7.ORB_SLAM2 Octomap mapping icon

This routine is implemented on Orin NX and cannot be implemented on a virtual machine. We are only explaining how the process is implemented. If you want to implement this function on your own motherboard, you need to compile the entire feature pack and connect relevant peripherals.

octomap website： http://octomap.github.io/

octomap code： https://github.com/OctoMap/octomap

octomap wiki： http://wiki.ros.org/octomap

octomap_server： http://wiki.ros.org/octomap_server

The operating environment and reference configurations for software and hardware are as follows:

- Reference model: ROSMASTER X3
- Robot hardware configuration: Arm series main control, Silan A1 LiDAR, Dabai_ Dcw2 depth camera
- Robot system: Ubuntu 20.04
- PC virtual machine: Ubuntu (20.04)+ROS2 (Foxy)
- Usage scenario: Use on a relatively clean 2D plane

1.octomap mapping based camera

Enter the Docker container and execute the following launch file on the sub terminal:

1)Start camera

```
ros2 launch orbbec_camera dabai_dcw2.launch.py
```
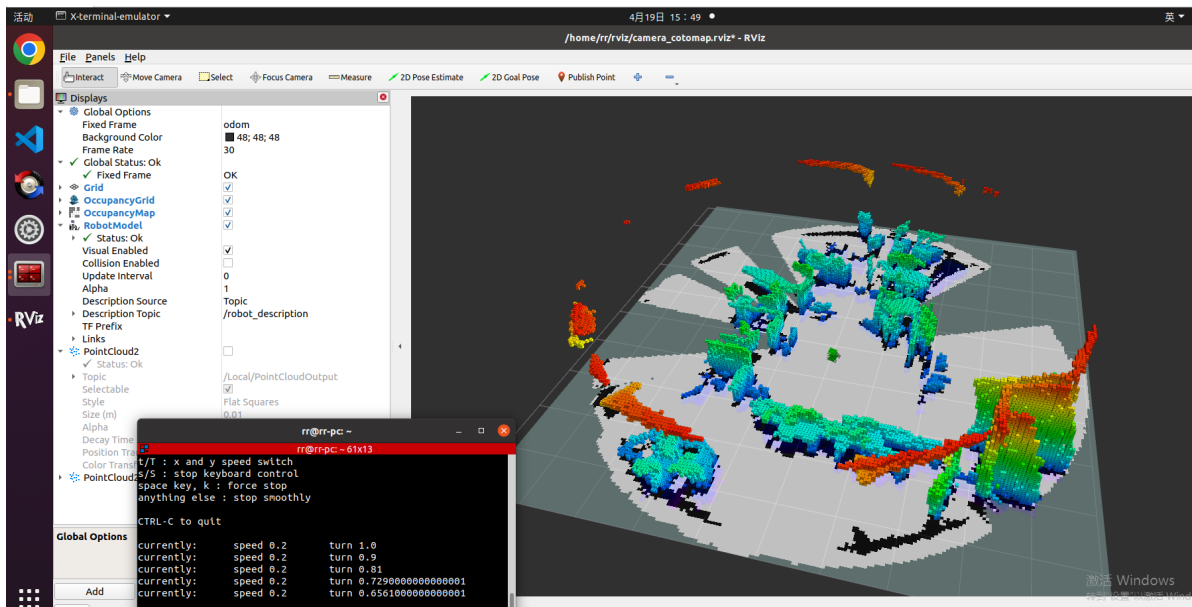
2)Start octomap_ Server mapping

```
ros2 launch yahboomcar_slam camera_octomap_launch.py
```

3)Enable rviz in Docker or Virtual Machine:

```
ros2 launch yahboomcar_slam display_octomap_launch.py
```

4)Using a remote control or keyboard to control the node to slowly move the machine to create a map, losing keyframes may cause the map to fail.

2. octomap mapping based on orbslam andpointcloud_mapping

1)Start camera

```
ros2 launch orbbec_camera dabai_dcw2.launch.py
```

2)Launch orbslam to release camera pose, color and depth maps. Depending on the performance of different controllers, the waiting time here is approximately within 10 seconds

```
ros2 launch yahboomcar_slam orbslam_base_launch.py
```


3)Start octomap_server mapping

```
ros2 launch yahboomcar_slam orbslam_pcl_octomap_launch.py
```

4)Start rviz

```
ros2 launch yahboomcar_slam display_octomap_launch.py
```

5)Using a remote control or keyboard to control the node to slowly move the machine to create a map, losing keyframes may cause the map to fail.
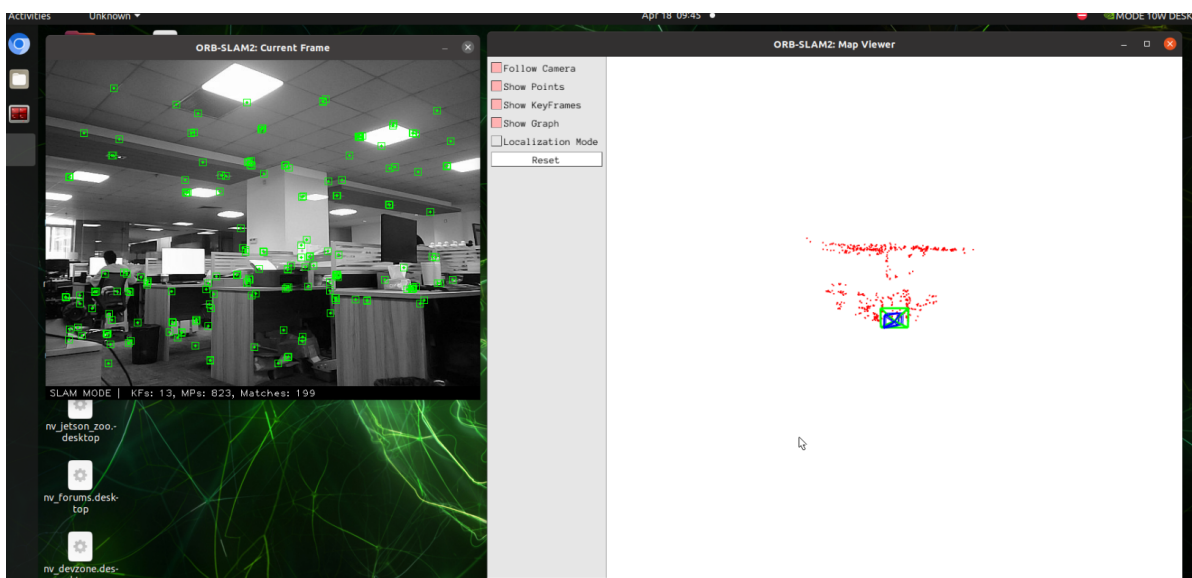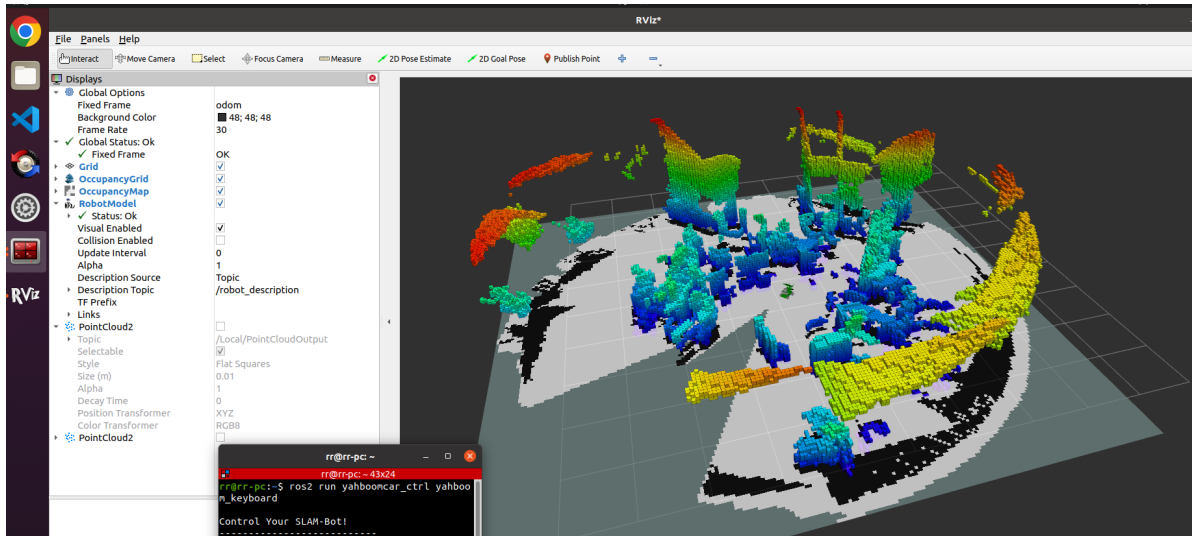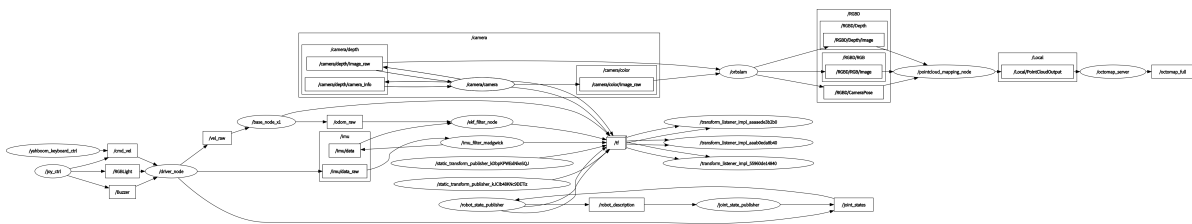

3. Node analysis

1)Display calculation chart

```
rqt_graph
```


2)Details of each node

```
rr@rr-pc:~/rviz$ ros2 node info /pointcloud_mapping_node
/pointcloud_mapping_node
  Subscribers:
    /RGBD/CameraPose: geometry_msgs/msg/PoseStamped
    /RGBD/Depth/Image: sensor_msgs/msg/Image
    /RGBD/RGB/Image: sensor_msgs/msg/Image
    /parameter_events: rcl_interfaces/msg/ParameterEvent
  Publishers:
    /Global/PointCloudOutput: sensor_msgs/msg/PointCloud2
    /Local/PointCloudOutput: sensor_msgs/msg/PointCloud2
    /parameter_events: rcl_interfaces/msg/ParameterEvent
    /rosout: rcl_interfaces/msg/Log
  Service Servers:
    /pointcloud_mapping_node/describe_parameters: rcl_interfaces/srv/DescribeParameters
    /pointcloud_mapping_node/get_parameter_types: rcl_interfaces/srv/GetParameterTypes
    /pointcloud_mapping_node/get_parameters: rcl_interfaces/srv/GetParameters
    /pointcloud_mapping_node/list_parameters: rcl_interfaces/srv/ListParameters
    /pointcloud_mapping_node/set_parameters: rcl_interfaces/srv/SetParameters
    /pointcloud_mapping_node/set_parameters_atomically: rcl_interfaces/srv/SetParametersAtomically
  Service Clients:

  Action Servers:

  Action Clients:
```

```
rr@rr-pc:~/rviz$ ros2 node info /octomap_server
/octomap_server
  Subscribers:
    /Local/PointCloudOutput: sensor_msgs/msg/PointCloud2
    /parameter_events: rcl_interfaces/msg/ParameterEvent
  Publishers:
    /free_cells_vis_array: visualization_msgs/msg/MarkerArray
    /occupied_cells_vis_array: visualization_msgs/msg/MarkerArray
    /octomap_binary: octomap_msgs/msg/Octomap
    /octomap_full: octomap_msgs/msg/Octomap
    /octomap_point_cloud_centers: sensor_msgs/msg/PointCloud2
    /parameter_events: rcl_interfaces/msg/ParameterEvent
    /projected_map: nav_msgs/msg/OccupancyGrid
    /rosout: rcl_interfaces/msg/Log
  Service Servers:
    /octomap_binary: octomap_msgs/srv/GetOctomap
    /octomap_full: octomap_msgs/srv/GetOctomap
    /octomap_server/clear_bbox: octomap_msgs/srv/BoundingBoxQuery
    /octomap_server/describe_parameters: rcl_interfaces/srv/DescribeParameters
    /octomap_server/get_parameter_types: rcl_interfaces/srv/GetParameterTypes
    /octomap_server/get_parameters: rcl_interfaces/srv/GetParameters
    /octomap_server/list_parameters: rcl_interfaces/srv/ListParameters
    /octomap_server/reset: std_srvs/srv/Empty
    /octomap_server/set_parameters: rcl_interfaces/srv/SetParameters
    /octomap_server/set_parameters_atomically: rcl_interfaces/srv/SetParametersAtomically
  Service Clients:

  Action Servers:

  Action Clients:
```

3)TF transformation

```
ros2 run tf2_tools view_frames.py
```

view_frames Result

Recorded at time: 1681892406.7783873

odom

Broadcaster: default_authority
Average rate: 12.936
Buffer length: 4.638
Most recent transform: 1681892406.642514
Oldest transform: 1681892402.004252

Broadcaster: default_authority
Average rate: 10000.0
Buffer length: 0.0
Most recent transform: 0.0
Oldest transform: 0.0

base_footprint

world

Broadcaster: default_authority
Average rate: 10000.0
Buffer length: 0.0
Most recent transform: 0.0
Oldest transform: 0.0

base_link

Broadcaster: default_authority
Average rate: 15.434
Buffer length: 5.094
Most recent transform: 1681892406.739242
Oldest transform: 1681892401.645015

Broadcaster: default_authority
Average rate: 15.434
Buffer length: 5.094
Most recent transform: 1681892406.739242
Oldest transform: 1681892401.645015

Broadcaster: default_authority
Average rate: 10000.0
Buffer length: 0.0
Most recent transform: 0.0
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Most recent transform: 0.0
Oldest transform: 0.0

Broadcaster: default_authority
Average rate: 10000.0
Buffer length: 0.0
Most recent transform: 0.0
Oldest transform: 0.0

Broadcaster: default_authority
Average rate: 10.209
Buffer length: 4.8
Most recent transform: 1681892406.720795
Oldest transform: 1681892401.920969

Broadcaster: default_authority
Average rate: 10.209
Buffer length: 4.8
Most recent transform: 1681892406.720795
Oldest transform: 1681892401.920969

back_left_wheel

back_right_wheel

imu_link

camera_link

laser_link

front_left_wheel

front_right_wheel

Broadcaster: default_authority
Average rate: 10000.0
Buffer length: 0.0
Most recent transform: 0.0
Oldest transform: 0.0

Broadcaster: default_authority
Average rate: 20.25
Buffer length: 4.741
Most recent transform: 1681892406.722019
Oldest transform: 1681892401.981179

Broadcaster: default_authority
Average rate: 10.125
Buffer length: 4.741
Most recent transform: 1681892406.722019
Oldest transform: 1681892401.981179

camera

camera_color_frame

camera_depth_frame

Broadcaster: default_authority
Average rate: 10.125
Buffer length: 4.741
Most recent transform: 1681892406.722019
Oldest transform: 1681892401.981179

Broadcaster: default_authority
Average rate: 10.125
Buffer length: 4.741
Most recent transform: 1681892406.722019
Oldest transform: 1681892401.981179

camera_color_optical_frame

camera_depth_optical_frame