

Transform API (tf2_ros)

In this assignment you will use the tf2_ros transform API you studied in units 5.3.3 to 5.3.5

The objective is to transform the pose of an object which is on top of the TurtleBot to the vacuum_gripper2_suction_cup reference frame.

Important Note:

For this assignment to work, you need to have completed assignment 1.

Week 5 - Assignment 3 --- 4 Points

In this assignment, you will need to complete the `week5_assignment3_script.py` file, that you can find in `hrwros_week5_assignment/scripts` folder.

As always, you only need to edit where you are instructed with `<write your code here>`.

Once completed, the script should do the following tasks:

- Subscribe to the relevant topic, published by the `new_logical_camera_2` you added in assignment 1. It should publish information about the object on top of the TurtleBot.
- Update the relevant reference frame for the pose of the object. (Hint: You can use the `view_frames` command and TF tree to find out what name should be used for the reference frame.)
- Transform the pose of the object to the `vacuum_gripper2_suction_cup` reference frame.

After you finish editing the script, you can test your solution by executing the following steps:

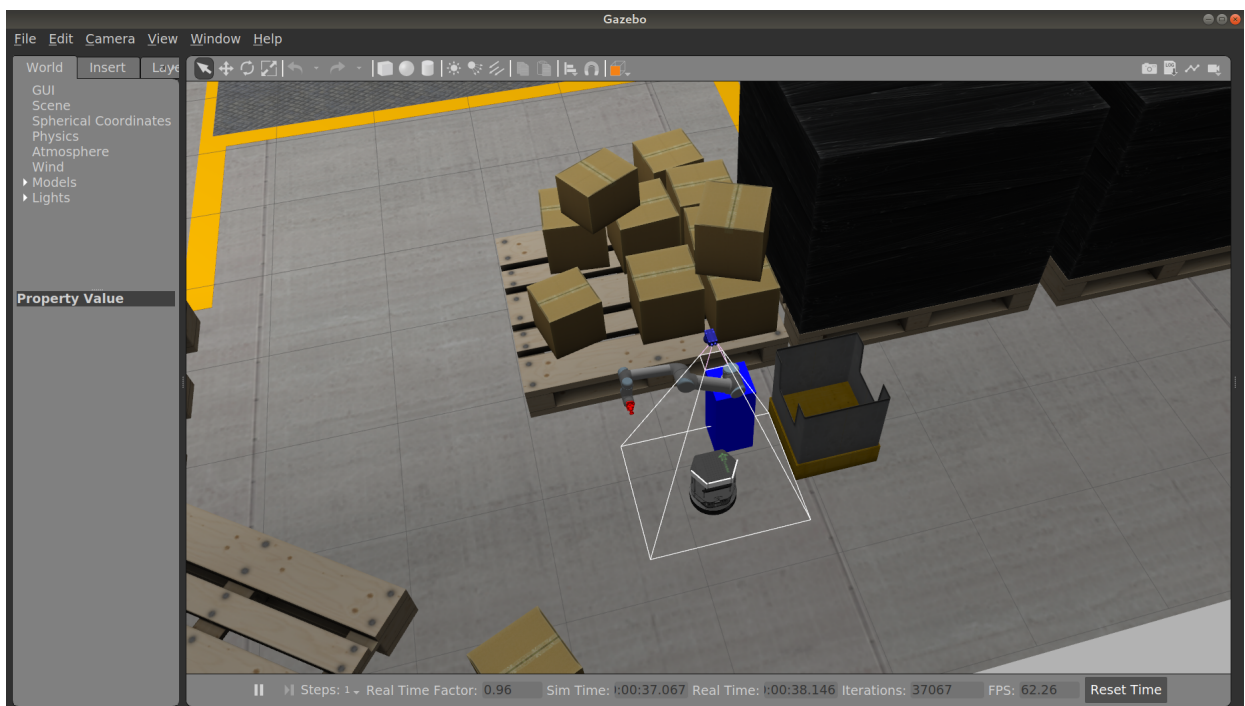
Step 1: Make sure, you terminate the factory simulation and any other CCS that may be running.

Step 2: Start the **assignment specific** factory simulation.

```
$ roslaunch hrwros_week5_assignment  
week5_assignment3.launch
```

We have modified some configurations of the factory for this assignment.

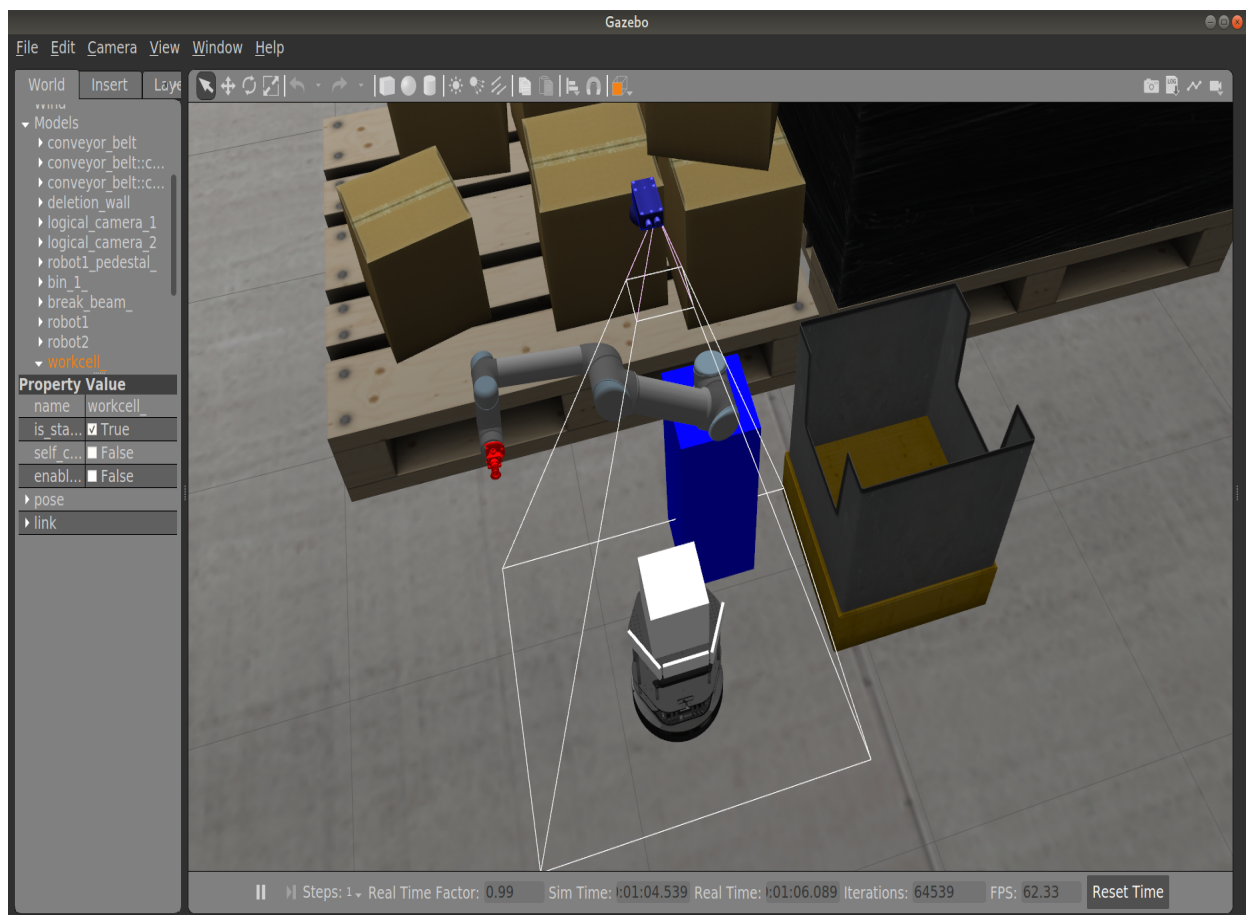
Please Verify that the Turtlebot now shows up right next to Robot2 pedestal under the newly installed logical camera.



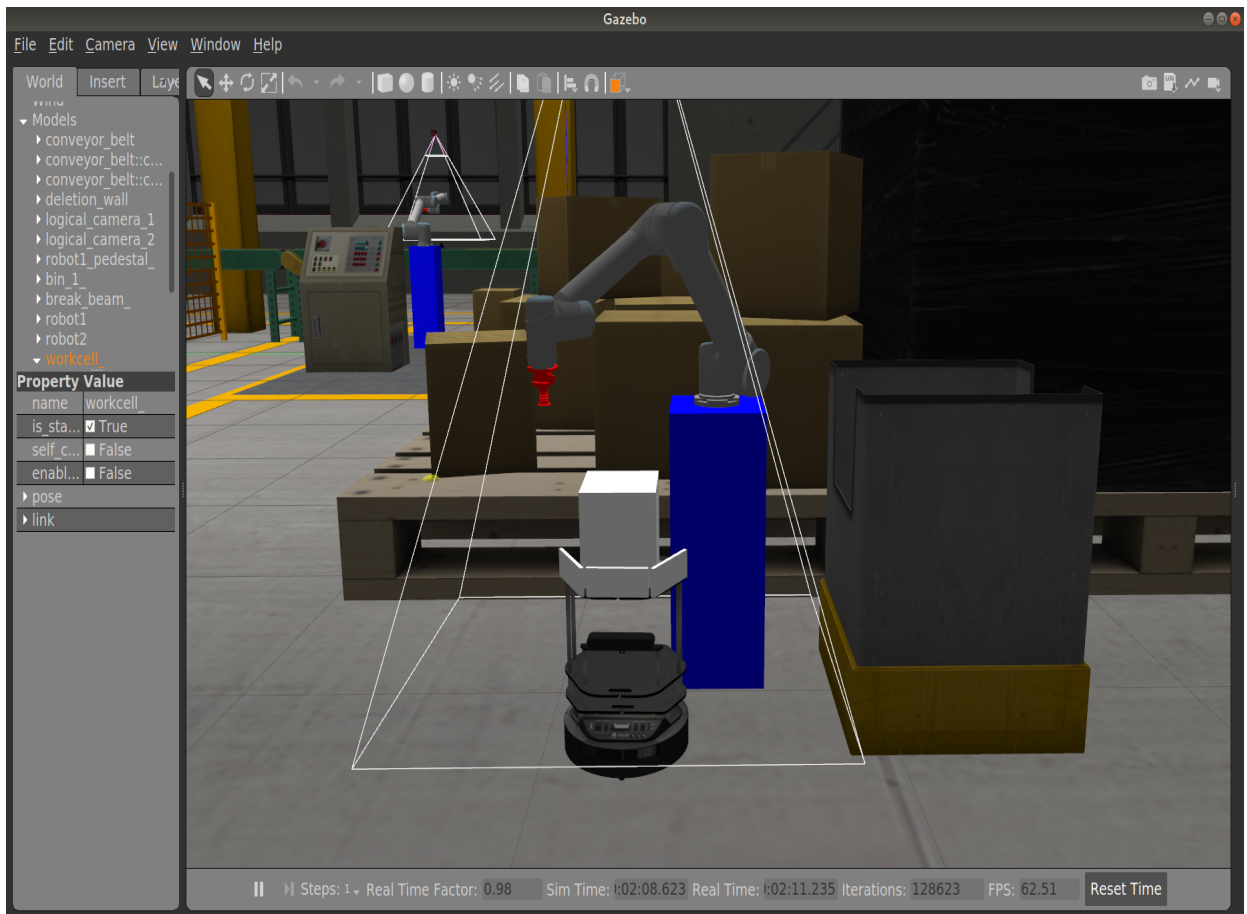
Step 3. Call the *spawn_object_on_turtlebot* service with:

```
$ rosservice call /spawn_object_on_turtlebot
```

After this, you should see a white box show up on top of the TurtleBot as shown below:



Step 4. Move the robot2 to the R2PreGrasp pose like shown in the screenshot



To do this, start a new CCS and run the MoveIt! commander script from Week4 with:

```
$ rosrn hrwros_week4 hrwros_moveit_commander_cmdline
```

Then select robot2 and move it to R2PreGrasp (You should know how to do this by now):

Step 5. Run the now completed week5_assignment3.py

```
$ rosrn hrwros_week5_assignment week5_assignment3.py
```

The transformed pose of the object should be printed on the CCS.

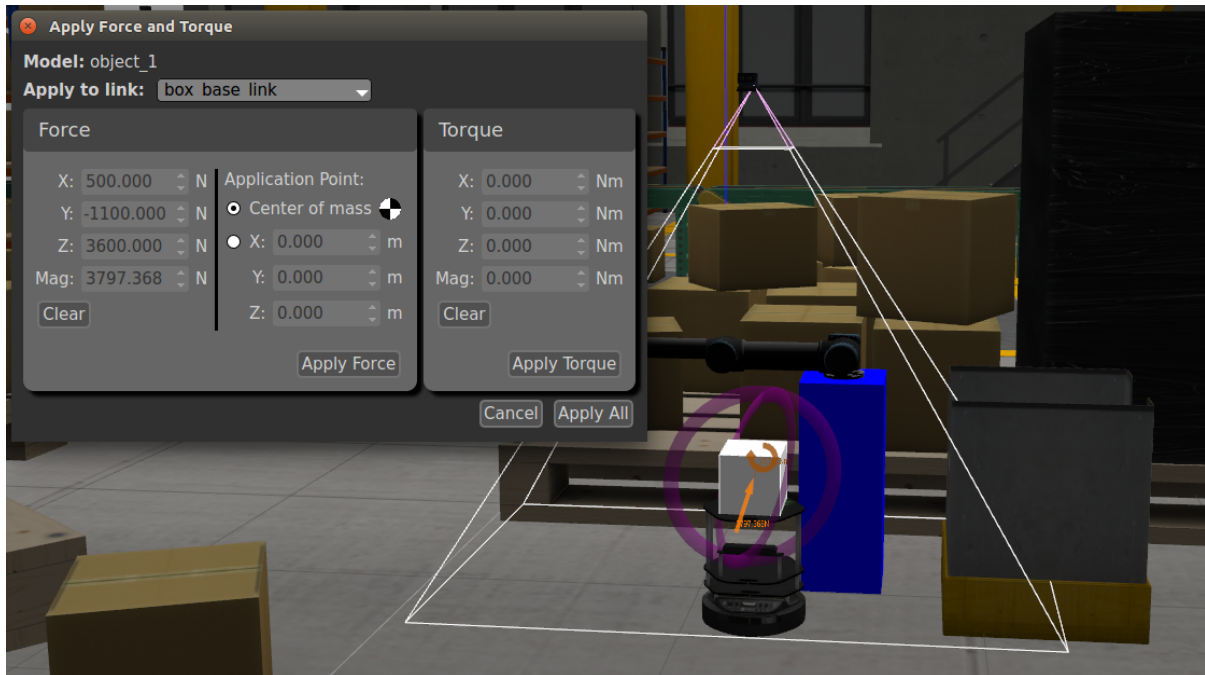
This completes the third and final assignment of week 5!

As with previous weeks, you can now go to the submission unit and upload all the assignments of this week.

Optional (additional steps)

And now, time for some fun! Since the object is not yet picked up by robot2, let's help it get it into the bin!

Go back to the factory simulation in Gazebo, and click on the white box on top of the TurtleBot. Now, right-click and you will see an option to apply force. Click on it and then, enter the forces as shown below:



Now click on **Apply Force** and you should see the box jump into the bin! Gazebo is a physics engine, so feel free to apply forces on any object in the factory scene that Gazebo knows about and have fun. If you manage to break down the simulation at some point, just restart it and you will be fine!