PLAY WITH THE VISUALIZED ROBOTS

- VISUALIZE THE ROBOT WITH ITS ASSOCIATED VISUAL MODEL AND INSPECT BODIES OR FRAMES BY CLICKING ON THEM.

- CHECK FOR COLLISIONS AT EACH CONFIGURATION AND VISUALIZE CONFIGURATIONS WITH COLLISIONS.

- TOGGLE THE VISIBILITY OF VISUAL GEOMETRY AND COLLISION GEOMETRY BY RIGHT-CLICKING ON THE BODIES.

- CREATE AND SHOW DIFFERENT ROBOT CONFIGURATIONS USING THE HOME CONFIGURATION OR RANDOM CONFIGURATION FUNCTIONS.

Interact with the Panda

- Check the Show Robot Visual checkbox in the Planned Path tab.

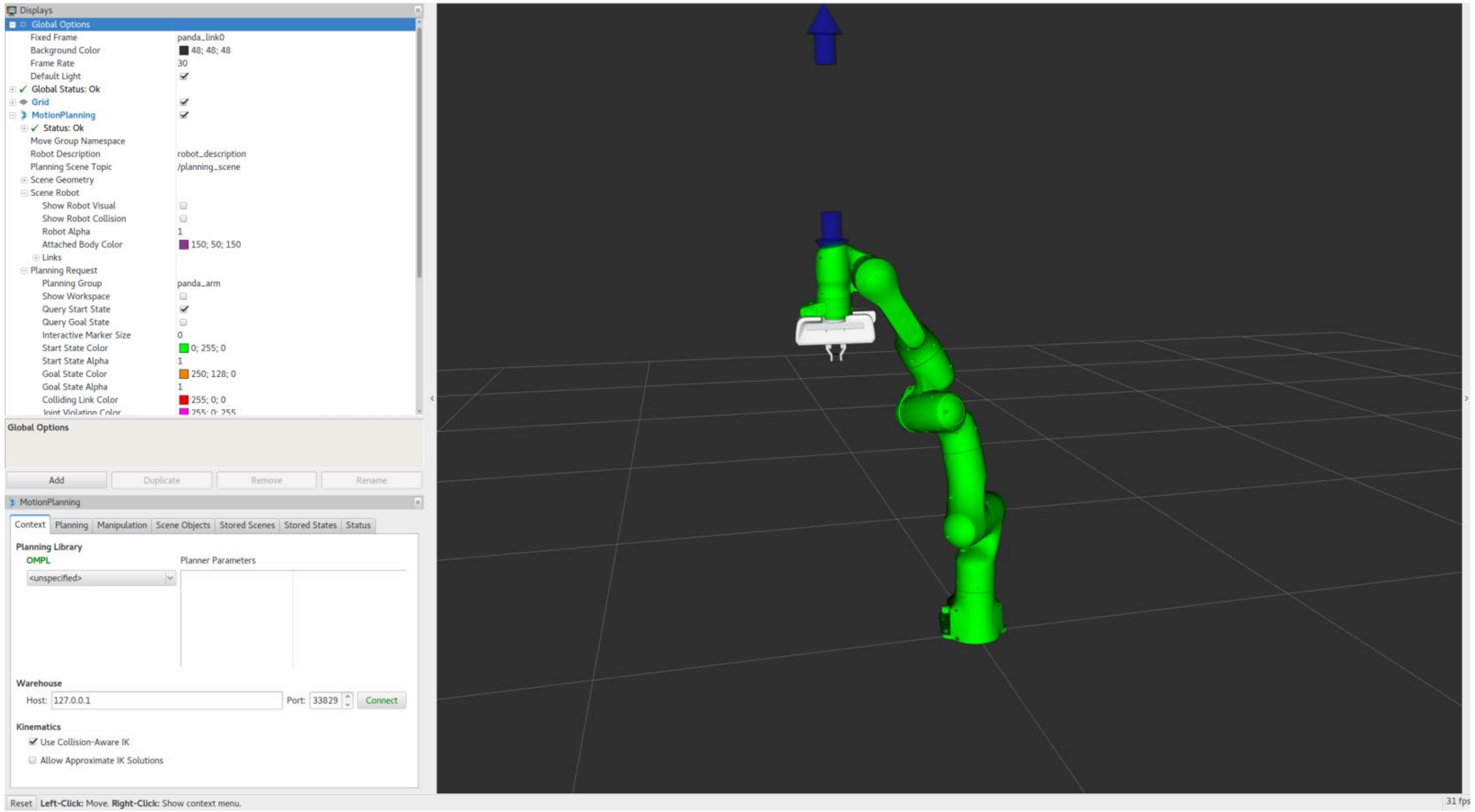
- Un-check the Show Robot Visual checkbox in the Scene Robot tab.

- Check the Query Goal State checkbox in the Planning Request tab.

- Check the Query Start State checkbox in the Planning Request tab.

- Interactive markers will now be visible, allowing the setting of the "Goal State" and "Start State" for motion planning.

Moving out of Reachable Workspace



Global Options	
Fixed Frame	panda_link0
Background Color	■ 48; 48; 48
Frame Rate	30
Default Light	☑
✓ Global Status: Ok	
Grid	☑
MotionPlanning	☑
✓ Status: Ok	
Move Group Namespace	
Robot Description	robot_description
Planning Scene Topic	/planning_scene
Scene Geometry	
Scene Robot	
Show Robot Visual	□
Show Robot Collision	□
Robot Alpha	1
Attached Body Color	■ 150; 50; 150
Links	
Planning Request	
Planning Group	panda_arm
Show Workspace	□
Query Start State	☑
Query Goal State	□
Interactive Marker Size	0
Start State Color	🟩 0; 255; 0
Start State Alpha	1
Goal State Color	🟧 250; 128; 0
Goal State Alpha	1
Colliding Link Color	🟥 255; 0; 0
Joint Violation Color	■ 255; 0; 255

Global Options

Planning Library

OMPL

<unspecified>

Planner Parameters

Warehouse

Host: 127.0.0.1 Port: 33829

Kinematics

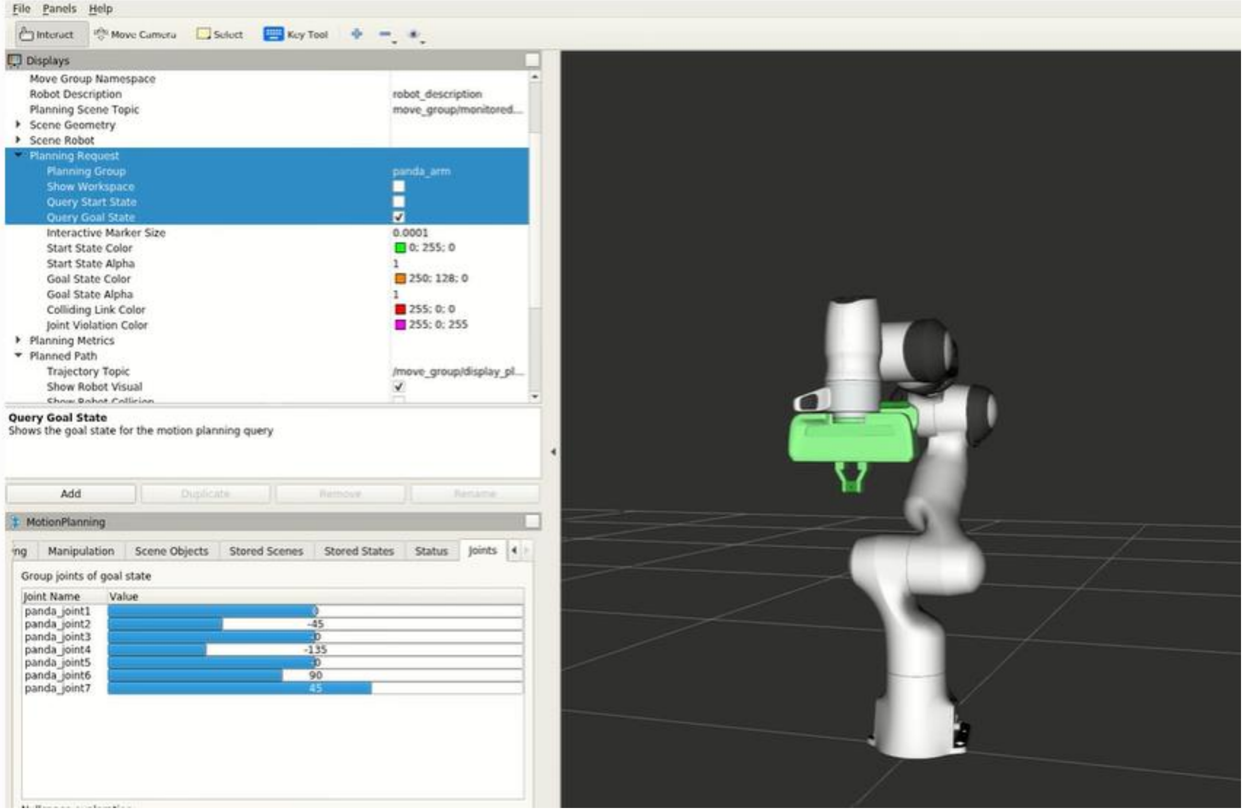
☑ Use Collision-Aware IK

□ Allow Approximate IK Solutions

Left-Click: Move. **Right-Click:** Show context menu.

Moving Joints or in Null Space

You can use the **Joints** tab to move single joints and the redundant joints of 7-DOF robots. Try moving the “null space exploration” slider as shown in the animation below.



Move Group Namespace	
Robot Description	robot_description
Planning Scene Topic	move_group/monitored...
Scene Geometry	
Scene Robot	
Planning Request	
Planning Group	panda_arm
Show Workspace	□
Query Start State	□
Query Goal State	☑
Interactive Marker Size	0.0001
Start State Color	🟩 0; 255; 0
Start State Alpha	1
Goal State Color	🟧 250; 128; 0
Goal State Alpha	1
Colliding Link Color	🟥 255; 0; 0
Joint Violation Color	🟪 255; 0; 255
Planning Metrics	
Planned Path	
Trajectory Topic	/move_group/display_pl...
Show Robot Visual	☑
Show Robot Collision	□

Query Goal State
Shows the goal state for the motion planning query

Group joints of goal state

Joint Name	Value
panda_joint1	0
panda_joint2	-45
panda_joint3	0
panda_joint4	-135
panda_joint5	0
panda_joint6	90
panda_joint7	45

Use Motion Planning with the Panda

To start motion planning with the Panda in the MoveIt RViz Plugin:

1. Move the Start State and Goal State to desired locations, ensuring no collision with the robot itself.

2. Visualize the Planned Path and check the Show Trail checkbox in the Planned Path tab.

3. Press the Plan button in the MotionPlanning window under the Planning tab to visualize the arm moving and a trail.

Choosing Specific Start/Goal States

To choose specific start and goal states for a planning request for your robot using the MoveIt RViz Plugin:

1. In the Planning tab, select the current state, previous state, a randomly sampled state, or a named state of the selected planning group from the .srdf file of the robot.

2. Select "previous" as the goal state after execution of a planned motion path to move back to the previous robot pose easily.

3. Both the current and previous start/goal states are automatically updated after execution, allowing easy movement back and forth between two states.

4. Use the interactive markers to set the goal and start states for motion planning.

Introspecting Trajectory Waypoints

To visually inspect trajectories point by point in RViz, follow these steps:

1. From the "Panels" menu, select "MotionPlanning - Slider".

2. Set your goal pose and run the "Plan" button in the Motion Planning panel.

3. Play with the "Slider" panel by moving the slider, pushing the "Play" button, and adjusting the goal pose as needed.

4. Ensure that you run "Plan" before running "Play" to see the correct trajectory, not the previous one.

5. If you don't see the interactive markers, press "Interact" in the top menu of RViz and add the "Interact" tool.

Executing Trajectories, Adjusting Speed

To visually inspect trajectories point by point in RViz, follow these steps:

1. From the "Panels" menu, select "MotionPlanning - Slider".

2. Set your goal pose and run the "Plan" button in the Motion Planning panel.

3. Play with the "Slider" panel by moving the slider, pushing the "Play" button, and adjusting the goal pose as needed.

4. Ensure that you run "Plan" before running "Play" to see the correct trajectory, not the previous one.

5. If you don't see the interactive markers, press "Interact" in the top menu of RViz and add the "Interact" tool.

Next Steps: RViz Visual Tools & Saving Your Configuration

To enable the RvizVisualToolsGui in RViz, follow these steps:

1. From the "Panels" menu, select "RvizVisualToolsGui".

2. Save your configuration in RViz before continuing to the next tutorials by going to File->Save Config.

These steps will help you visualize and inspect trajectories point by point in RViz, making it easier to understand and debug your robot's motion planning.

Move Group Python Interface

Introduction to Move Group Python Interface

- The Move Group Python Interface is a simple user interface for the MoveIt Motion Planning Framework.
- It provides wrappers for most operations that the average user will likely need, such as setting joint or pose goals, creating motion plans, moving the robot, adding objects into the environment, and attaching/detaching objects from the robot.
- The interface is designed to be user-friendly and powerful, allowing users to control the robot's motion and interact with the environment.
- It offers a quick and efficient way to work with MoveIt for motion planning and manipulation tasks.

Getting Started with Move Group Python Interface

- The tutorial provides step-by-step instructions for getting started with the Move Group Python Interface.
- It includes guidance on launching RViz and the MoveGroup node, which are essential for visualizing and controlling the robot's motion.
- Users are instructed to open two shells, start RViz, and run the Python code using rosrun to initialize the interface and the robot's environment.
- The expected output in RViz is described, allowing users to verify that the setup is correct and the interface is ready for use.

Setting Joint and Pose Goals

- Users can set joint or pose goals for the robot using the Move Group Python Interface.
- Joint goals involve specifying the desired joint values for the robot, while pose goals define the desired position and orientation of the end-effector.
- The interface allows for flexible goal setting, enabling users to plan and execute precise motion tasks based on the robot's kinematic structure.
- Setting accurate joint and pose goals is essential for defining the desired robot configuration and achieving specific manipulation tasks.

Motion Planning and Execution

a. The Move Group Python Interface supports the creation and execution of motion plans for the robot.

b. Users can plan and execute motion trajectories to move the robot's end-effector from its current position to the specified goal.

c. The interface provides capabilities for collision checking, path optimization, and real-time motion control, ensuring safe and efficient robot motion.

d. Motion planning and execution are fundamental aspects of robot control, and the interface simplifies the process for users, allowing them to focus on task-level commands and high-level manipulation goals.