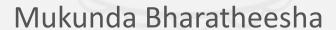
5.3

ROS package tf2_ros: a basic introduction



tf2_ros package

- tf2_ros is a ROS package that implements the functional aspects of TF
 - actively maintain spatial and temporal relationships between reference frames.
- transform pose from a given reference frame to a target reference frame
 - "time travel" functionality look up spatio-temporal relationships between frames in the past.

Was there a tf1 ROS package?

- Yes, it was (and is) called just tf.
 - still works and used in many applications.
 - command line tools.
 - all in one (vs clear separation of functionalities in tf2 via packages).
- tf2_ros is recommended and all tf functionalities have been migrated to tf2
 - transform buffer to cache transforms over a certain duration.

tf2_ros: information representation

- How are the spatio-temporal relationships quantified?
 - 3D transformation: translation, rotation (quaternion) and time stamp (geometry_msgs/TransformStamped).
 - ROS topic: /tf (tf2_msgs/TFMessage).
- TF Command line tools
 - Start the course simulation in a new terminal
 - lower graphics demand with gui:=false argument.
 - Start another terminal, source the workspace setup files.

tf/tf2_ros: command line tools

Print transformation between source and target frames on the terminal

```
$ rosrun tf tf_echo <source_frame> <target_frame>
```

View the "TF tree"

```
$ rosrun tf view_frames
```

```
$ rosrun tf2_tools view_frames.py
```

Publish a static transform between a parent and a (new) child frame

```
$ rosrun tf2_ros static_transform_publisher <trans>
<rot> "parent" "child"
```

command line tool: tf_echo (static)

```
donnie@tudelft: ~/ros/hrwros_ws
/home/donnie/ros/hrwros code ws/src/hrwros code/hrwros gazebo/launch/hrwros environment.launch h 🗱
donnie@tudelft:~/ros/hrwros ws$ rosrun tf tf echo world robot2 pedestal link
At time 0.000
                                                              joint <origin>
- Translation: [-7.800, -1.500, 0.000]
- Rotation: in Quaternion [0.000, 0.000, 0.000, 1.000]
            in RPY (radian) [0.000, -0.000, 0.000]
            in RPY (degree) [0.000, -0.000, 0.000]
At time 0.000
- Translation: [-7.800, -1.500, 0.000]

    Rotation: in Quaternion [0.000, 0.000, 0.000, 1.000]

            in RPY (radian) [0.000, -0.000, 0.000]
            in RPY (degree) [0.000, -0.000, 0.000]
At time 0.000
  Translation: [-7.800, -1.500, 0.000]
  Rotation: in Quaternion [0.000, 0.000, 0.000, 1.000]
            in RPY (radian) [0.000, -0.000, 0.000]
            in RPY (degree) [0.000, -0.000, 0.000]
```

command line tool: tf_echo (dynamic)

```
🔞 🖨 🗊 donnie@tudelft: ~/ros/hrwros_ws
/home/donnie/ros/hrwros code ws/src/hrwros code/hrwros gazebo/launch/hrwros environment.launch h 🗱
donnie@tudelft:~/ros/hrwros ws$ rosrun tf tf echo world robot1 forearm link
At time 120.600
- Translation: [1.112, 1.849, 1.077]
                                                                 translation
 Rotation: in Quaternion [0.000, 0.707, 0.000, 0.707]
            in RPY (radian) [0.000, 1.571, 0.000]
            in RPY (degree) [0.000, 90.000, 0.000]
At time 120.600
- Translation: [1.112, 1.849, 1.077]
                                                                 quaternion
 Rotation: in Quaternion [0.000, 0.707, 0.000, 0.707]
            in RPY (radian) [0.000, 1.571, 0.000]
            in RPY (degree) [0.000, 90.000, 0.000]
At time 121.600
 Translation: [1.112, 1.849, 1.077]
 Rotation: in Quaternion [0.000, 0.707, 0.000, 0.707]
            in RPY (radian) [0.000, 1.571, 0.000]
            in RPY (degree) [0.000, 90.000, 0.000]
At time 122.600
- Translation: [1.112, 1.849, 1.077]
 Rotation: in Quaternion [0.000, 0.707, 0.000, 0.707]
            in RPY (radian) [0.000, 1.571, 0.000]
            in RPY (degree) [0.000, 90.000, 0.000]
donnie@tudelft:~/ros/hrwros ws$
```