

## Ch2 URDF 10\_9\_2022

Alias foxy or noetic

```
harman@harman-VirtualBox:~$ noetic
```

ROS\_DISTRO was set to 'foxy' before. Please make sure that the environment does not mix paths from different distributions.

```
harman@harman-VirtualBox:~$ gedit .bashrc
```

```
harman@harman-VirtualBox:~$ source ~/catkin_ws/devel/setup.bash
```

```
harman@harman-VirtualBox:~$ roscd ros_robotics
```

```
harman@harman-VirtualBox:~/catkin_ws/src/ros_robotics$ ls
```

```
CMakeLists.txt launch package.xml urdf urdf.rviz worlds
```

```
harman@harman-VirtualBox:~$ rospack list | grep state
```

```
joint_state_controller /opt/ros/noetic/share/joint_state_controller
```

```
joint_state_publisher /opt/ros/noetic/share/joint_state_publisher
```

```
joint_state_publisher_gui /opt/ros/noetic/share/joint_state_publisher_gui
```

```
robot_state_publisher /opt/ros/noetic/share/robot_state_publisher
```

```
NOTE: ROBOT_STATE AND JOINT_STATE
```

```
harman@harman-VirtualBox:~$ roscd ros_robotics
```

```
roscd: No such package/stack 'ros_robotics' No Source – NO dice
```

```
harman@harman-VirtualBox:~$ source ~/catkin_ws/devel/setup.bash
```

```
harman@harman-VirtualBox:~$ roscd ros_robotics
```

```
harman@harman-VirtualBox:~/catkin_ws/src/ros_robotics$ ls
```

```
CMakeLists.txt launch package.xml urdf urdf.rviz worlds
```

```
harman@harman-VirtualBox:~/catkin_ws/src/ros_robotics$ cd launch; ls
```

```
ddrobot_gazebo.launch ddrobot_rviz.launch ddrobot_rviz_launch_bak
```

Launch File Page 45 Modified for Noetic

```
harman@harman-VirtualBox:~/catkin_ws/src/ros_robotics/launch$ gedit ddrobot_rviz.launch
```

```
<launch>
```

```
<!-- values passed by command line input The model i.e. dd_robotx.urdf-->
```

```
<arg name="model" />
```

```
<!-- <arg name="gui" default="False" /> 7/30/21 Put gui:=True on Command Line-->
```

```
<!-- set these parameters on Parameter Server -->
```

```
<param name="robot_description" textfile="$(find ros_robotics)/urdf/$(arg model)" />
```

```
<param name="use_gui" value="$(arg gui)" />
```

```
<!-- Start 3 nodes: joint_state_publisher_gui, robot_state_publisher and rviz -->
```

```
<node name="joint_state_publisher_gui" pkg="joint_state_publisher_gui"
```

```
type="joint_state_publisher_gui" />
```

```

<node name="robot_state_publisher" pkg="robot_state_publisher"
  type="robot_state_publisher" />
<!-- state_publisher changed to robot_state_publisher -->

<node name="rviz" pkg="rviz" type="rviz" args="-d $(find ros_robotics)/urdf.rviz" required="true"
/>
<!-- (required = "true") if rviz dies, entire roslaunch will be killed -->
</launch>

```

(For Noetic – change joint\_state\_publisher to joint\_state\_publisher\_gui -  
change state\_publisher to robot\_state\_publisher

`state_publisher` was a deprecated alias for the node named `robot_state_publisher`. It was removed in [https://github.com/ros/robot\\_state\\_pu...](https://github.com/ros/robot_state_pu...) which is included in the ROS Noetic release of that package. Change `type="state_publisher"` to `type="robot_state_publisher"`

<https://automaticaddison.com/robot-state-publisher-vs-joint-state-publisher/>  
**The Robot State Publisher then takes two main inputs:**

The `sensor_msgs/JointState` messages from the Joint State Publisher.

A model of the robot in [URDF](#) file format.

The **Robot State Publisher** takes that information, outputs the position and orientation of each [coordinate frame of the robot](#), and publishes this data to the [tf2 package](#).

The `tf2` package is responsible for keeping track of the position and orientation of all coordinate frames of a robot over time. At any given time, you can [query the tf2 package](#) to find out the position and orientation of any coordinate frame (i.e. “childframe”) relative to another coordinate frame (i.e. “parent” frame).

## Joint State Publisher: Simulation vs. Real World

When you are creating [robots in simulation using a tool like Gazebo](#), you are going to want to use the [joint state publisher Gazebo plugin](#) to publish the position and orientation of the joints (i.e. publish the `sensor_msgs/JointState` messages).

### ----- **dd\_robot Page 45-47 The Red Box**

```
harman@harman-VirtualBox:~$ noetic
```

```
harman@harman-VirtualBox:~$ source ~/catkin_ws/devel/setup.bash
```

```
harman@harman-VirtualBox:~$ roslaunch ros_robotics ddrobot_rviz.launch ERROR!
```

```
model:=dd_robot.urdf
```

```
... logging to /home/harman/.ros/log/bf430b30-483f-11ed-9eed-4774ab3f9541/roslaunch-harman-VirtualBox-4918.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.
```

```
RLEException: [/home/harman/catkin_ws/src/ros_robotics/launch/ddrobot_rviz.launch] requires the 'gui' arg to be set. The traceback for the exception was written to the log file
```

```
harman@harman-VirtualBox:~$ roslaunch ros_robotics ddrobot_rviz.launch
```

```
model:=dd_robot.urdf gui:=True
```

```
RLException: [ddrobot_rviz.launch] is neither a launch file in package [ros_robotics] nor is [ros_robotics] a launch file name/ The traceback for the exception was written to the log file
```

```
harman@harman-VirtualBox:~$ source ~/catkin_ws/devel/setup.bash
```

```
harman@harman-VirtualBox:~$ roslaunch ros_robotics ddrobot_rviz.launch
```

```
model:=dd_robot.urdf gui:=True
```

```
... logging to /home/harman/.ros/log/54abf340-45e7-11ed-b715-6d7bad9e7d4c/roslaunch-harman-VirtualBox-6663.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://harman-VirtualBox:33417/
```

#### SUMMARY

```
=====
```

#### PARAMETERS

```
* /robot_description: <?xml version='1....
```

```
* /rostdistro: noetic
```

```
* /rosversion: 1.15.14
```

```
* /use_gui: True
```

#### NODES

```
/
```

```
joint_state_publisher (joint_state_publisher/joint_state_publisher)
```

```
robot_state_publisher (robot_state_publisher/robot_state_publisher)
```

```
rviz (rviz/rviz)
```

```
auto-starting new master
```

```
process[master]: started with pid [6671]
```

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

```
setting /run_id to 54abf340-45e7-11ed-b715-6d7bad9e7d4c
```

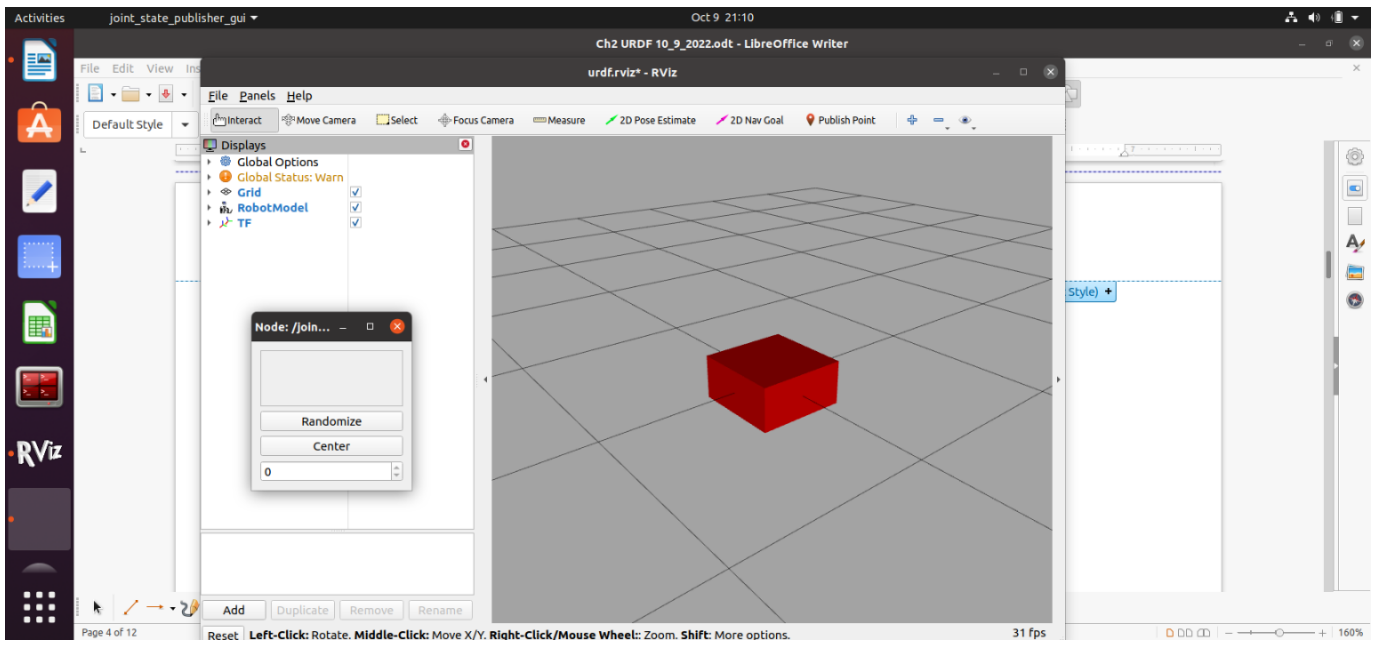
```
process[rosout-1]: started with pid [6681]
```

```
started core service [/rosout]
```

```
process[joint_state_publisher-2]: started with pid [6684]
```

```
process[robot_state_publisher-3]: started with pid [6687]
```

```
process[rviz-4]: started with pid [6690]
```



## dd\_robot2 Page 49-50

```
harman@harman-VirtualBox:~$ noetic
```

```
harman@harman-VirtualBox:~$ source ~/catkin_ws/devel/setup.bash
```

```
harman@harman-VirtualBox:~$ roslaunch ros_robotics ddrobot_rviz.launch
```

```
model:=dd_robot2.urdf gui:=True
```

```
... logging to /home/harman/.ros/log/0d89dd12-45ea-11ed-b715-6d7bad9e7d4c/roslaunch-harman-VirtualBox-7284.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://harman-VirtualBox:33633/
```

### SUMMARY

```
=====
```

### PARAMETERS

- \* /robot\_description: <?xml version='1....
- \* /rostdistro: noetic
- \* /rosversion: 1.15.14
- \* /use\_gui: True

### NODES

```
/
```

```
joint_state_publisher (joint_state_publisher/joint_state_publisher)  
robot_state_publisher (robot_state_publisher/robot_state_publisher)  
rviz (rviz/rviz)
```

```
auto-starting new master
```

```
process[master]: started with pid [7292]
```

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

```
setting /run_id to 0d89dd12-45ea-11ed-b715-6d7bad9e7d4c
```

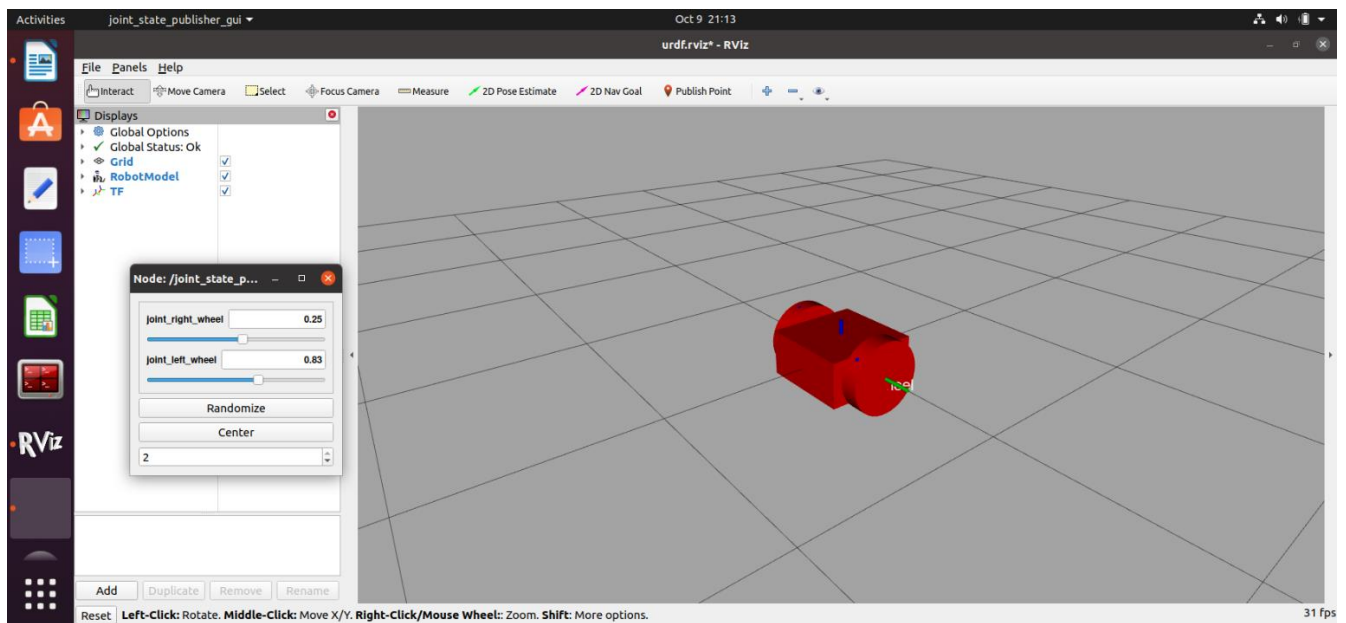
```
process[rosout-1]: started with pid [7302]
```

```
started core service [/rosout]
```

```
process[joint_state_publisher-2]: started with pid [7305]
```

```
process[robot_state_publisher-3]: started with pid [7310]
```

```
process[rviz-4]: started with pid [7311]
```



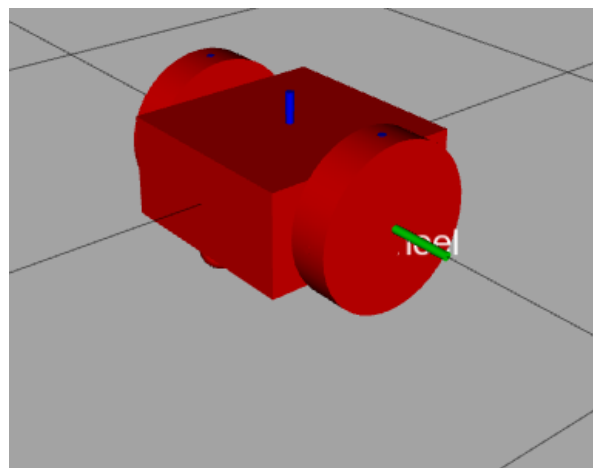
**dd\_robot2**

**dd\_robot3 Caster Pg 51-52**

**(Noetic and source)**

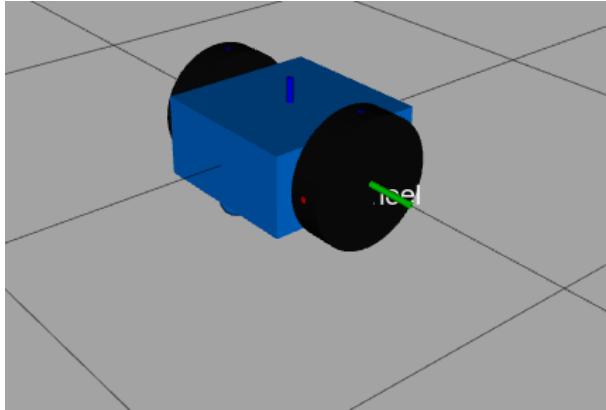
**harman@harman-VirtualBox:~\$ roslaunch ros\_robotics ddrobot\_rviz.launch**

**model:=dd\_robot3.urdf gui:=True**



## dd\_robot4 Pg 52-54 Add Color (Noetic and source)

```
harman@harman-VirtualBox:~$ roslaunch ros_robotics ddrobot_rviz.launch  
model:=dd_robot4.urdf gui:=True
```



## dd\_robot5\_urdf Pg 55 10\_6\_2022 Collisions & Moving Wheels

```
harman@harman-VirtualBox:~$ roslaunch ros_robotics ddrobot_rviz.launch model:=dd_robot5.urdf  
gui:=True
```

```
... logging to /home/harman/.ros/log/b40eb2c2-45e3-11ed-b715-6d7bad9e7d4c/roslaunch-harman-  
VirtualBox-3586.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://harman-VirtualBox:34487/
```

### SUMMARY

```
=====
```

### PARAMETERS

- \* /robot\_description: <?xml version='1....
- \* /roscdistro: noetic
- \* /rosversion: 1.15.14
- \* /use\_gui: True

### NODES

```
/
```

- joint\_state\_publisher (joint\_state\_publisher/joint\_state\_publisher)
- robot\_state\_publisher (robot\_state\_publisher/robot\_state\_publisher)
- rviz (rviz/rviz)

```
auto-starting new master
```

```
process[master]: started with pid [3594]
```

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

```
setting /run_id to b40eb2c2-45e3-11ed-b715-6d7bad9e7d4c
process[rosout-1]: started with pid [3604]
started core service [/rosout]
process[joint_state_publisher-2]: started with pid [3607]
process[robot_state_publisher-3]: started with pid [3608]
process[rviz-4]: started with pid [3609]
```

## **dd\_robot5 Page 55 Move the Wheels!** **(Noetic and source)**

harman@harman-VirtualBox:~\$ **roslaunch ros\_robotics ddrobot\_rviz.launch**  
**model:=dd\_robot5.urdf gui:=True Page 55**

```
... logging to /home/harman/.ros/log/3a1169ea-4842-11ed-9eed-4774ab3f9541/roslaunch-harman-VirtualBox-5717.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://harman-VirtualBox:44479/
```

### SUMMARY

```
=====
```

### PARAMETERS

```
* /robot_description: <?xml version='1....
* /rostdistro: noetic
* /rosversion: 1.15.14
* /use_gui: True
```

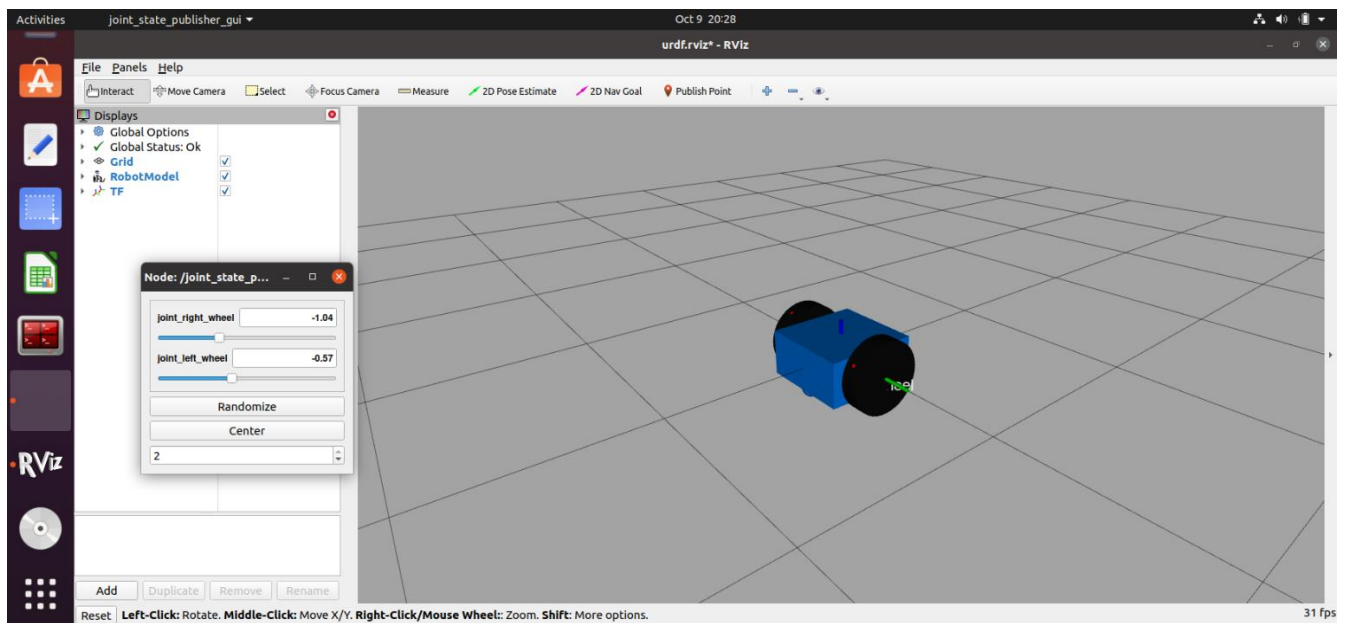
### NODES

```
/
  joint_state_publisher_gui (joint_state_publisher_gui/joint_state_publisher_gui)
  robot_state_publisher (robot_state_publisher/robot_state_publisher)
  rviz (rviz/rviz)
```

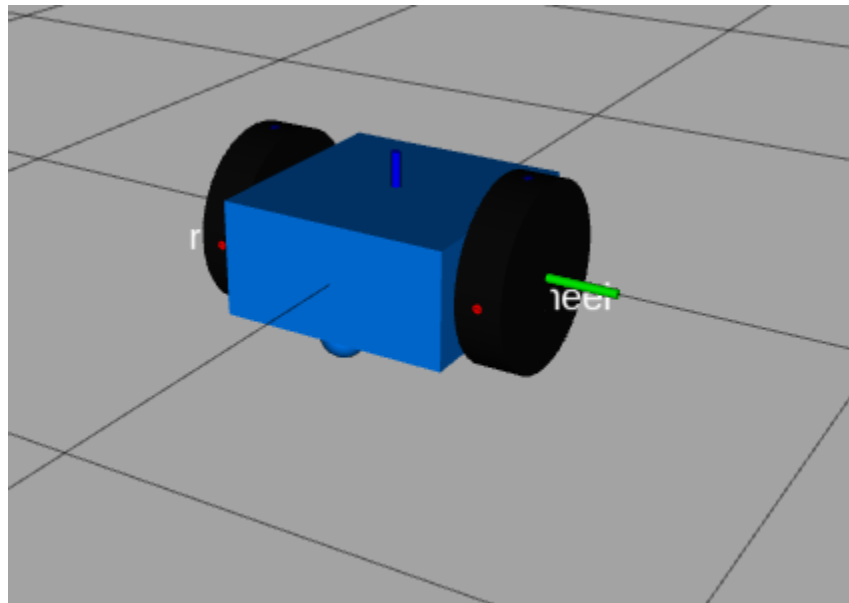
```
auto-starting new master
process[master]: started with pid [5725]
ROS_MASTER_URI=http://localhost:11311
```

```
setting /run_id to 3a1169ea-4842-11ed-9eed-4774ab3f9541
process[rosout-1]: started with pid [5735]
started core service [/rosout]
process[joint_state_publisher_gui-2]: started with pid [5739]
process[robot_state_publisher-3]: started with pid [5743]
process[rviz-4]: started with pid [5744]
```





dd\_robot5 -



[http://wiki.ros.org/joint\\_state\\_publisher](http://wiki.ros.org/joint_state_publisher)  
Noetic

As of early 2020, the GUI functionality has been split out of the main `joint_state_publisher` package into its own package called `joint_state_publisher_gui`.

The old `use_gui` parameter to `joint_state_publisher` is still honored, but launches `joint_state_publisher_gui` if installed and available.

For packages transitioning before this change, `joint_state_publisher_gui` should be added as an `<exec_depend>` to `package.xml` and launch files should be updated to launch `joint_state_publisher_gui` instead of using `joint_state_publisher` with `use_gui` parameter.

## dd\_robot6 with Inertia

## (Noetic and source)

harman@harman-VirtualBox:~\$ **roslaunch ros\_robotics ddrobot\_rviz.launch**

**model:=dd\_robot6.urdf gui:=True**

... logging to /home/harman/.ros/log/0efff1a6-4845-11ed-9eed-4774ab3f9541/roslaunch-harman-VirtualBox-6360.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://harman-VirtualBox:46445/

### SUMMARY

=====

### PARAMETERS

\* /robot\_description: <?xml version='1....

\* /rostdistro: noetic

\* /rosversion: 1.15.14

\* /use\_gui: True

### NODES

/

joint\_state\_publisher\_gui (joint\_state\_publisher\_gui/joint\_state\_publisher\_gui)

robot\_state\_publisher (robot\_state\_publisher/robot\_state\_publisher)

rviz (rviz/rviz)

auto-starting new master

process[master]: started with pid [6368]

ROS\_MASTER\_URI=http://localhost:11311

setting /run\_id to 0efff1a6-4845-11ed-9eed-4774ab3f9541

process[rosout-1]: started with pid [6378]

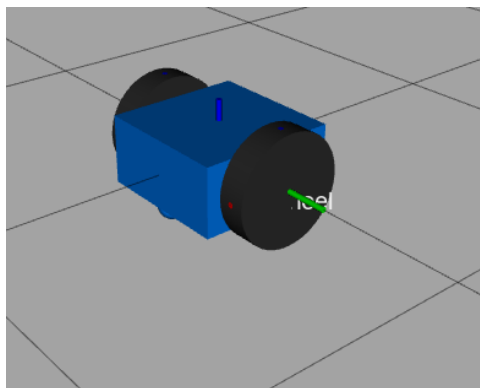
started core service [/rosout]

process[joint\_state\_publisher\_gui-2]: started with pid [6381]

process[robot\_state\_publisher-3]: started with pid [6383]

process[rviz-4]: started with pid [6386]

dd\_robot5 – Same screen as for dd\_robot5 with sliders.



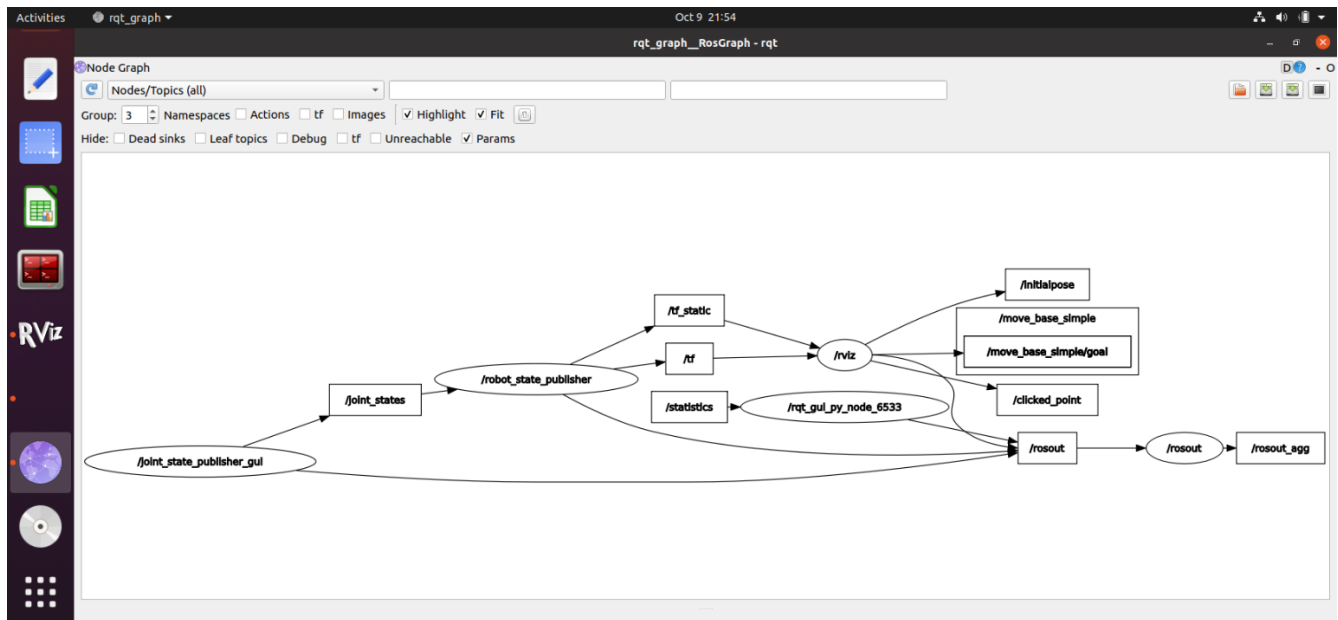
Alias foxy or noetic

harman@harman-VirtualBox:~\$ **noetic**

ROS\_DISTRO was set to 'foxy' before. Please make sure that the environment does not mix paths from different distributions.

```
harman@harman-VirtualBox:~$ source ~/catkin_ws/devel/setup.bash
```

```
harman@harman-VirtualBox:~$ rqt_graph
```



## Topics and Nodes

Alias foxy or noetic

```
harman@harman-VirtualBox:~$ noetic
ROS_DISTRO was set to 'foxy' before. Please make sure that the environment does not mix paths from
different distributions.
```

```
harman@harman-VirtualBox:~$ source ~/catkin_ws/devel/setup.bash
```

```
harman@harman-VirtualBox:~$ ros2 topic list
```

```
  /parameter_events
```

```
  /rosout
```

```
harman@harman-VirtualBox:~$ rostopic list
```

```
  /clicked_point
```

```
  /initialpose
```

```
  /joint_states
```

```
  /move_base_simple/goal
```

```
  /rosout
```

```
  /rosout_agg
```

```
  /statistics
```

```
  /tf
```

```
  /tf_static
```

```
harman@harman-VirtualBox:~$ rostopic type /joint_states
```

```
sensor_msgs/JointState
```

```
harman@harman-VirtualBox:~$ rostopic echo /joint_states -n1
```

```
header:
```

```
  seq: 9544
```

```
  stamp:
```

```
    secs: 1665370651
```

```
    nsecs: 532656908
```

```
  frame_id: "
```

```
name:
```

```
  - joint_right_wheel
```

```
  - joint_left_wheel
```

```
position: [0.0, 0.0]
```

```
velocity: []
```

```
effort: []
```

```
---
```

```
harman@harman-VirtualBox:~$ rostopic echo /joint_states -n1 (Move wheels a bit)
```

```
header:
```

```
  seq: 9984
```

```
  stamp:
```

```
    secs: 1665370695
```

```
    nsecs: 532104015
```

```
  frame_id: "
```

```
name:
```

```
  - joint_right_wheel
```

```
  - joint_left_wheel
```

```
position: [-1.0373538942153497, -0.8036194007882691]
```

```
velocity: []
```

```
effort: []
```

```
---
```

```
harman@harman-VirtualBox:~$ rosnodetool list
```

```
  /joint_state_publisher_gui
```

/robot\_state\_publisher  
/rosout  
/rqt\_gui\_py\_node\_6533  
/rviz

## The final dd\_robot6.urdf file with all the trimmings – Page 58

```
<?xml version='1.0'?>
<robot name="dd_robot">

  <!-- Base Link -->
  <link name="base_link">
    <visual>
      <origin xyz="0 0 0" rpy="0 0 0" />
      <geometry>
        <box size="0.5 0.5 0.25"/>
      </geometry>
      <material name="blue">
        <color rgba="0 0.5 1 1"/>
      </material>
    </visual>
    <!-- Base collision, mass and inertia -->
    <collision>
      <origin xyz="0 0 0" rpy="0 0 0" />
      <geometry>
        <box size="0.5 0.5 0.25"/>
      </geometry>
    </collision>
    <inertial>
      <mass value="5"/>
      <inertia ixx="0.13" ixy="0.0" ixz="0.0" iyy="0.21" iyz="0.0" izz="0.13"/>
    </inertial>

    <!-- Caster -->
    <visual name="caster">
      <origin xyz="0.2 0 -0.125" rpy="0 0 0" />
      <geometry>
        <sphere radius="0.05" />
      </geometry>
    </visual>
    <!-- Caster collision, mass and inertia -->
    <collision>
      <origin xyz="0.2 0 -0.125" rpy="0 0 0" />
      <geometry>
        <sphere radius="0.05" />
      </geometry>
    </collision>
    <inertial>
      <mass value="0.5"/>
      <inertia ixx="0.0001" ixy="0.0" ixz="0.0" iyy="0.0001" iyz="0.0" izz="0.0001"/>
    </inertial>

  </link>
```

```

<!-- Right Wheel -->
<link name="right_wheel">
  <visual>
    <origin xyz="0 0 0" rpy="1.570795 0 0" />
    <geometry>
      <cylinder length="0.1" radius="0.2" />
    </geometry>
    <material name="darkgray">
      <color rgba=".2 .2 .2 1"/>
    </material>
  </visual>
  <!-- Right Wheel collision, mass and inertia -->
  <collision>
    <origin xyz="0 0 0" rpy="1.570795 0 0" />
    <geometry>
      <cylinder length="0.1" radius="0.2" />
    </geometry>
  </collision>
  <inertial>
    <mass value="0.5"/>
    <inertia ixx="0.01" ixy="0.0" ixz="0.0" iyy="0.005" iyz="0.0" izz="0.005"/>
  </inertial>

```

```

</link>

```

```

<!-- Right Wheel joint -->
<joint name="joint_right_wheel" type="continuous">
  <parent link="base_link"/>
  <child link="right_wheel"/>
  <origin xyz="0 -0.30 0" rpy="0 0 0" />
  <axis xyz="0 1 0" />
</joint>

```

```

<!-- Left Wheel -->
<link name="left_wheel">
  <visual>
    <origin xyz="0 0 0" rpy="1.570795 0 0" />
    <geometry>
      <cylinder length="0.1" radius="0.2" />
    </geometry>
    <material name="darkgray">
      <color rgba=".2 .2 .2 1"/>
    </material>
  </visual>
  <!-- Left Wheel collision, mass and inertia -->
  <collision>
    <origin xyz="0 0 0" rpy="1.570795 0 0" />
    <geometry>
      <cylinder length="0.1" radius="0.2" />
    </geometry>
  </collision>

```

```
</geometry>
</collision>
<inertial>
  <mass value="0.5"/>
  <inertia ixx="0.01" ixy="0.0" ixz="0.0" iyy="0.005" iyz="0.0" izz="0.005"/>
</inertial>
</link>

<!-- Left Wheel joint -->
<joint name="joint_left_wheel" type="continuous">
  <parent link="base_link"/>
  <child link="left_wheel"/>
  <origin xyz="0 0.30 0" rpy="0 0 0" />
  <axis xyz="0 1 0" />
</joint>

</robot>
```