In this lecture, the basics of TF and the actual functionality of the tf2_ros package will be explained.

Important Note:

The following command is not available in ROS Noetic:

```
$ rosrun tf view_frames
```

It has been replaced by this one:

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

ROS package tf2_ros: a basic introduction

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tf2_ros package

- Implements functional aspects, and actively maintain relations.

- Transform pose: allows for "time travel" - look up the spatiotemporal relation.

Was there a TF (1) package?

- Yes

    - Used in many applications

    - Command line tools

    - All in one (vs clear separation in TF2)

- All TF functionalities are migrated to `tf2_ros`

    - Availability of a transform buffer in `tf2_ros`.

Information representation:

- Quantification

    - 3D transformation.

    - ROS topic: `/tf (tf2_msgs/TFMessage)`

tf command line tools:

- Print transformation
  `$ rosrun tf tf_echo <source_frame> <target_frame>`

- View the "TF tree"
  `$ rosrun tf2_tools view_frames.py`

- Publish a static transform
  `$ rosrun tf2_ros static_transform_publisher <trans> <rot> "parent" "child"`

- `tf_echo` (static and dynamic)

tf_echo (**static**)

- Query transform that never moves in our environment.

- Prints latest information with 1Hz.

- Fixed with each other (equal times).

- Outputs translation and quaternion .

Launch factory environment without gazebo gui

- We don't need to visualize the robots for this part, so we can launch the factory environment without the gazebo gui

```
$ roslaunch hrwros_gazebo hrwros_environment.launch
gui:=false
```

Monitor a static tf transformation

```
$ rosrun tf tf_echo world robot2_pedestal_link
```

Monitor a dynamic tf transformation

```
$ rosrun tf tf_echo world robot2_forearm_link
```

In this last command, you may see some warnings or error messages on the screen. We'll see why that could happen in the next video!

Question 1

1 point possible (ungraded)
/tf topic transports messages which are just an array of geometry_msgs/TransformStamped message type.

○ True

○ False

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Question 2

1 point possible (ungraded)

Which of the following statements are true about the tf_echo command?

- [ ] It is only useful to display transform information links that are connected to each other by fixed joints.

- [ ] tf_echo can be used to display transform information between links that are connected to each other. It does not matter whether they are connected by a fixed joint or a moving joint.

- [ ] tf_echo is always error/warning free.

- [ ] None of the above.

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