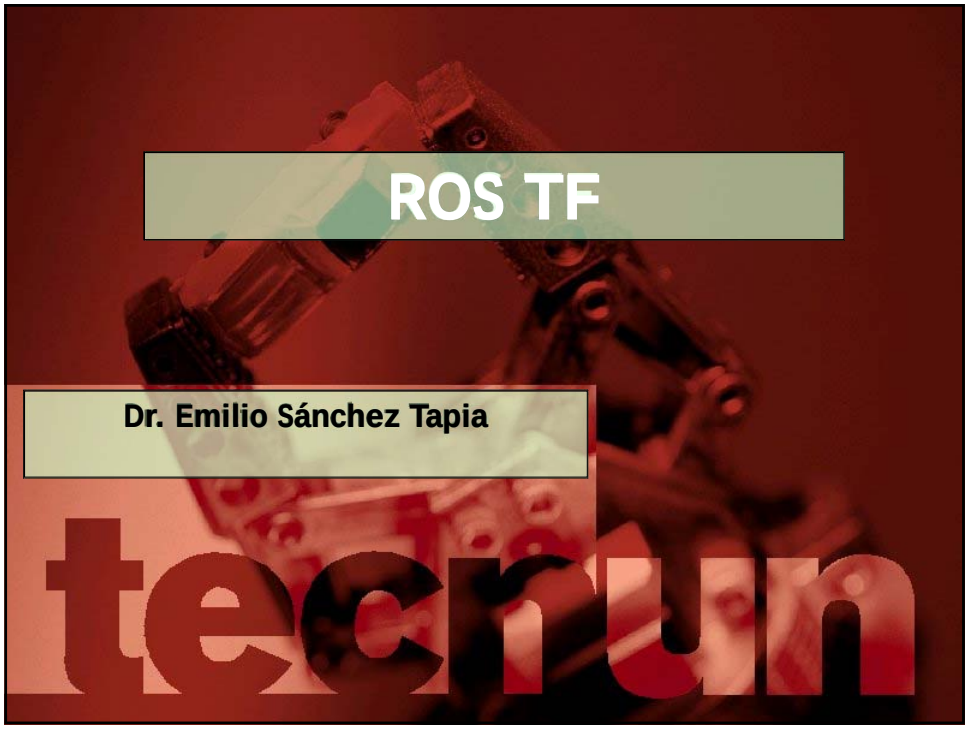
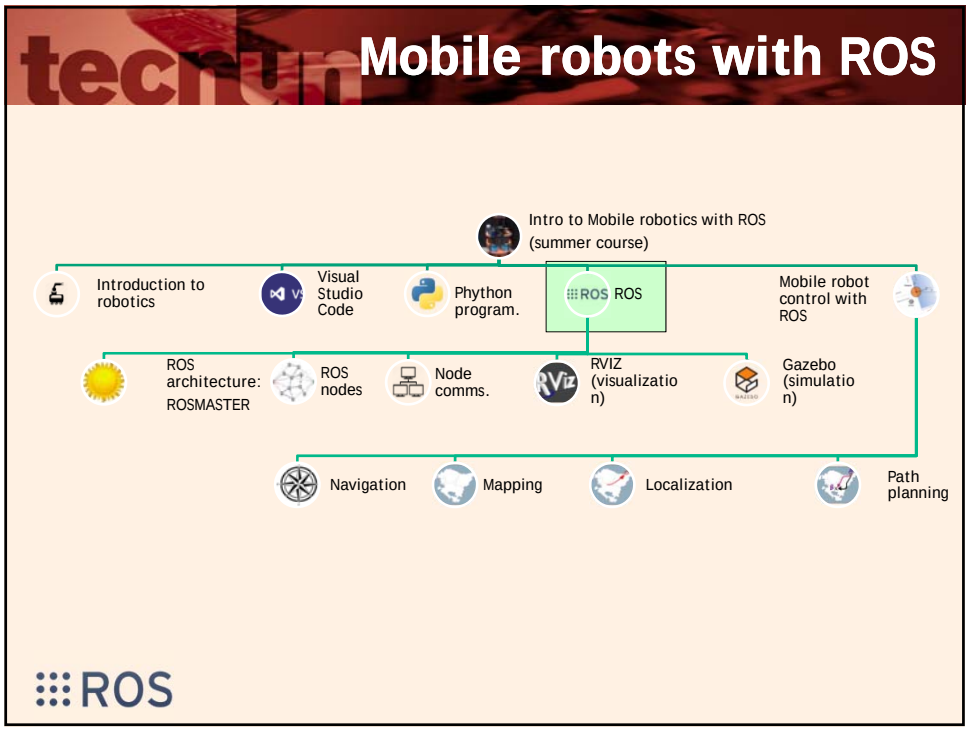
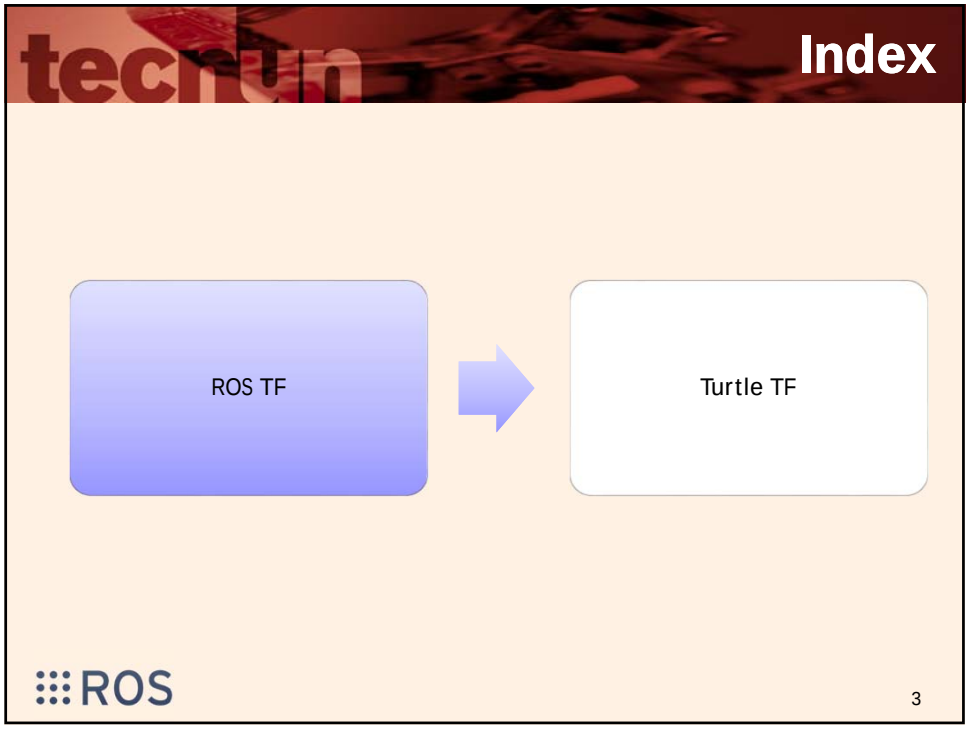

ROS TF
Dr. Emilio Sánchez Tapia
tecnun


tecnun
Mobile robots with ROS
Intro to Mobile robotics with ROS (summer course)
Introduction to robotics
Visual Studio Code
Phython program.
ROS
Mobile robot control with ROS
ROS architecture: ROSMASTER
ROS nodes
Node comms.
RVIZ (visualizatio n)
Gazebo (simulatio n)
Navigation
Mapping
Localization
Path planning
ROS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ROS TF
ROS

ROS Transformations (TF)

- Physical system, especially robotics systems, have many coordinate frames that change over time.
- TF is a Tool for keeping track of coordinate frames over time.
- It maintains relationship between coordinate frames in a tree structure buffered in time
- It is used To transform points, vectors, etc. between coordinate frames at desired time
- It is implemented as publisher/subscriber model on the topics `/tf` and `/tf_static`

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ROS TF: console commmads

```
> rosrun tf tf_monitor → print information about current TF
> rosrun tf tf_echo source_frame target_frame → info
                                  between two frames
> rosrun tf view_frames → creates a graph of TF tree

> rosrun tf static_transform_publisher x y z qx qy qz qw
frame_id child_frame_id period_in_ms → creates a TF using
                                       the quaternion for
                                       orientations

> rosrun tf static_transform_publisher x y z yaw pitch roll
frame_id child_frame_id period_in_ms → creates a TF using
                                       the Euler for
                                       orientations
```

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ROS TF: broadcast/listen

- **Listen/subscribe for transforms** - Receive and buffer all coordinate frames that are broadcasted in the system, and query for specific transforms between frames.
- **Broadcast/publish transforms** - Send out the relative pose of coordinate frames to the rest of the system. A system can have many broadcasters that each provide information about a different part of the robot.
- More information to program ROS TF→ http://wiki.ros.org/tf/Tutorials

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ROS TF: test turtle_tf

```
> roslaunch turtle_tf turtle_tf_demo.launch &
> rosrun tf view_frames
Listening to /tf for 5.000000 seconds
Done Listening
dot - graphviz version 2.38.0 (20140413.2041)
Detected dot version 2.38
frames.pdf generated

> rosrun rqt_tf_tree rqt_tf_tree → to see the
                                   tree in rqt
```

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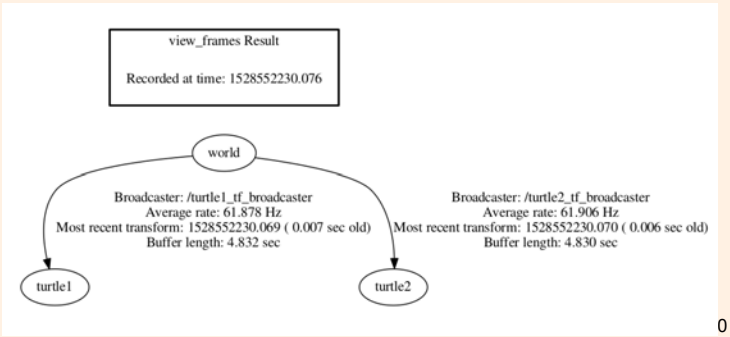
ROS TF: watch turtle_tf graph

- Open the pdf file generated (frames.pdf)
- Turtle_tf
  - creates three coordinate frames: a world frame, a turtle1 frame, and a turtle2 frame.
  - uses a **tf broadcaster** to publish the turtle coordinate frames
  - uses a **tf listener** to compute the difference in the turtle frames
  - move one turtle to follow the other.



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ROS TF: see the tf between the turtles

```
> rosrun tf tf_echo turtle1 turtle2
At time 1528553139.935
- Translation: [0.000, 0.000, 0.000]
- Rotation: in Quaternion [0.000, 0.000, 0.775, 0.632]
            in RPY (radian) [0.000, -0.000, 1.774]
            in RPY (degree) [0.000, -0.000, 101.648]
```

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