd map file's name is different from these names, you need to update autoware.launch.xml:

```
  <!-- Map -->
- <arg name="lanelet2_map_file" default="lanelet2_map.osm" description="lanelet2 map file name"/>
+ <arg name="lanelet2_map_file" default="<YOUR-LANELET-MAP-NAME>.osm" description="lanelet2 map file name"/>
- <arg name="pointcloud_map_file" default="pointcloud_map.pcd" description="pointcloud map file name"/>
+ <arg name="pointcloud_map_file" default="<YOUR-POINTCLOUD-MAP-NAME>.pcd" description="pointcloud map file name"/>
```

Now we are ready to launch the planning simulator:

```
ros2 launch autoware_launch planning_simulator.launch.xml map_path:=<YOUR-MAP-FOLDER-DIR> vehicle_model:=<YOUR-VEHICLE-MODEL> sensor_model:=<YOUR-SENSOR-KIT>
```

Example for tutorial_vehicle:

```
ros2 launch autoware_launch planning_simulator.launch.xml map_path:=$HOME/Files/autoware_map/tutorial_map/ vehicle_model:=tutorial_vehicle sensor_model:=tutorial_vehicle_sensor_kit vehicle_id:=tutorial_vehicle
```

1. Click `2D Pose Estimate` button on rviz or press `P` and give a pose for initialization.

2. Click `2D Goal Pose` button on rviz or press `G` and give a pose for goal point.
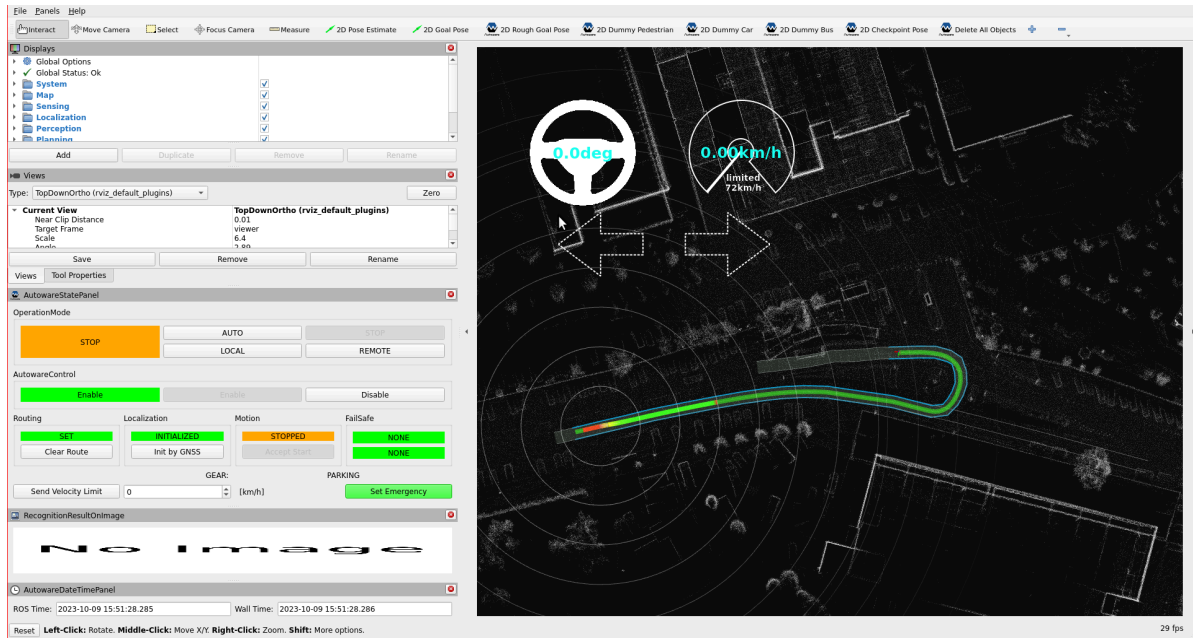
Testing our created vector map with planning simulator