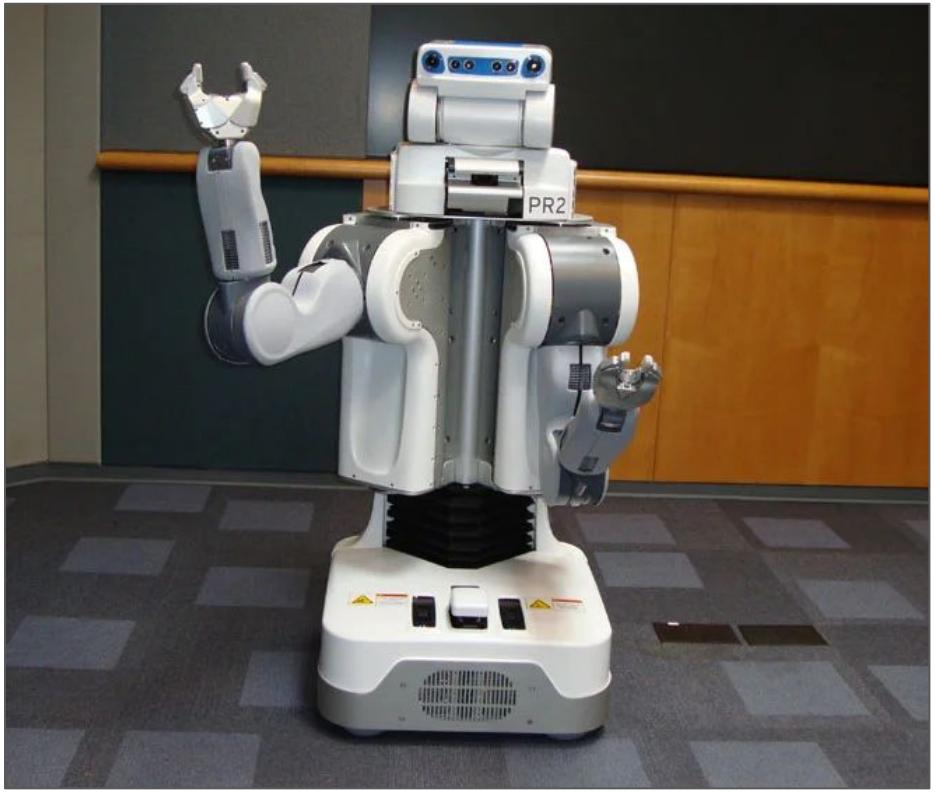
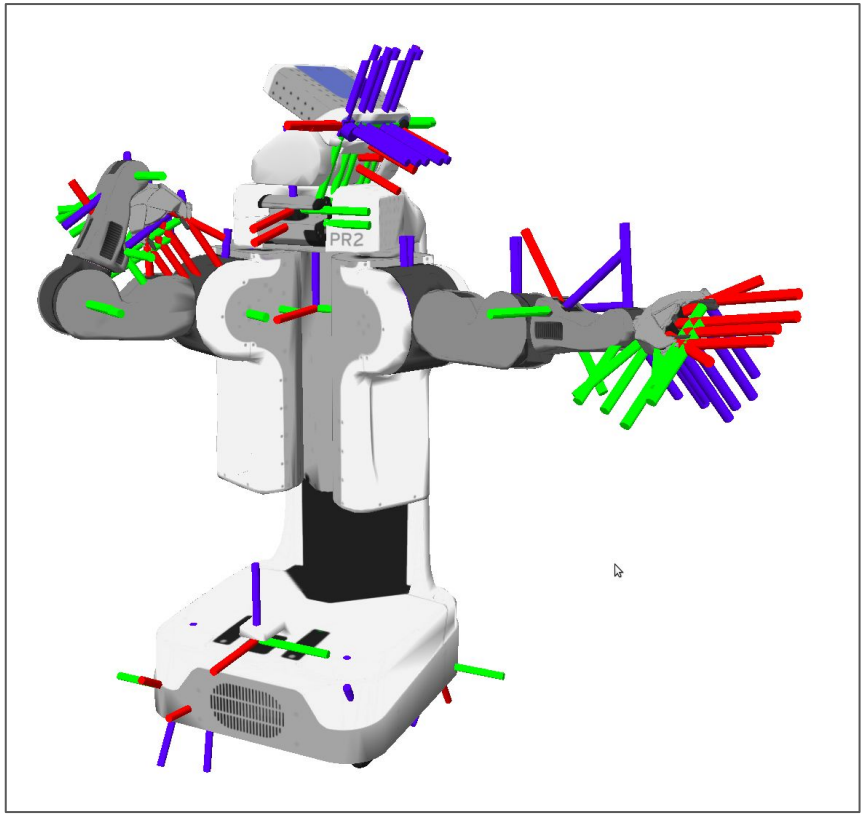
tf and moveit

What is tf?

- tf is a package in ROS which lets users keep track of multiple frames over time.
- tf2 is the second generation of tf library which has clear interface.
- But tf will still remain in support. Few functions are not available in tf2

Usage:





By Willow Garage

Useful APIs:

from tf import transformations

- euler_from_quaternion()
- quaternion_from_euler()
- quaternion_multiply()
- concatenate_matrix()
- inverse_matrix()

https://github.com/ros/geometry/blob/hydro-devel/tf/src/tf/transformations.py

tf2

Broadcasting transforms: Publish the relative pose and coordinate to the system. This allow us to setup our own relationship between two coordinate frames

Listening transforms: Specify the published transform and query the specific transform between coordinate frames (not quite the same as Subscribing to a Topic)

Broadcaster

Transform is defined in geometry_msgs.msg

Import TransformStamped

Setup broadcaster at appropriate position.(generally in callback)

To publish the broadcaster use sendTranform function

http://wiki.ros.org/tf2/Tutorials/Writing%20a%20tf2%20broadcaster%20%28Python%29

Listener

```
tfBuffer = tf2_ros.Buffer()

listener = tf2_ros.TransformListener(tfBuffer)

trans = tfBuffer.lookup_transform(turtle_name, 'turtle1', rospy.Time())
```

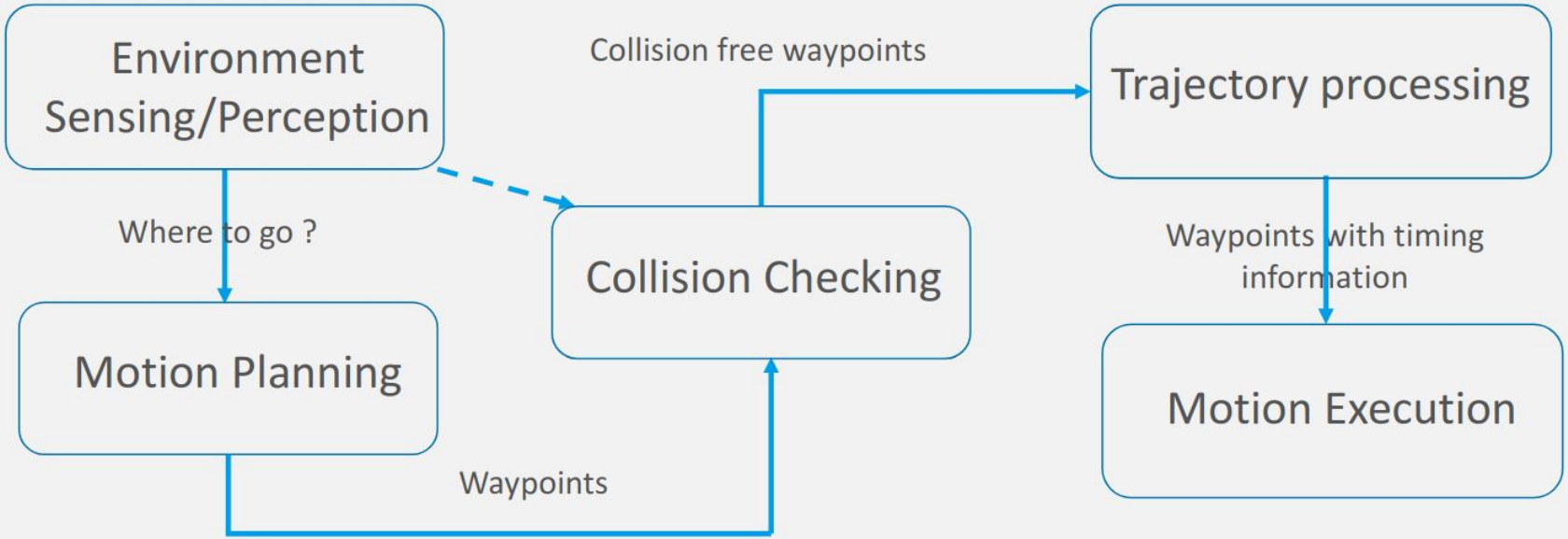
http://wiki.ros.org/tf2/Tutorials/Writing%20a%20tf2%20listener%20%28Python%29

ORB-SLAM2

move!t

- A ROS package designed specifically for manipulation
- Tasks in manipulation:
  - Interact with an object
  - Pick and place
  - Fastening nuts and bolts, etc.

Manipulation - functional modules



Typical functional modules associated with Manipulation

Usage:

- Moveit setup assistant: This lets us configure any package that we need to use with moveit
- Moveit commander-command line interface
- Python or C++ scripts

Setup Assistant: https://www.youtube.com/watch?v=BxCik8OI1Fw&list=PLK0b4e05LnzazEXI3heKyJwRAaisYwQum&index=2

Python Interface Tut: moveit_tutorials/move_group_python_interface_tutorial.py at master · ros-planning/moveit_tutorials

UR5 Description: https://github.com/ros-industrial/universal_robot

Convert the Xacro file to URDF: rosrun xacro xacro .xacro > .urdf

Credit: PhD comics and Willow Garage

Resources:

tf2/Tutorials - ROS

TF (transform) in ROS by perdue