[Robot navagation]

[Ilamparidi sankar]

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[03/09/2021]

The gole of the project is to simplify the time consiption for the bigeners in ROS navigation

I have used ros noetic and turtlebot3 for the project

for more information about the rules

1.Setup gazebo simulation

2.turtlebot robot location

3.Localization & Mapping

4.Navigation

5.python script to automate navigation

1.setup gazebo simulation
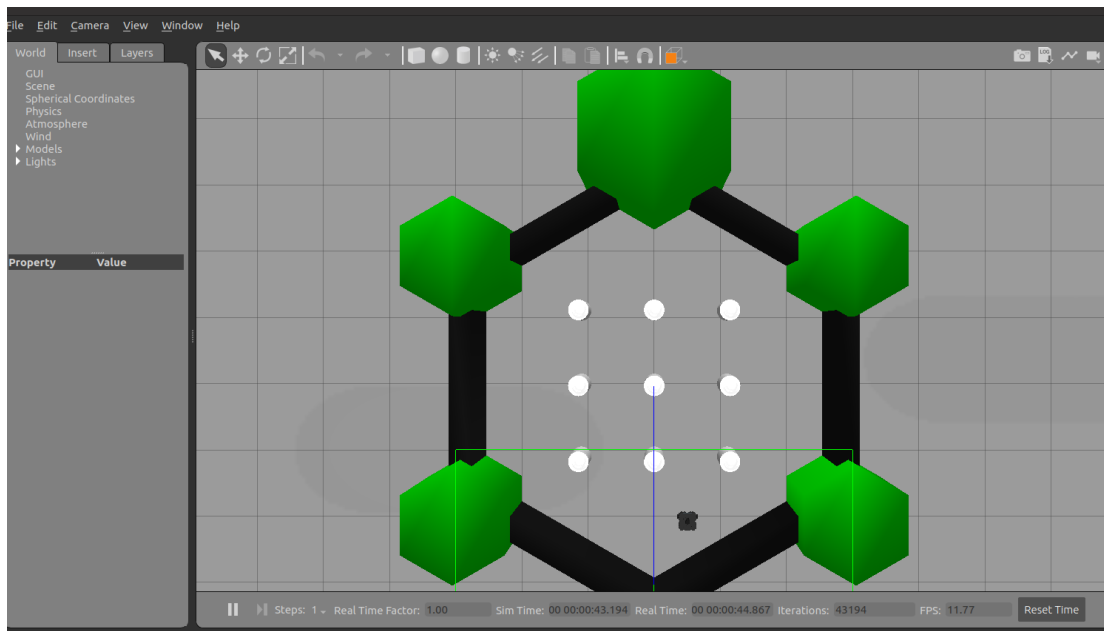
For my project I have set up turtlebot3 gazebo simulation

Install simulation package

$ cd ~/catkin_ws/src/

$ git clone -b noetic-devel https://github.com/ROBOTIS-GIT/turtlebot3_simulations.git

$ cd ~/catkin_ws && catkin_make

Like this the simulater will be appeired

TurtleBot3 World

$ export TURTLEBOT3_MODEL=waffle

$ roslaunch turtlebot3_gazebo turtlebot3_world.launch

To operate turtlebot3

$ roslaunch turtlebot3_teleop turtlebot3_teleop_key.launch

To check the simulater launch the key_bord teleop to move the robot

2. Turtlebot robot localition

This is the way to create your own locatization package

cd catkin_ws/src

catkin_create_pkg turtlebot3_localization

cd robot_localization_turtlebot3

mkdir config

touch ekdf_template.yaml

mkdir launch

touch start_filter.launch

In the ekdf template.ymal

Downlode ekdf template.ymal and start_filter.launch file from my repo

cd catkin_ws

catkin_make

to check your odomantere

rostopic echo -n1 /odom

```
arunsankar@arunsankar-VPCZ13A7E:~$ rostopic echo -n1 /odom
header:
  seq: 869
  stamp:
    secs: 29
    nsecs: 194000000
  frame_id: "odom"
child_frame_id: "base_footprint"
pose:
  pose:
    position:
      x: -1.9999990235845904
      y: -0.4999829747251726
      z: -0.0010073991465241253
    orientation:
      x: -1.7457726636969786e-06
      y: 0.0015896503137144483
      z: 5.287608389496763e-05
      w: 0.9999987351056763
  covariance: [1e-05, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 1e-05, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 10000000000
00.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 1000000000000.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 1000000000000.0,
0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.001]
twist:
  twist:
    linear:
      x: 6.411783854264735e-07
      y: 1.1838443574534952e-06
      z: 0.0
    angular:
      x: 0.0
      y: 0.0
      z: 7.676495426049322e-06
  covariance: [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0,
0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0]
---
arunsankar@arunsankar-VPCZ13A7E:~$
```

and to check the package

roslaunch turtlebot3_localization start_filter.launch

```
arunsankar@arunsankar-VPCZ13A7E:~$ roslaunch turtlebot3_localization start_filter.launch
... logging to /home/arunsankar/.ros/log/8508768c-0d60-11ec-a389-2798b68f2291/roslaunch-arunsankar-V
PCZ13A7E-5050.log
Checking log directory for disk usage. This may take a while.
Press Ctrl-C to interrupt
Done checking log file disk usage. Usage is <1GB.

started roslaunch server http://arunsankar-VPCZ13A7E:46001/

SUMMARY
========

PARAMETERS
 * /ekf_localization/base_link_frame: base_link
 * /ekf_localization/frequency: 50
 * /ekf_localization/imu0: /imu/data
 * /ekf_localization/imu0_config: [False, False, Fa...
 * /ekf_localization/imu0_differential: False
 * /ekf_localization/initial_estimate_covariance: ['1e-9', 0, 0, 0,...
 * /ekf_localization/odom0: /noisy_odom
 * /ekf_localization/odom0_config: [True, True, Fals...
 * /ekf_localization/odom0_differential: False
 * /ekf_localization/odom_frame: odom
 * /ekf_localization/process_noise_covariance: [0.05, 0, 0, 0, 0...
 * /ekf_localization/publish_tf: flase
 * /ekf_localization/two_d_mode: True
 * /ekf_localization/world_frame: odom
 * /rosdistro: noetic
 * /rosversion: 1.15.11

NODES
  /
    ekf_localization (robot_localization/ekf_localization_node)

ROS_MASTER_URI=http://localhost:11311
```

3.Localization & Mapping

Run slam node

$ roscore

$ export TURTLEBOT3_MODEL=burger

$ roslaunch turtlebot3_slam turtlebot3_slam.launch

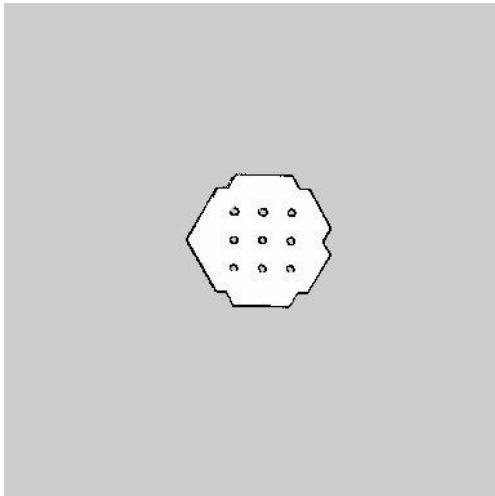Run Teleoperation Node(to move your robot using keybord)

$ roslaunch turtlebot3_teleop turtlebot3_teleop_key.launch

map_update_intrerval

save the mape

$ rosrun map_server map_saver -f ~/map (f is the folder location)

4.Navigation
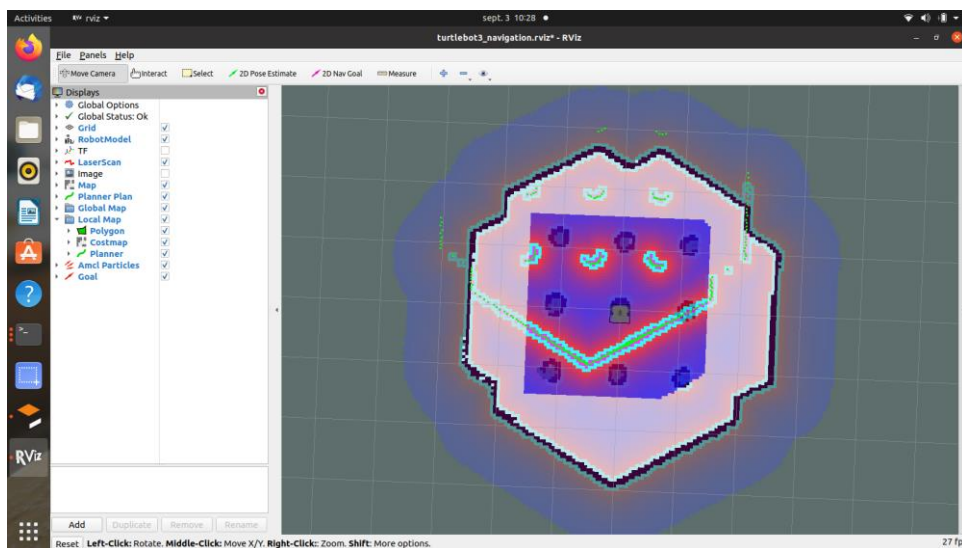
$ roscore

$ export TURTLEBOT3_MODEL=waffle

$ roslaunch turtlebot3_navigation turtlebot3_navigation.launch map_file:=$HOME/map.yaml

set navigation goal

5.python script to automate navigation

roscore

cd catkin_ws

$ roslaunch turtlebot3_navigation turtlebot3_navigation.launch map_file:=$HOME/map.yaml

$ rosrun nav paridi.py

This is for the automatic navigation