ROS Task Documentation – Exercises

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Exercise 1:

1.)

- Created ~/git and ~/Workspaces directories.
- Under ~/Workspaces directory, created a directory called smb_ws -> src.
- Extracted the zip folder into ~/git directory.
- Created a symlink (`ln -s ........`) under the ~/Workspaces/smb_ws/src directory.

```
swaminathan@swaminathan-ASUS-TUF-Dash-F15-FX517ZM-FX517ZM:~$ mkdir Workspaces
swaminathan@swaminathan-ASUS-TUF-Dash-F15-FX517ZM-FX517ZM:~$ ls
catkin_ws  Documents  Music     Public  Templates  Workspaces
Desktop    Downloads  Pictures  snap    Videos
swaminathan@swaminathan-ASUS-TUF-Dash-F15-FX517ZM-FX517ZM:~$ cd Workspaces
swaminathan@swaminathan-ASUS-TUF-Dash-F15-FX517ZM-FX517ZM:~/Workspaces$ mkdir smb_ws/src
mkdir: cannot create directory ‘smb_ws/src’: No such file or directory
swaminathan@swaminathan-ASUS-TUF-Dash-F15-FX517ZM-FX517ZM:~/Workspaces$ mkdir -p smb_ws/src
swaminathan@swaminathan-ASUS-TUF-Dash-F15-FX517ZM-FX517ZM:~/Workspaces$ ls
smb_ws
swaminathan@swaminathan-ASUS-TUF-Dash-F15-FX517ZM-FX517ZM:~/Workspaces$ cd smb_ws/
swaminathan@swaminathan-ASUS-TUF-Dash-F15-FX517ZM-FX517ZM:~/Workspaces/smb_ws$ ls
src
swaminathan@swaminathan-ASUS-TUF-Dash-F15-FX517ZM-FX517ZM:~/Workspaces/smb_ws$ cd ..
swaminathan@swaminathan-ASUS-TUF-Dash-F15-FX517ZM-FX517ZM:~/Workspaces$ cd .
swaminathan@swaminathan-ASUS-TUF-Dash-F15-FX517ZM-FX517ZM:~/Workspaces$ cd
swaminathan@swaminathan-ASUS-TUF-Dash-F15-FX517ZM-FX517ZM:~$ mkdir git
swaminathan@swaminathan-ASUS-TUF-Dash-F15-FX517ZM-FX517ZM:~$ ls
catkin_ws  Documents  git     Pictures  snap       Videos
Desktop    Downloads  Music   Public    Templates  Workspaces
```

Errors and Fixes:

Resources searched through:
https://stackoverflow.com/questions/41234957/catkin-command-not-found
https://github.com/NelsenEW/eth-zurich-solution
(For the latter link, I did not go through the rest of the solution. The link was strictly used for finding out the dependencies)

- catkin command was not recognized.

Fix: `sudo apt-get install python3-catkin-tools`

- hector_gazebo_plugins Cmake error.

Fix: Had to install a few dependencies -

```
sudo apt install -y ros-<distro>-hector-gazebo-plugins \
                    ros-<distro>-velodyne \
                    ros-<distro>-velodyne-description \
                    ros-<distro>-velodyne-gazebo-plugins \
                    ros-<distro>-pointcloud-to-laserscan \
                    ros-<distro>-twist-mux
```

```
NOTE: Forcing CMake to run for each package.
--------------------------------------------------------------------------------
[build] Found 9 packages in 0.0 seconds.
[build] Updating package table.
Starting  >>> catkin_tools_prebuild
Finished  <<< catkin_tools_prebuild                [ 1.0 seconds ]
Starting  >>> hector_gazebo_plugins
Finished  <<< hector_gazebo_plugins                [ 12.0 seconds ]
Starting  >>> smb_description
Finished  <<< smb_description                      [ 1.3 seconds ]
Starting  >>> smb_control
Finished  <<< smb_control                          [ 1.2 seconds ]
Starting  >>> smb_gazebo
Finished  <<< smb_gazebo                           [ 8.4 seconds ]
[build] Summary: All 5 packages succeeded!
[build]   Ignored:   5 packages were skipped or are skiplisted.
[build]   Warnings:  None.
[build]   Abandoned: None.
[build]   Failed:    None.
[build] Runtime: 24.0 seconds total.
[build] Note: Workspace packages have changed, please re-source setup files to use them.
```

- Sourced the setup file.
- cd to the smb_commons directory through src/
- roslaunch smb_gazebo smb_gazebo.launch

2.)

rosnode

```
swaminathan@swaminathan-ASUS-TUF-Dash-F15-FX517ZM-FX517ZM:~$ rosnode list
/base_controller_spawner
/gazebo
/gazebo_gui
/pointcloud_to_laserscan
/rosout
/smb_robot_state_publisher
/twist_mux
```

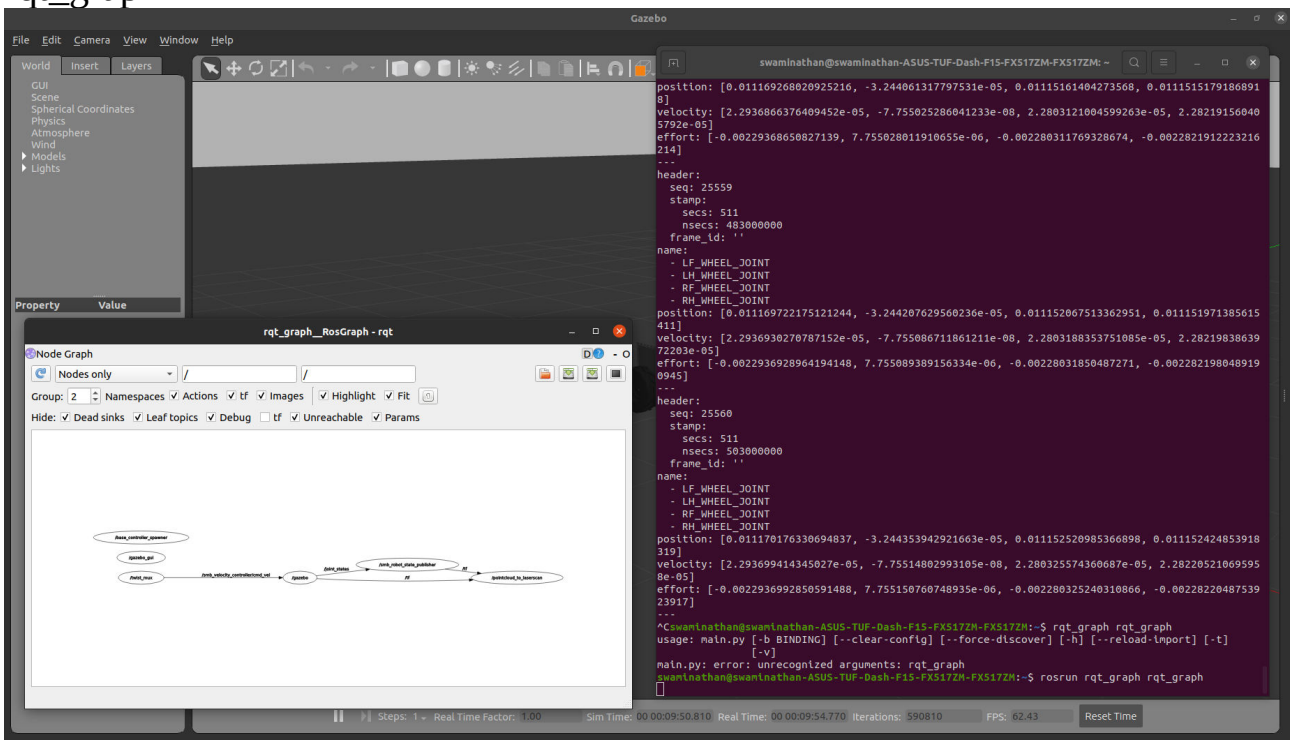
rostopic

```
swaminathan@swaminathan-ASUS-TUF-Dash-F15-FX517ZM-FX517ZM:~$ rostopic list
/clock
/cmd_vel
/diagnostics
/e_stop
/gazebo/link_states
/gazebo/model_states
/gazebo/parameter_descriptions
/gazebo/parameter_updates
/gazebo/performance_metrics
/gazebo/set_link_state
/gazebo/set_model_state
/gazebo_ros_control/pid_gains/LF_WHEEL_JOINT/parameter_descriptions
/gazebo_ros_control/pid_gains/LF_WHEEL_JOINT/parameter_updates
/gazebo_ros_control/pid_gains/LH_WHEEL_JOINT/parameter_descriptions
/gazebo_ros_control/pid_gains/LH_WHEEL_JOINT/parameter_updates
/gazebo_ros_control/pid_gains/RF_WHEEL_JOINT/parameter_descriptions
/gazebo_ros_control/pid_gains/RF_WHEEL_JOINT/parameter_updates
/gazebo_ros_control/pid_gains/RH_WHEEL_JOINT/parameter_descriptions
/gazebo_ros_control/pid_gains/RH_WHEEL_JOINT/parameter_updates
/imu0
/imu0/accel/parameter_descriptions
/imu0/accel/parameter_updates
/imu0/bias
/imu0/rate/parameter_descriptions
/imu0/rate/parameter_updates
/imu0/yaw/parameter_descriptions
/imu0/yaw/parameter_updates
/joint_states
/joy_teleop/cmd_vel
/odom
/rosout
/rosout_agg
/rslidar_points
/scan
/smb_velocity_controller/cmd_vel
/smb_velocity_controller/odom
/smb_velocity_controller/parameter_descriptions
/smb_velocity_controller/parameter_updates
/tf
/tf_static
/twist_marker_server/cmd_vel
```

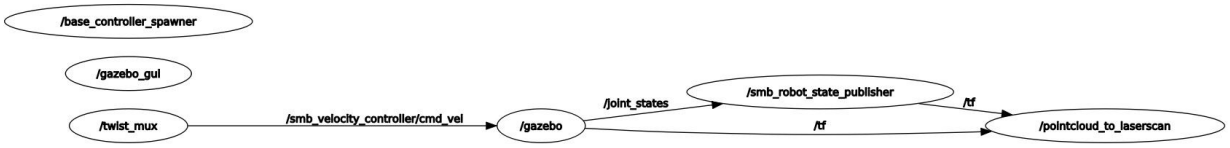
rostopic echo clock

```
^Cswaminathan@swaminathan-ASUS-TUF-Dash-F15-FX517ZM-FX517ZM:~$ rostopic echo clock
clock:
  secs: 378
  nsecs: 126000000
---
clock:
  secs: 378
  nsecs: 127000000
---
clock:
  secs: 378
  nsecs: 128000000
---
clock:
  secs: 378
  nsecs: 129000000
---
clock:
  secs: 378
  nsecs: 130000000
---
```

rqt_graph



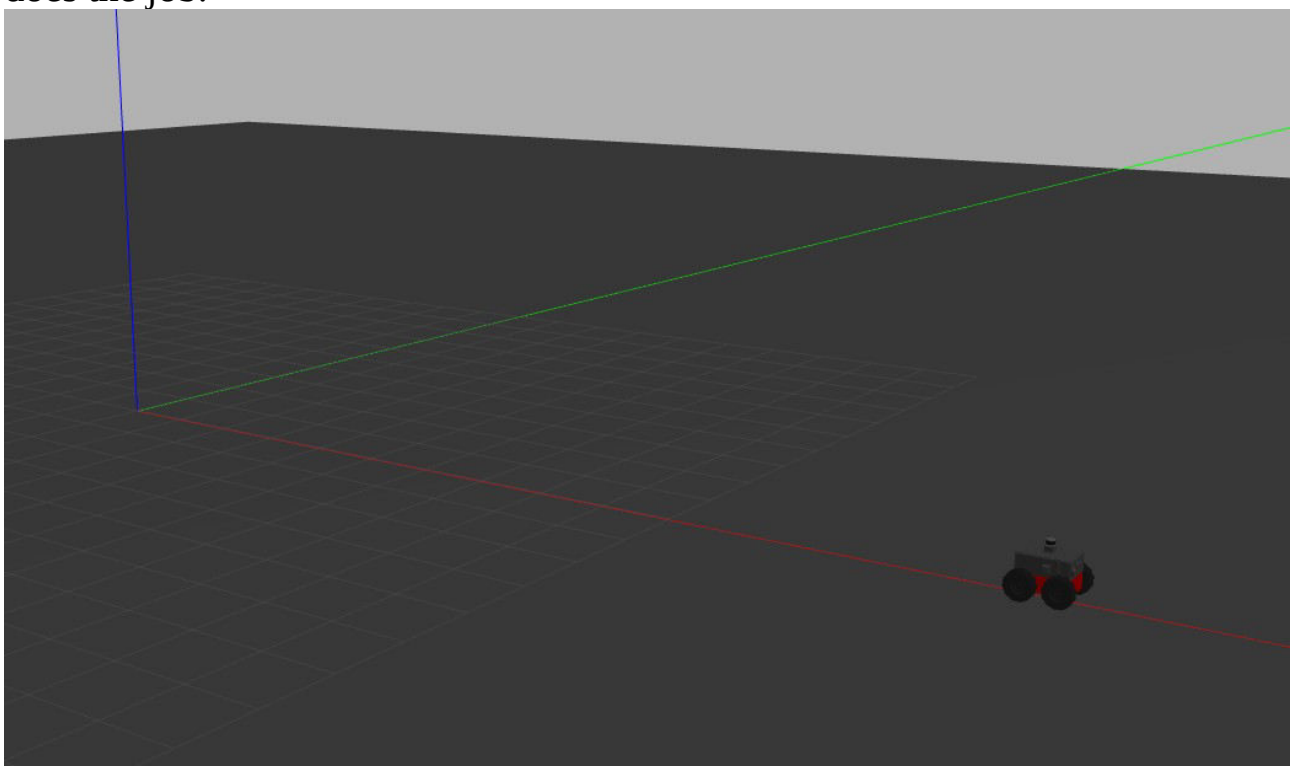
rqt_graph enlarged



3.) Command a desired velocity:

```
swaminathan@swaminathan-ASUS-TUF-Dash-F15-FX517ZM-FX517ZM:~$ rostopic pub /cmd_vel geometry_msgs
/Twist '[500.0 , 0.0 , 0.0]' '[5.0 , 0.0 , 0.0]'
publishing and latching message. Press ctrl-C to terminate
^Cswaminathan@swaminathan-ASUS-TUF-Dash-F15-FX517ZM-FX517ZM:~$ rostopic pub /cmd_vel geometry_ms
gs/Twist '[0.0 , 0.0 , 0.0]' '[5.0 , 0.0 , 0.0]'
publishing and latching message. Press ctrl-C to terminate
```

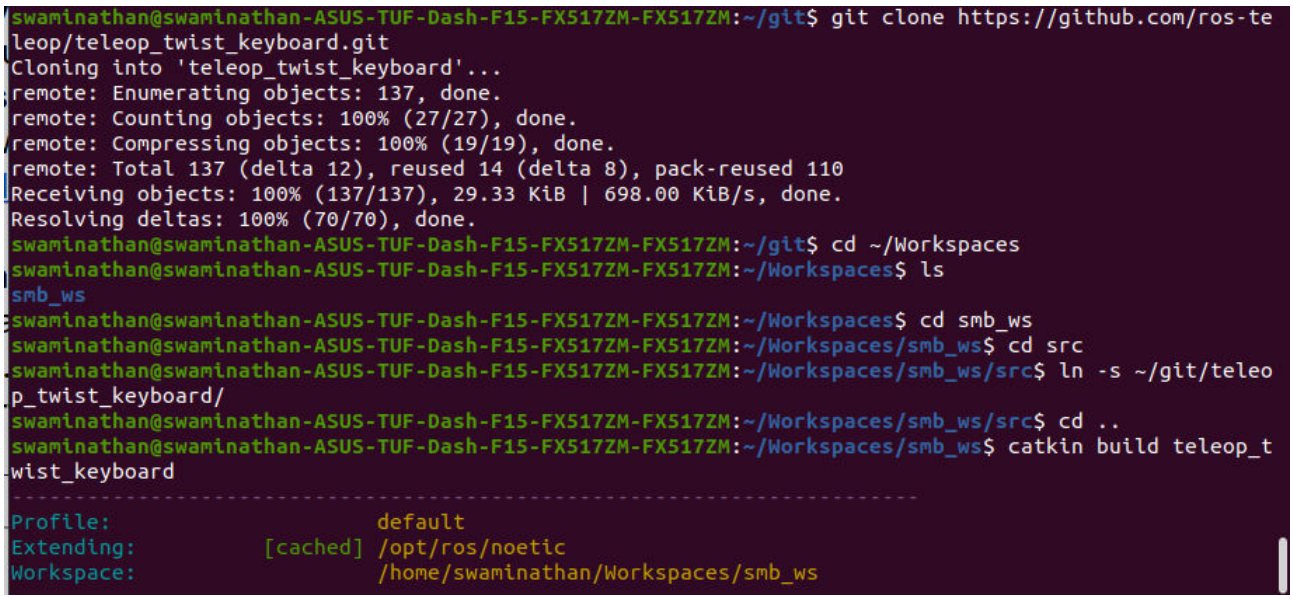
Errors faced:
Looking at the rqt_graph, I had tried to publish to smv_velocity_controller/cmd_vel. However, apparently, publishing to cmd_vel does the job.



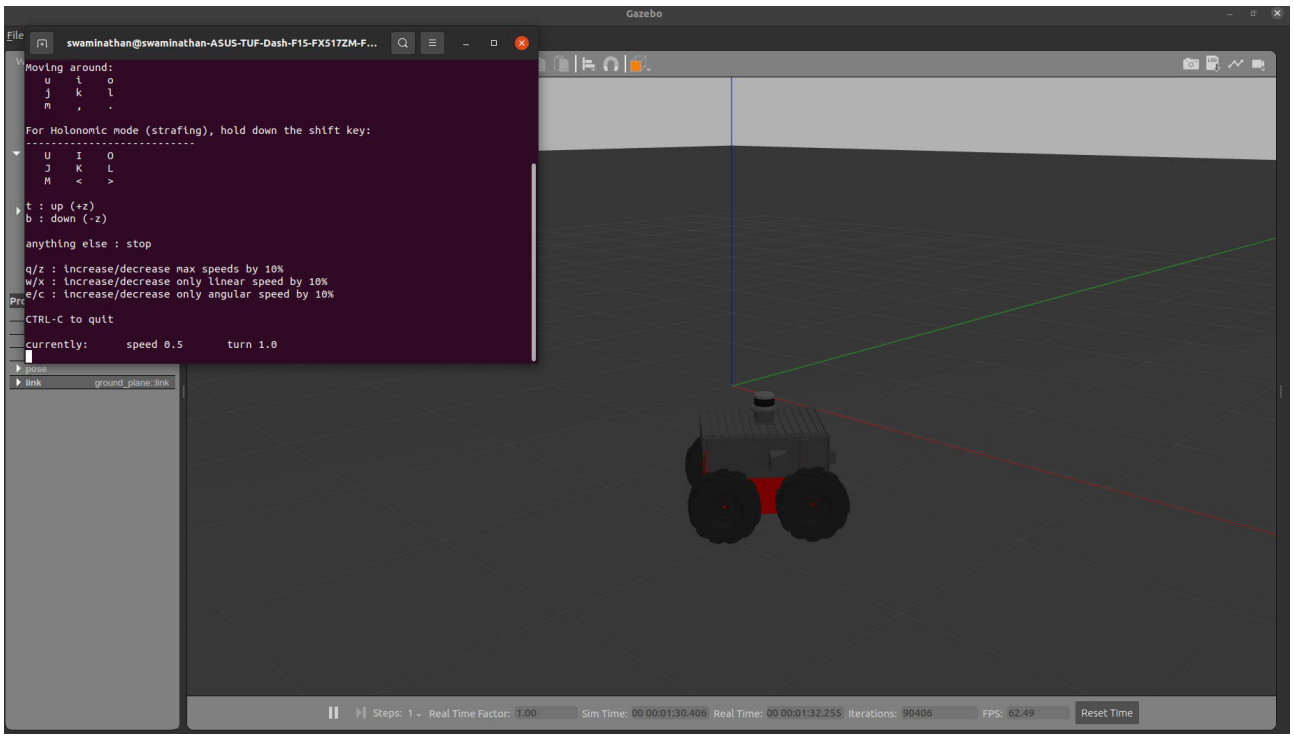
4.)

Resource: https://github.com/ros-teleop/teleop_twist_keyboard

- teleop_twist_keyboard was cloned
- it was compiled through catkin build in the workspace



Errors and Fixes:
teleop_twist_keyboard was not recognized as a package. This is because while opening a new terminal, the setup.bash is not sourced. So we have to source it each time.



5.)

- Created a new .launch file in src

changed.launch | smb_gazebo.launch

```
<?xml version="1.0" encoding="utf-8"?>

<launch>
        <include file = "$(find smb_gazebo)/launch/smb_gazebo.launch">
                <arg name = "world_file" value = "$(find smb_gazebo)/worlds/-
big_map_summer_school.world"/>
        </include>
</launch>
```

Errors and Fixes:

- The gazebo simulator for some reason (*) does not display world files that are out of the directory of src. (Even after providing the absolute path). So I have used the world file inside the worlds folder present in the src/smb_gazebo directory. World files can also be pasted here from other folders and run similarly.