In this section, we will use RViz to visualize what the robot is doing. RViz is a great tool for debugging and we will use it for the rest of the course.

First, launch the TurtleBot world.

```
$ roslaunch turtlebot_gazebo turtlebot_world.launch
```

Now, we will open up a pre-configured RViz file in a second CCS.

```
$ roslaunch turtlebot_rviz_launchers view_robot.launch
```

So what are we going to visualize in RViz? Let's do Odometry! Remember that, Odometry is the use of data from motion sensors to estimate change in position over time.

In a new CCS let's echo the odometry topic.

```
$ rostopic echo /odom
```

This will keep the data updated; however, since the robot is not moving there is not much to change. You will just see fluctuations around the values.

So let's move the robot to see change in those values!!

We have learned 3 ways to move the turtlebot, so let's use them
- **(Remember to use only one at the time)**

- The first one is publishing directly on the CCS.

```
$ rostopic pub -r 10 /cmd_vel_mux/input/teleop geometry_msgs/Twist
'{linear: {x: 0.1, y: 0, z: 0}, angular: {x: 0, y: 0, z: -1}}'
```

- The second one is using the keyboard_teleop functionality

```
$ roslaunch turtlebot_teleop keyboard_teleop.launch
```

- The third one is using our python script to control the turtlebot

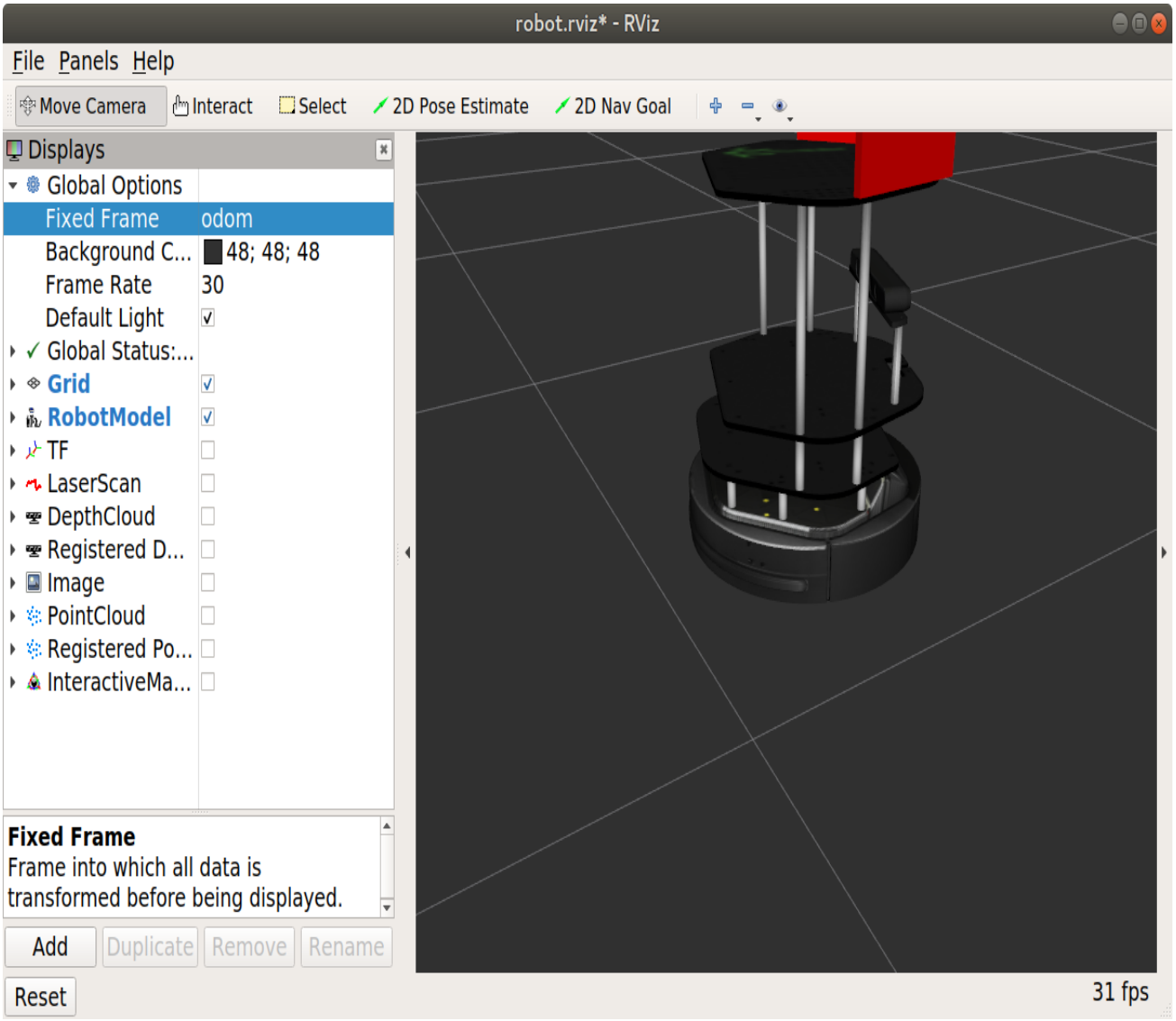
```
$ rosrun hrwros_week3 drive_turtlebot_circle.py
```

Now you should see the values change in the `/odom` topic

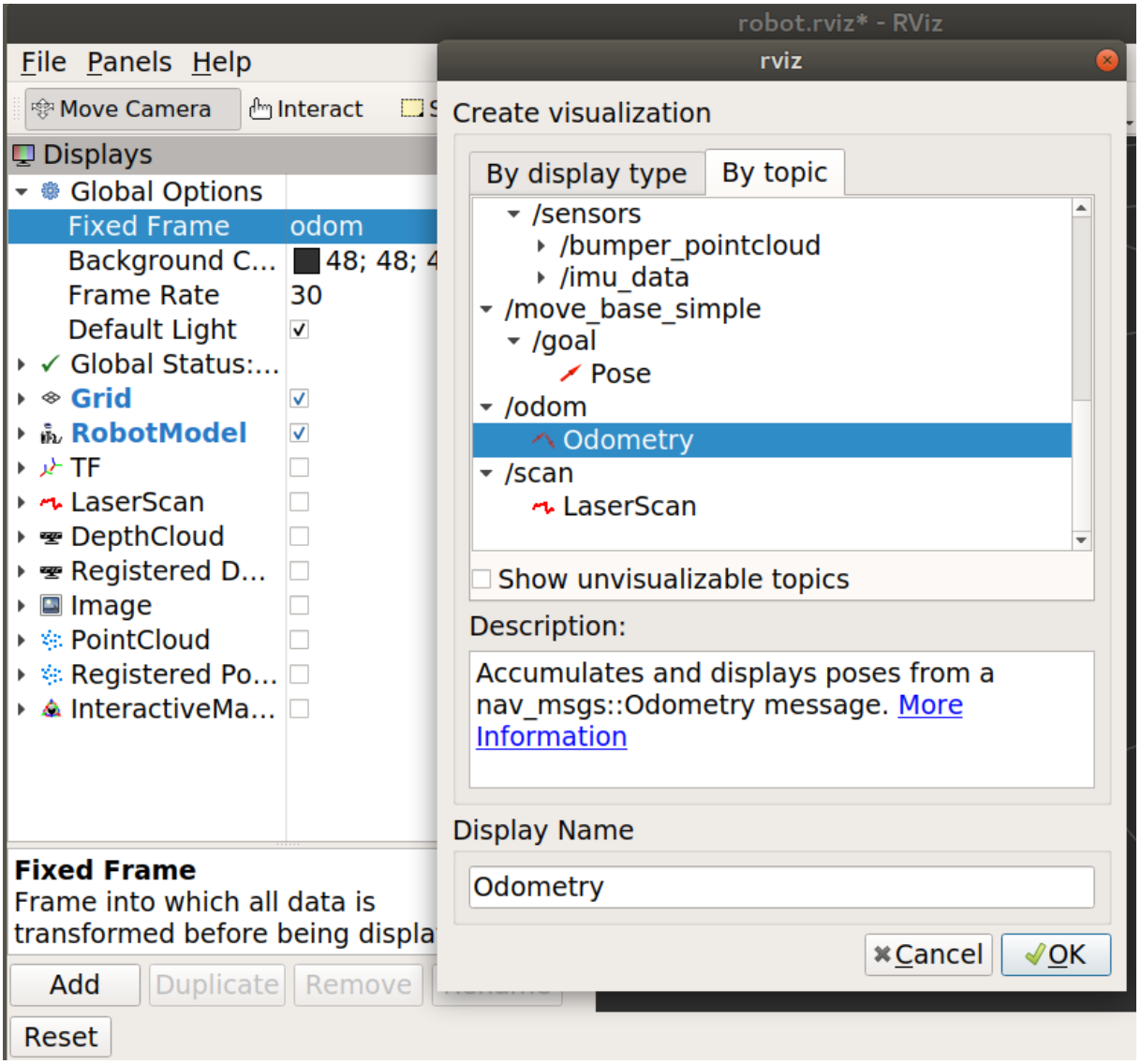
Let's move over now to RViz in order to visualize the odometry

Go to the RVIZ window and change the following settings:

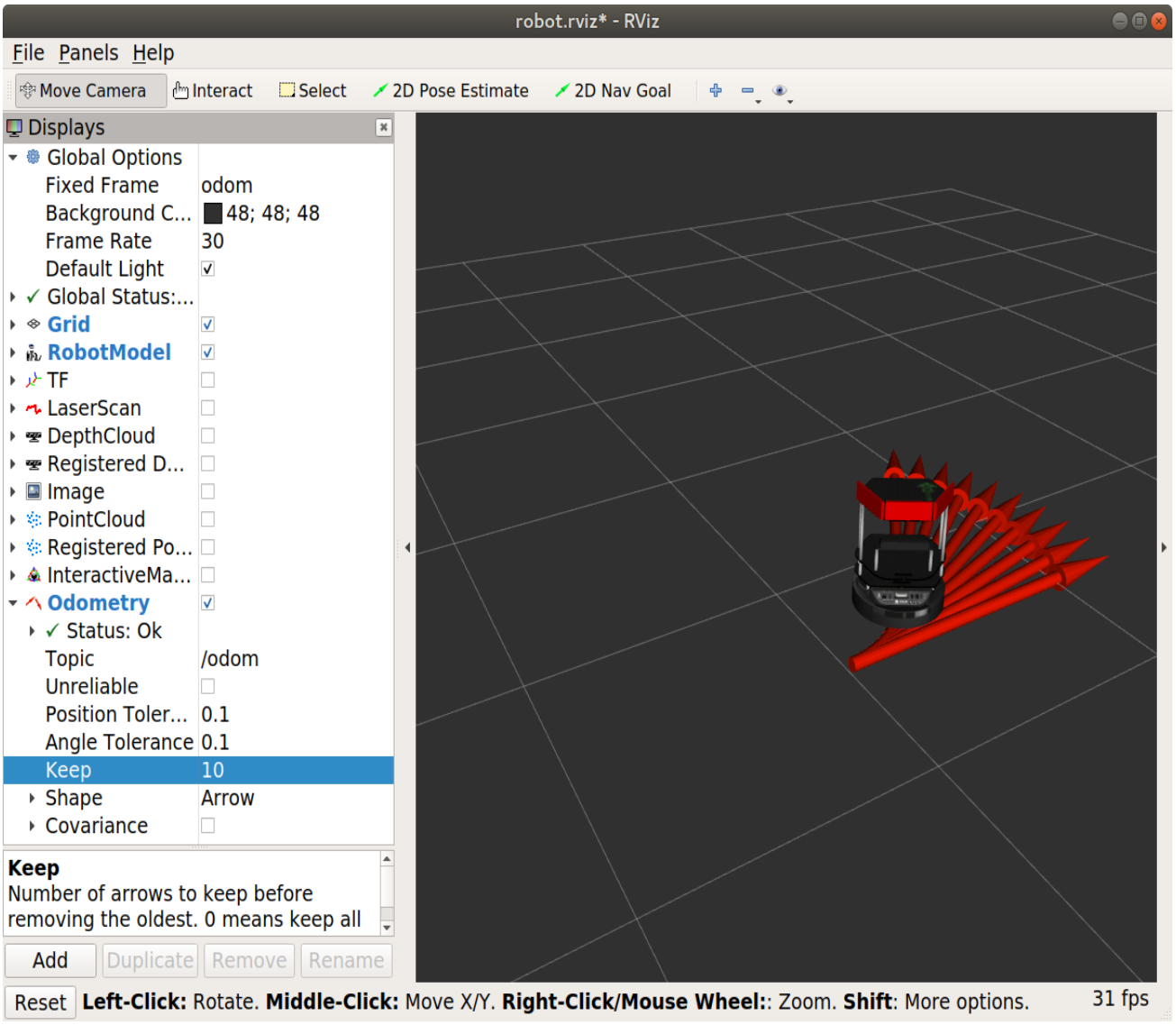
- Under **Global options** on the left side panel for **Fixed frame**, change **base_link** or **base_footprint** to **odom**.



- Click on **Add**, and select the **By topic** tab.
- Choose /**odom → odometry** and click on **OK**.



- Make sure the topic name is */odom*, uncheck the *covariance* checkbox and set the *Keep* value to 10.



After changing all of this you should see the turtlebot moving in RViz and arrow's in the direction it's moving.

You can change some additional settings based your personal preference.