Running SLAM

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Installing slam_toolbox

```
sudo apt install ros-foxy-slam-toolbox
```

Before running slam_toolbox

Make sure the odometry on your car is tuned!

Launching slam_toolbox

- Launch teleop in one window
- Launch slam_toolbox
  - `ros2 launch slam_toolbox online_async_launch.py params_file:=/home/nvidia/f1tenth_ws/src/f1tenth_system/f1tenth_stack/config/f1tenth_online_async.yaml`

Visualization

- Launch rviz2
- Add `/map` by topic
- Add `/graph_visualization` by topic
- On top left corner of rviz, panels – add new panel – add SlamToolBoxPlugin panel
- Once you're done mapping, save the map using the plugin. You can give it a name in the text box next to Save Map. Map will be saved in whichever directory you ran slam_toolbox.

Running Particle Filter

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Installing range_libc

- Clone the repo:
  - `cd`
  - `git clone https://github.com/f1tenth/range_libc.git`
- Install with:
  - `cd range_libc/pywrapper`
  - `sudo WITH_CUDA=ON python setup.py install`

Installing particle filter

- Clone the package
  - `cd /home/nvidia/f1tenth_ws/src`
  - `git clone https://github.com/f1tenth/particle_filter.git`
- Install dependencies
  - `rosdep install -r --from-paths src --ignore-src --rosdistro foxy -y`
- Compile workspace again
  - `cd /home/nvidia/f1tenth_ws && colcon build`
  - `source install/setup.bash`

Running Particle Filter

1. Launch teleop
2. Launch particle filter with:

```
ros2 launch particle_filter localize_launch.py
```

Visualizing

1. Run rviz2
2. Use add by topic, add `map`. In the settings for map, change durability policy under topic to transient local
3. To show the current localization, add `/pf/viz/inferred_pose`
4. Optionally, you can add `/pf/viz/particles` to see the particles

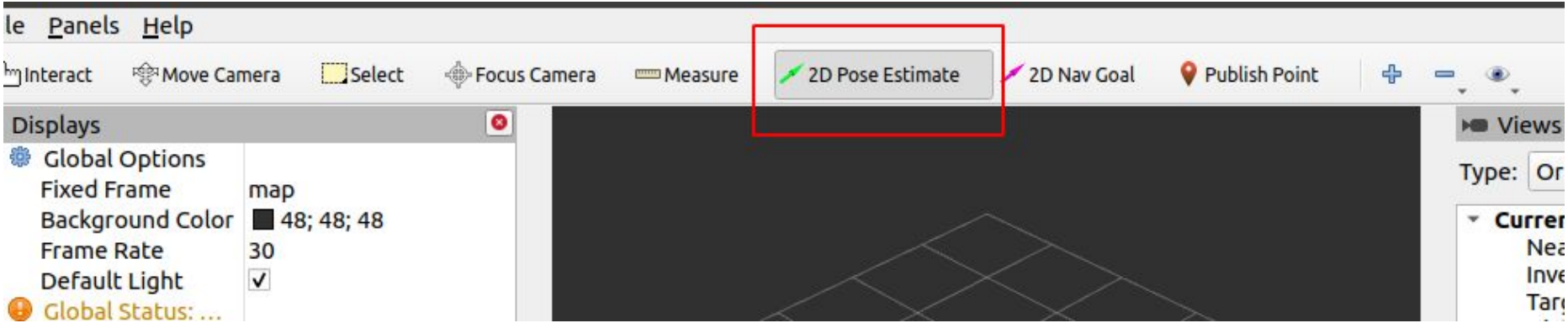
Checking the update frequency

Check the publishing frequency on /pf/viz/inferred_pose. It should be at least 30 Hz.

Changing the map used

1. Put the map files (image+.yaml) in particle_filter/maps
2. Change particle_filter/config/localize.yaml to reflect the map you want to use

Set Initial position



Use the 2D Pose Estimate to set the initial position

For the particle filter