8、MoveIt Configuration

This course takes transbot_config_camera as an example, and transbot_config_astra is the same process.

1. Start the configuration program

- Start up roscore

```
roscore
```

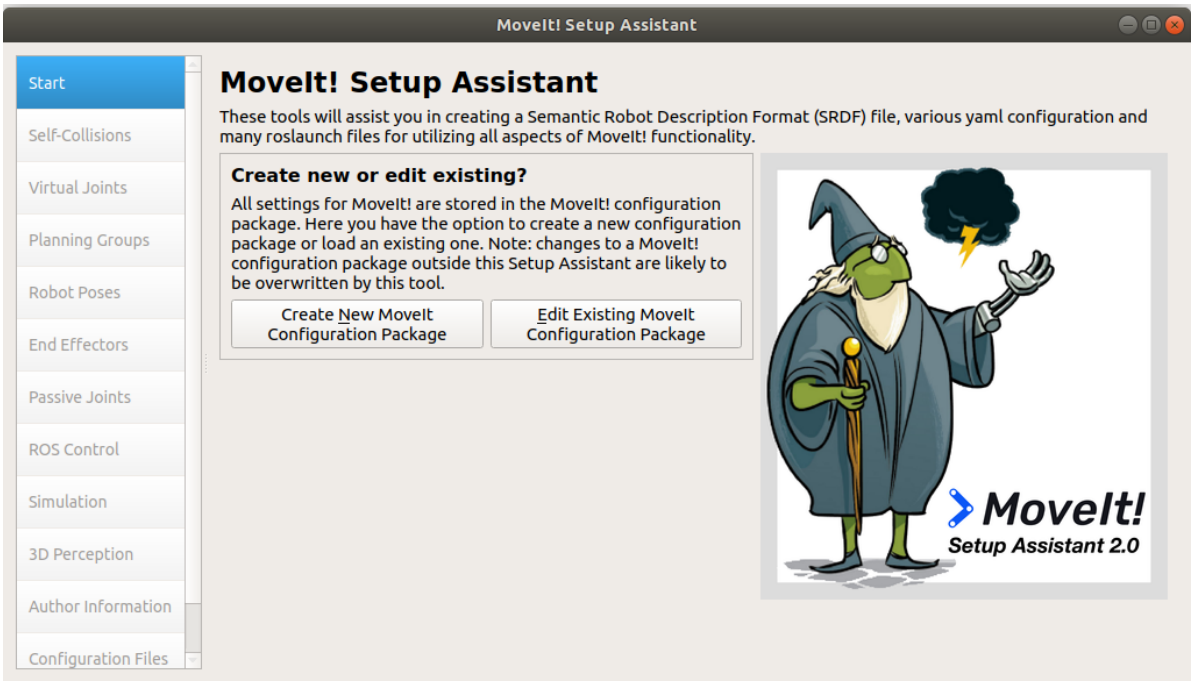
- Open another command line and start MoveIt

```
rosrun moveit_setup_assistant moveit_setup_assistant
```

2. Configuration process

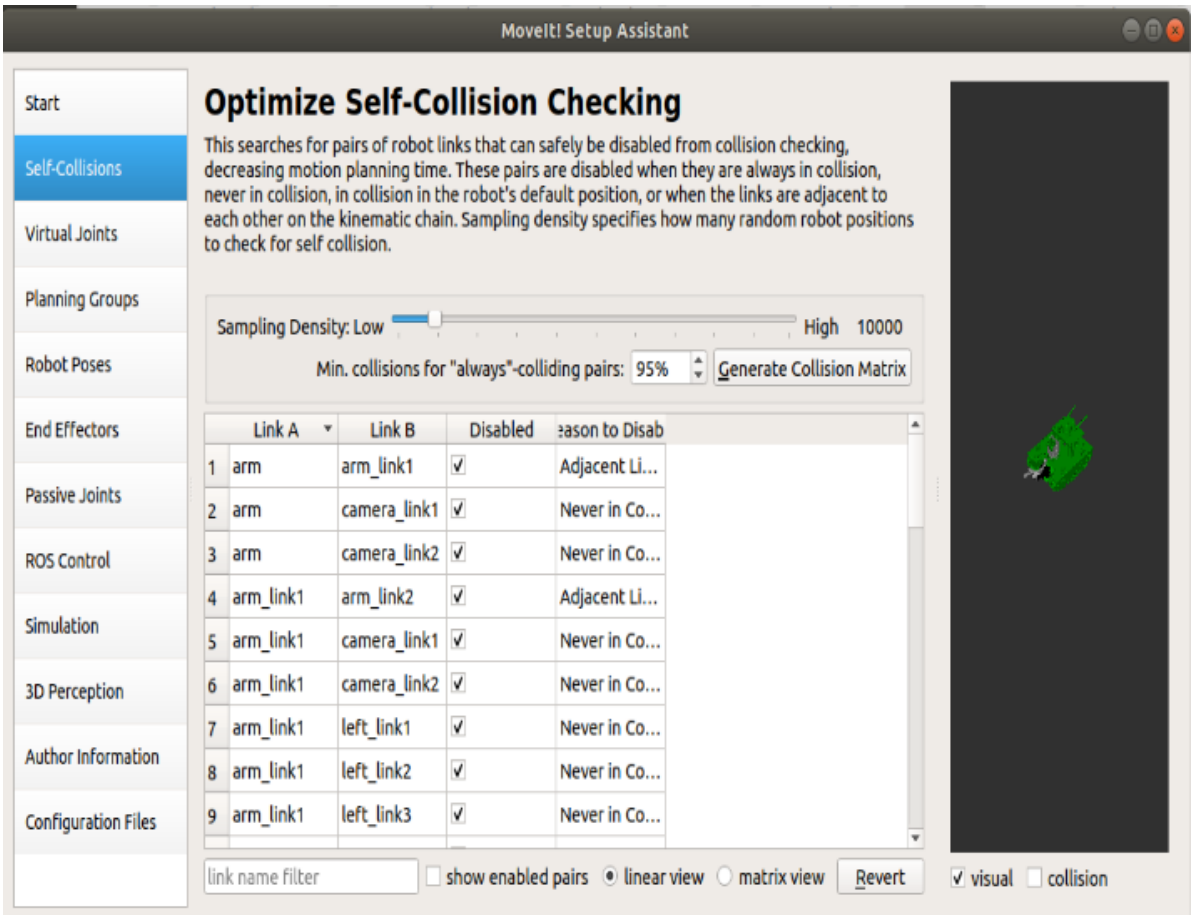
- Load URDF model

If it is the first time to load the model generation configuration, select the left side; if it is to modify the generated configuration file, select the right side.



Click the `Browse` button, find the URDF model file, and click [Load Files] in the lower right corner to load it.

- Avoid Collision Matrix，ACM，clikc `Generate Collision Matrix` button.



- Add a virtual joint, which can be understood as a joint connecting the robot and the world. (Transbot is not set)

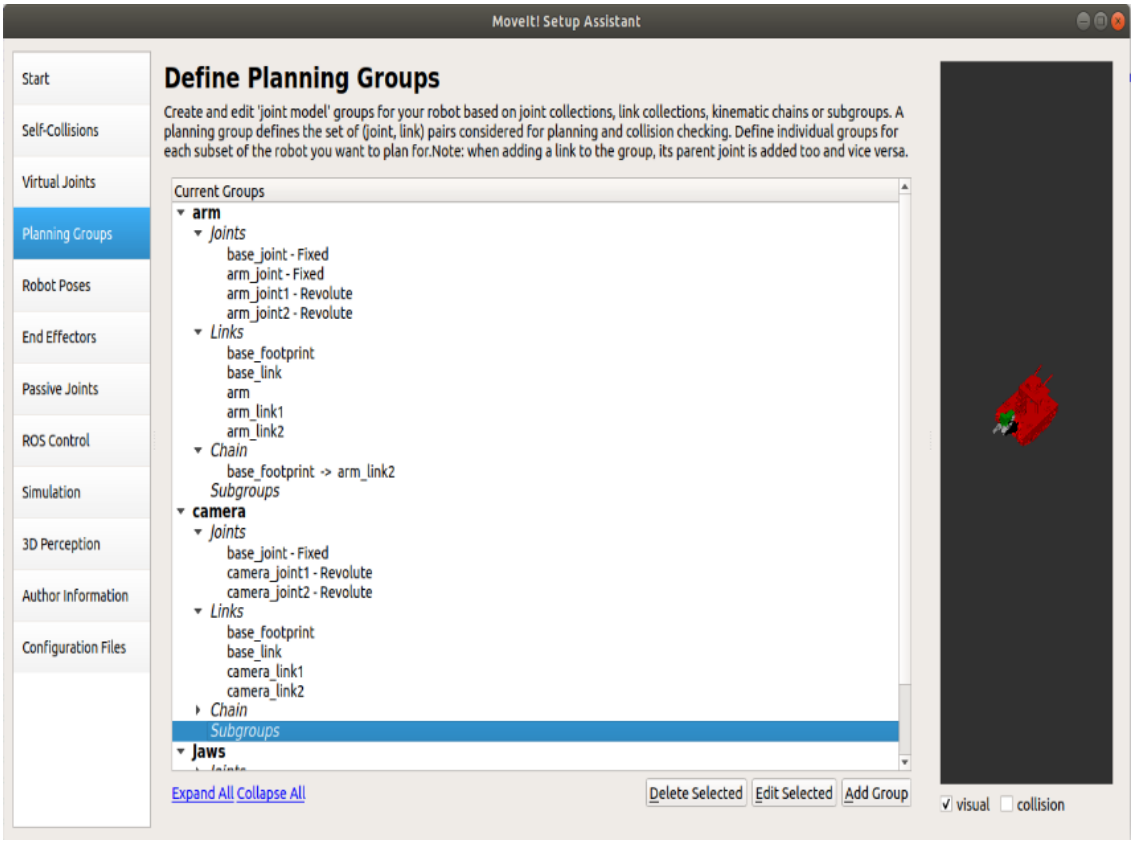
`Virtual Joint Name`：Virtual joint name.

`Child Link` It is necessary to connect the 'world' to that part of the robot.

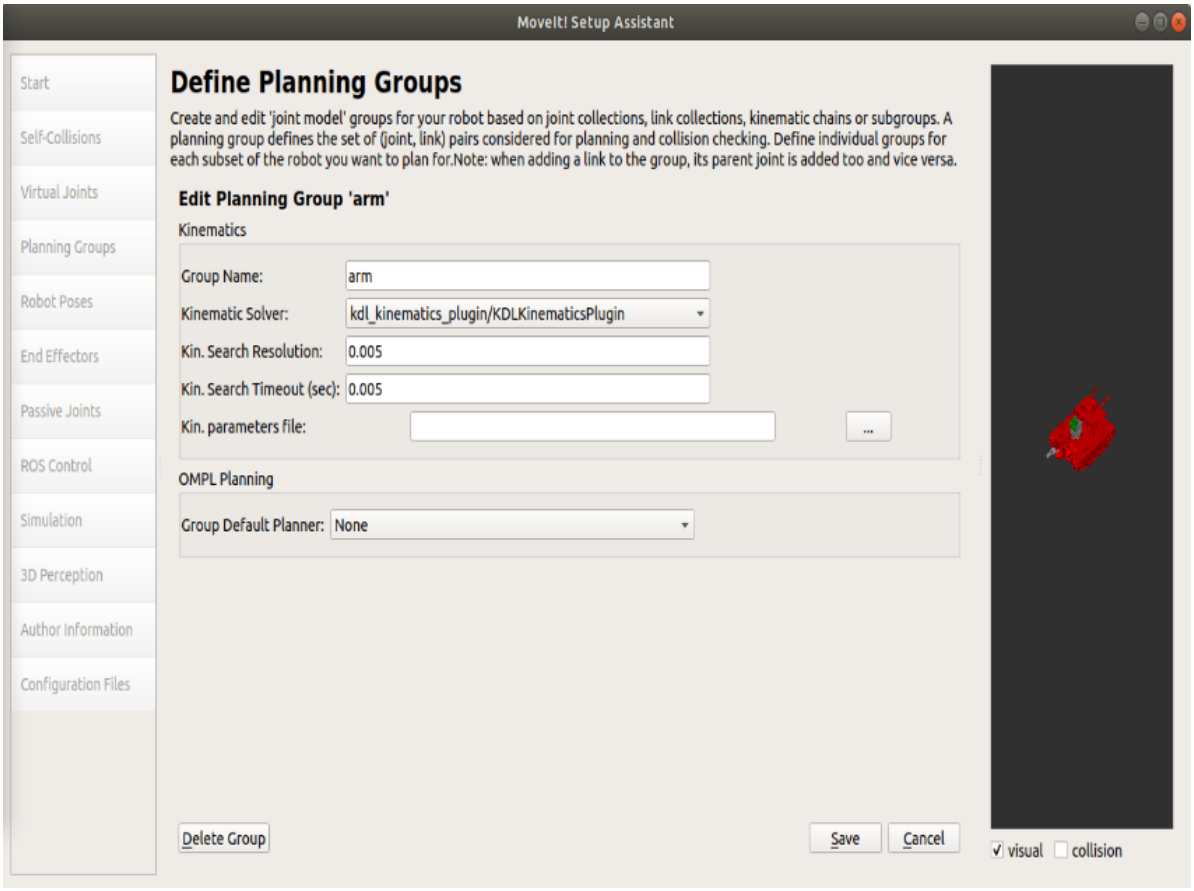
`Parent Frame Name`：Name of the world coordinate, generally called `world` in ROS.

`Joint Type` joint type, select fixed `Fixed`. It means that the robot is fixed relative to the world. And the other two, `Planar` refers to the plane mobile base (xy plane + angle), used for mobile robots such as PR2; there is also a kind of `Floating`, refers to the floating base (xyz position+orientation), such as class Human robot.

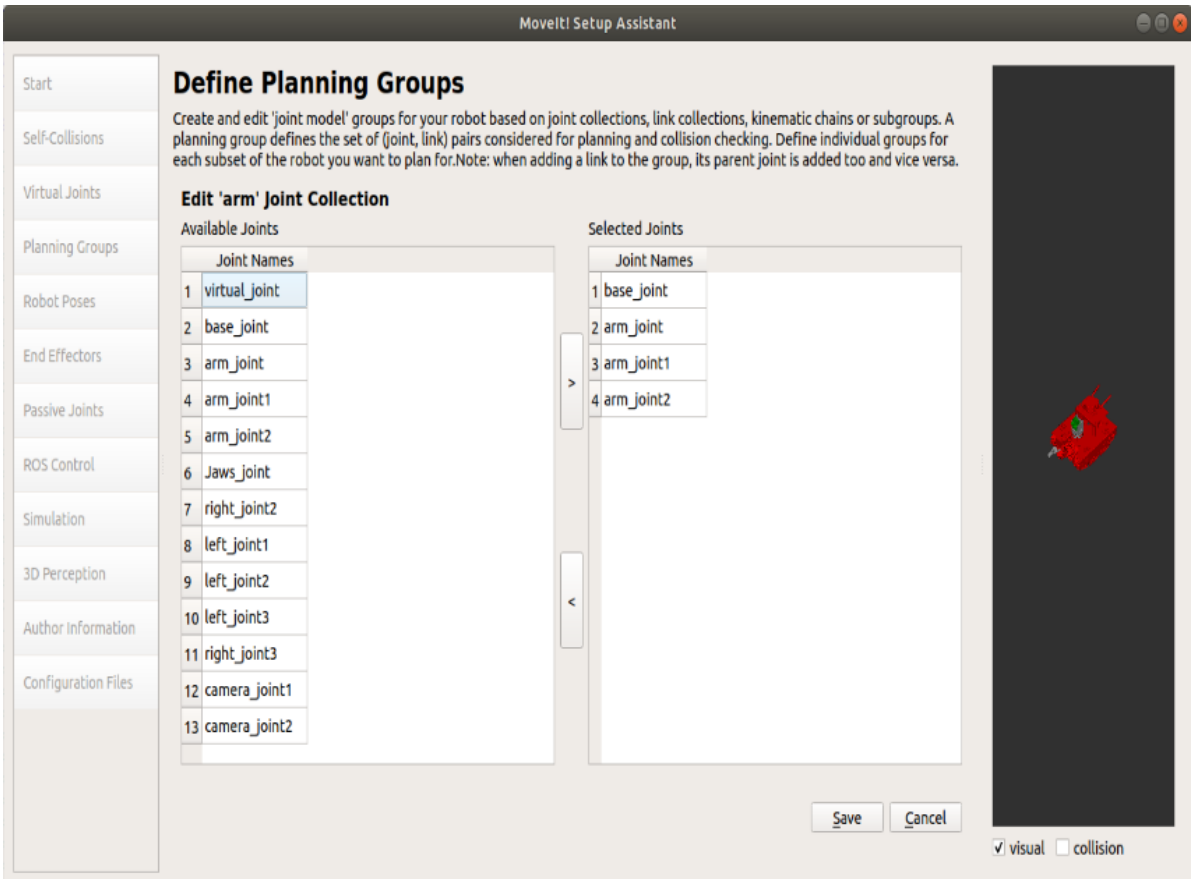
- Creating a motion planning group `Planning Group` is one of the cores of MoveIt.



  - Group Name：Name of the motion planning group.
  - Kinematic Solver：Kinematics solving tool, generally we use KDL, `The Kinematics and Dynamics Library`。
  - Kin. Search Resolution：The sampling density of the joint space.
  - Kin. Search TImeout：Solution time.

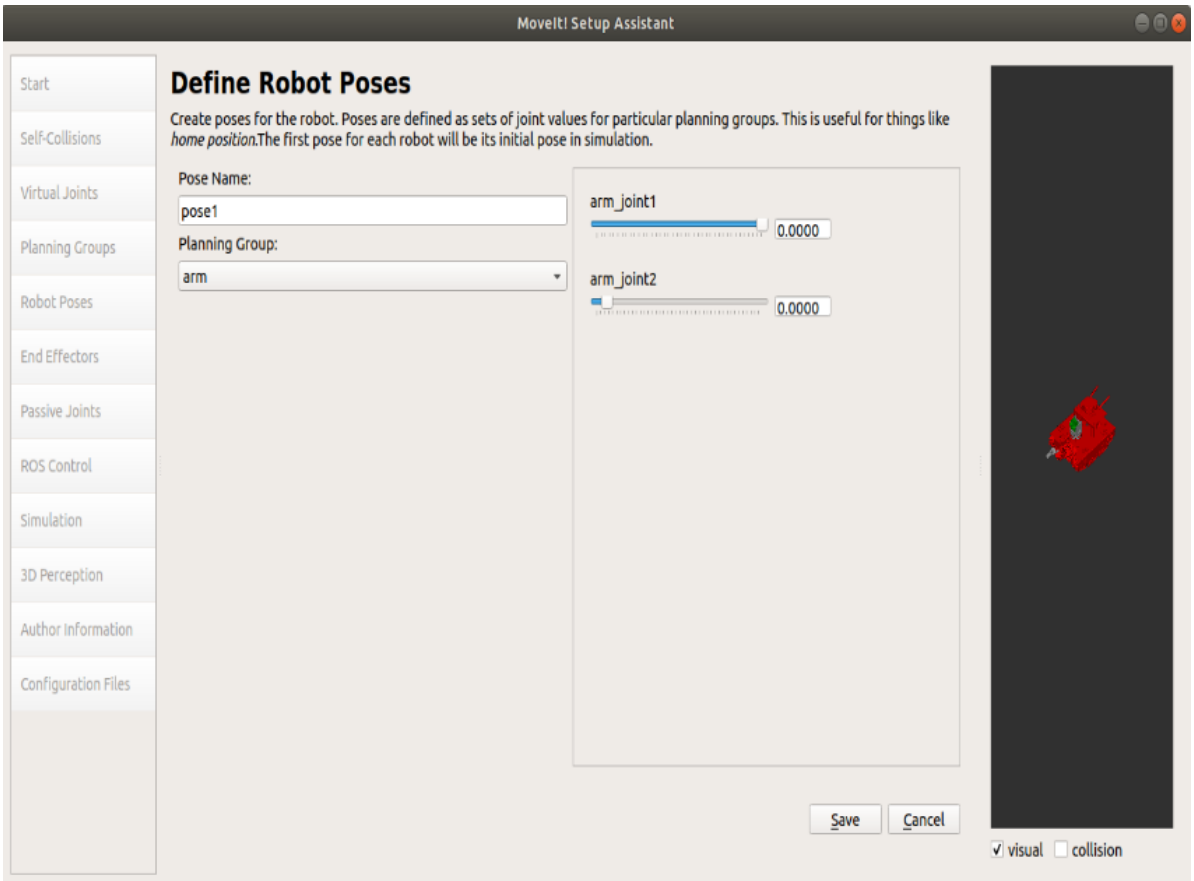


- Define planning group

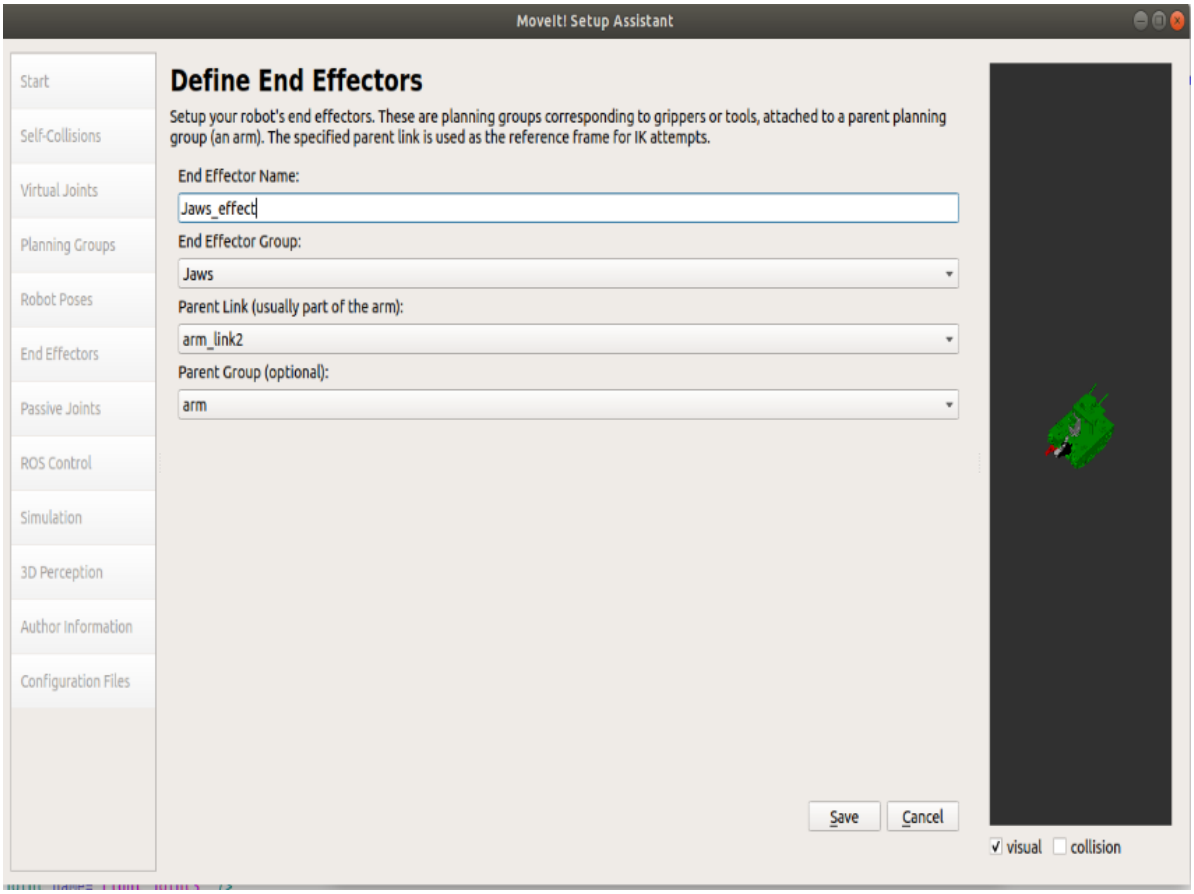


- Create Robot Poses

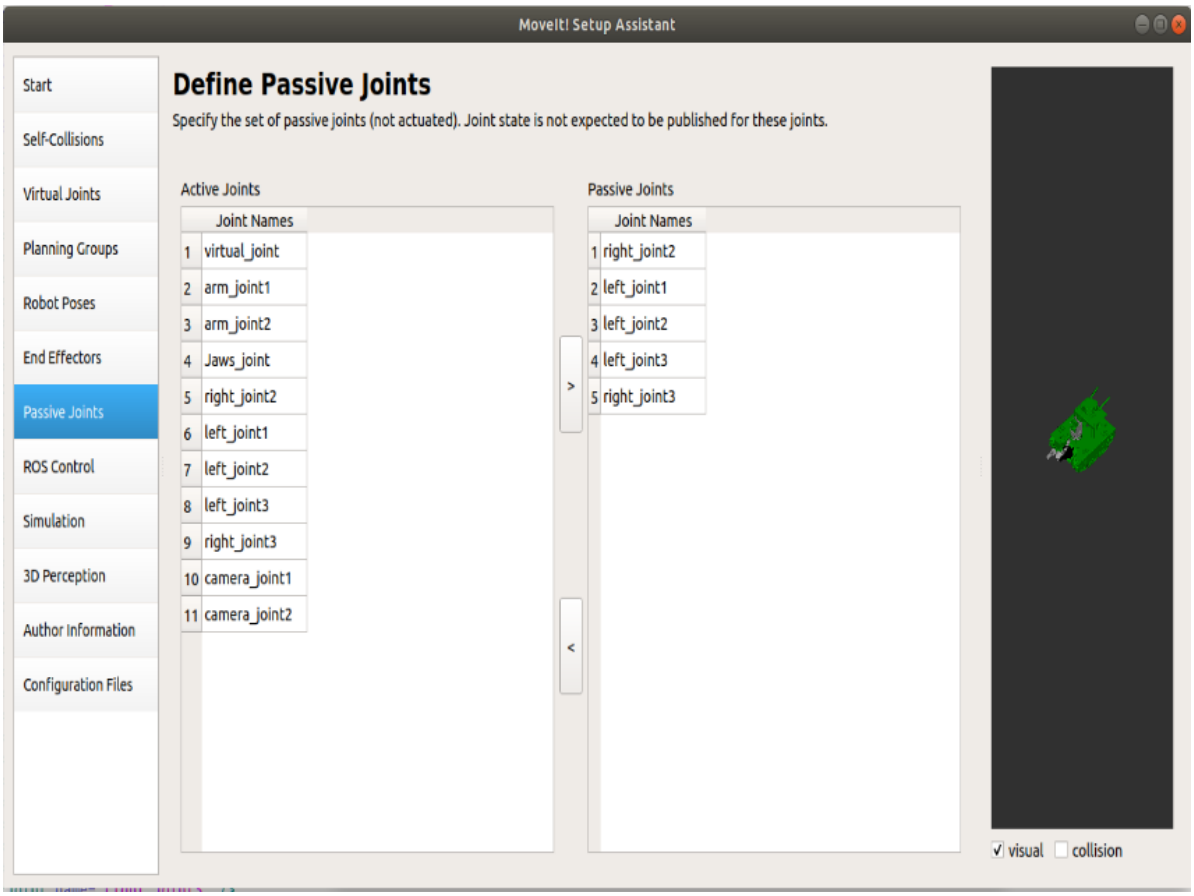
Specific settings



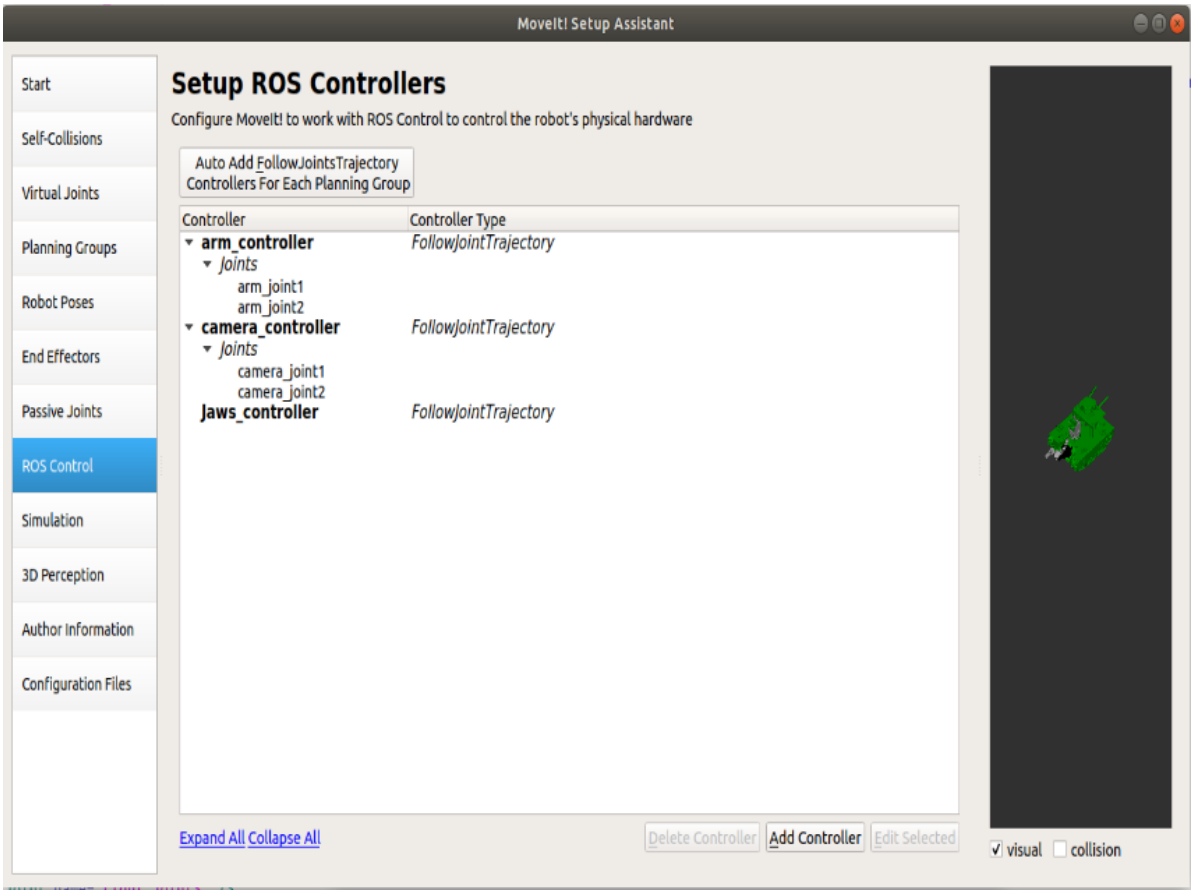
- Setting up the end effectors



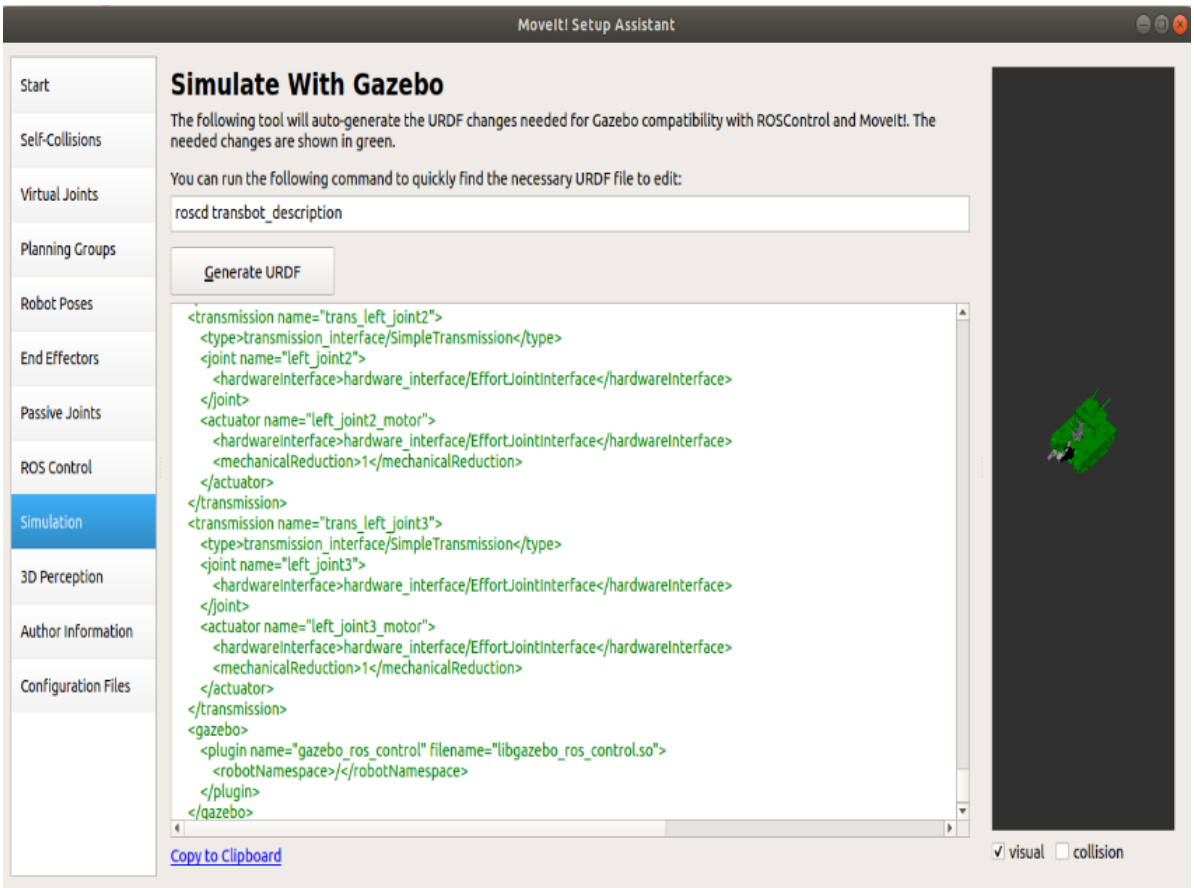
- Set up passive joints



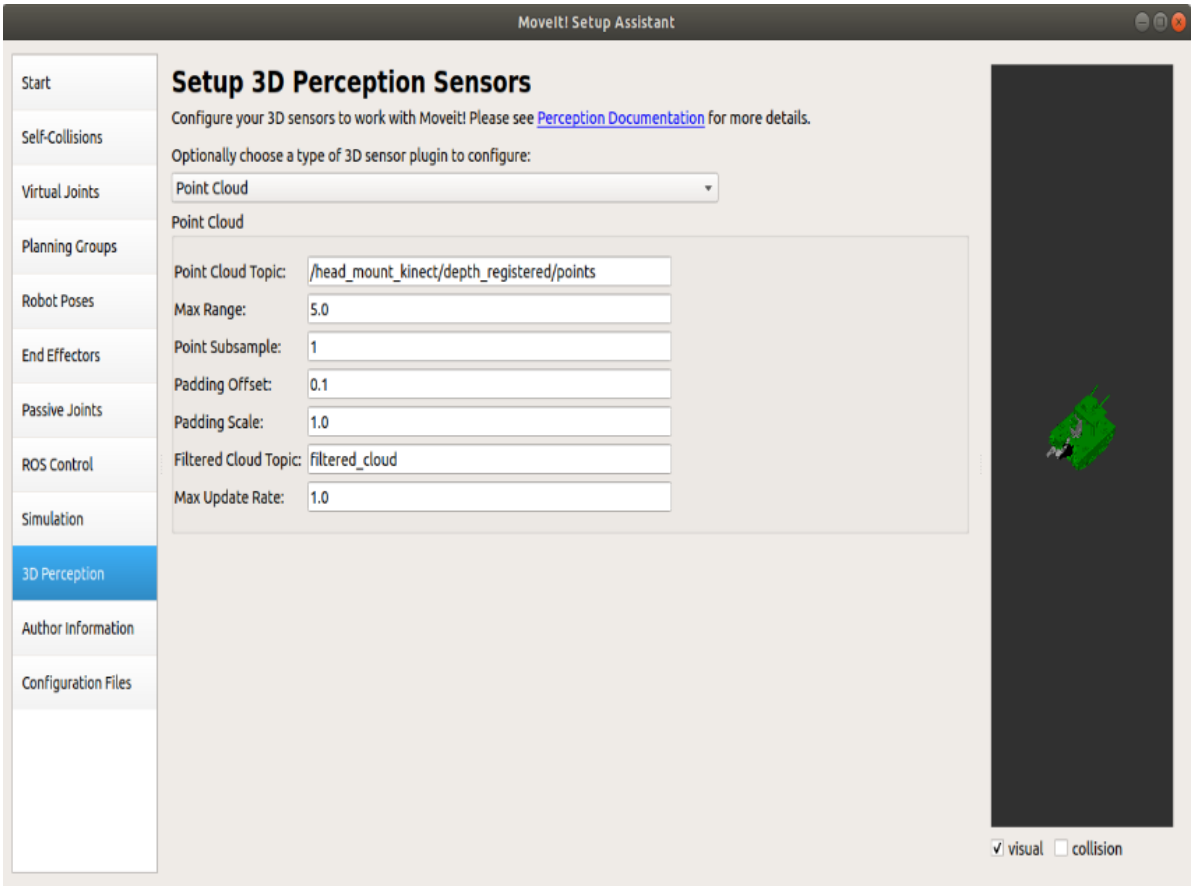
- Build a ROS controller



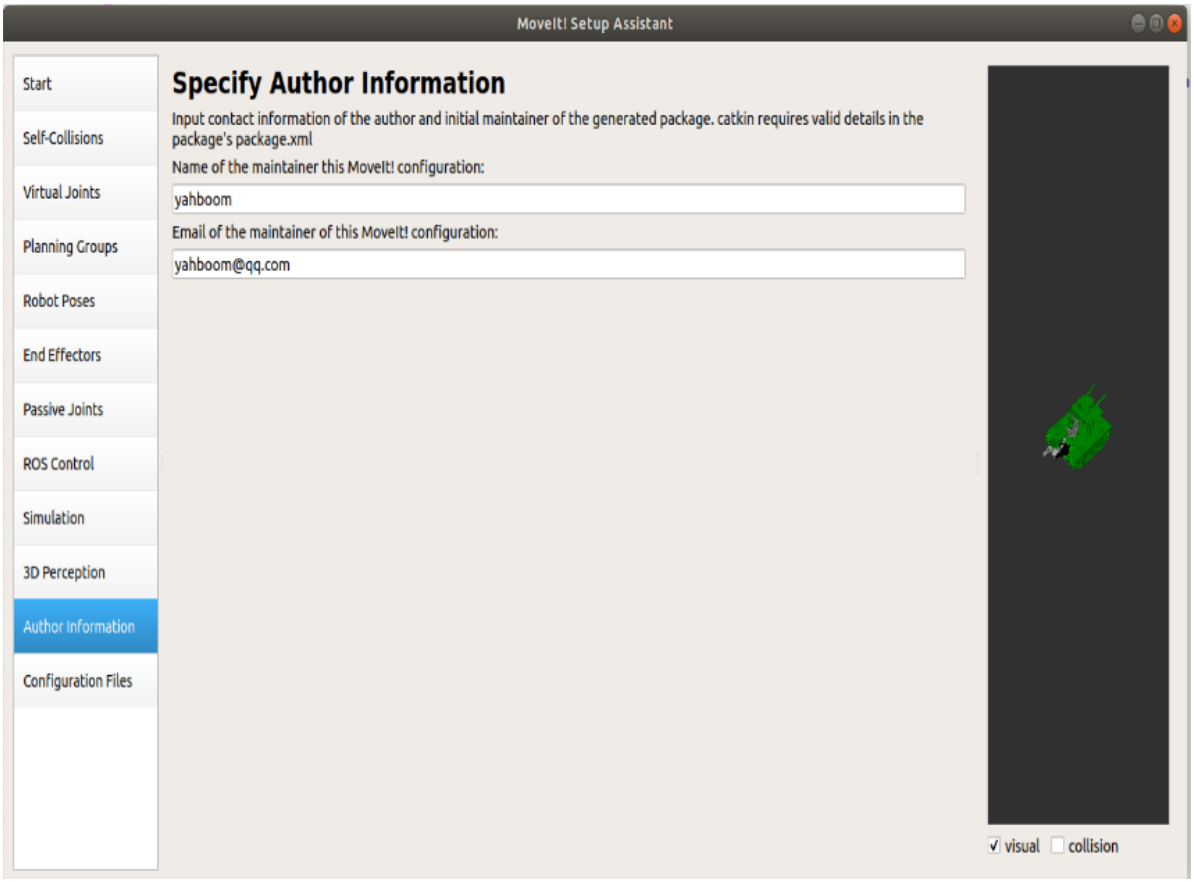
- Add available gazebo simulation (can be skipped)



- Create 3D information (can be skipped)

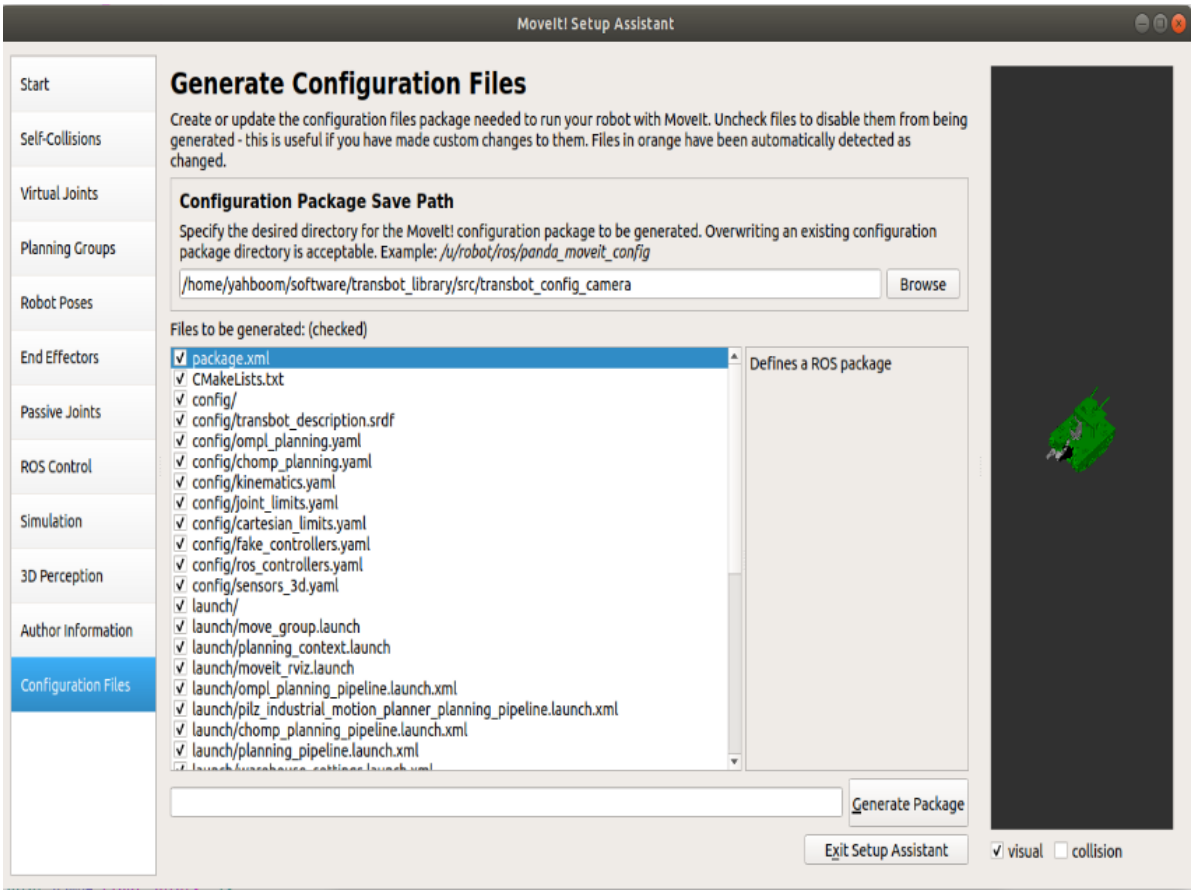


- Add author information, if you don't add it, you can't generate



- Generate configuration file

Create a new transbot_config_camera folder, place the configuration file in this folder, click the `Browse` button, select the folder, and click the `Generate Package` button to generate the configuration file. After finishing, just exit.



3.Detailed configuration package

Open the transbot_config_camera folder just created, we find that there are two folders, config and launch.

- config folder
  - fake_controllers.yaml：This is a virtual controller configuration file, which is convenient for us to run MoveIt without a physical robot or even any simulator (such as gazebo).
  - joint_limits.yaml：Here is the limit of the position, velocity and acceleration of each joint of the robot, which will be used in future planning.
  - kinematics.yaml：Things set by the motion planning group, used to initialize the kinematics solution library
  - dofbot.srdf：This is an important MoveIt configuration file.
  - ompl_planning.yaml：There are the various parameters for configuring various algorithms of OMPL.
  - SRDF file：SRDF is the configuration file of moveit and is used in conjunction with URDF.
- launch folder
  - demo.launch：Demo is the summary point of the operation. Open it and we can see that it includes other launch files.
  - move_group.launch：Its function is to make a planning group move.
  - planning_context.launch：We can see that the urdf and srdf files used are defined, as well as the kinematics solution library. It is not recommended to change these contents manually.
  - setup_assistant.launch：If you need to change some configuration, you can run it directly.

4.Configuration verification

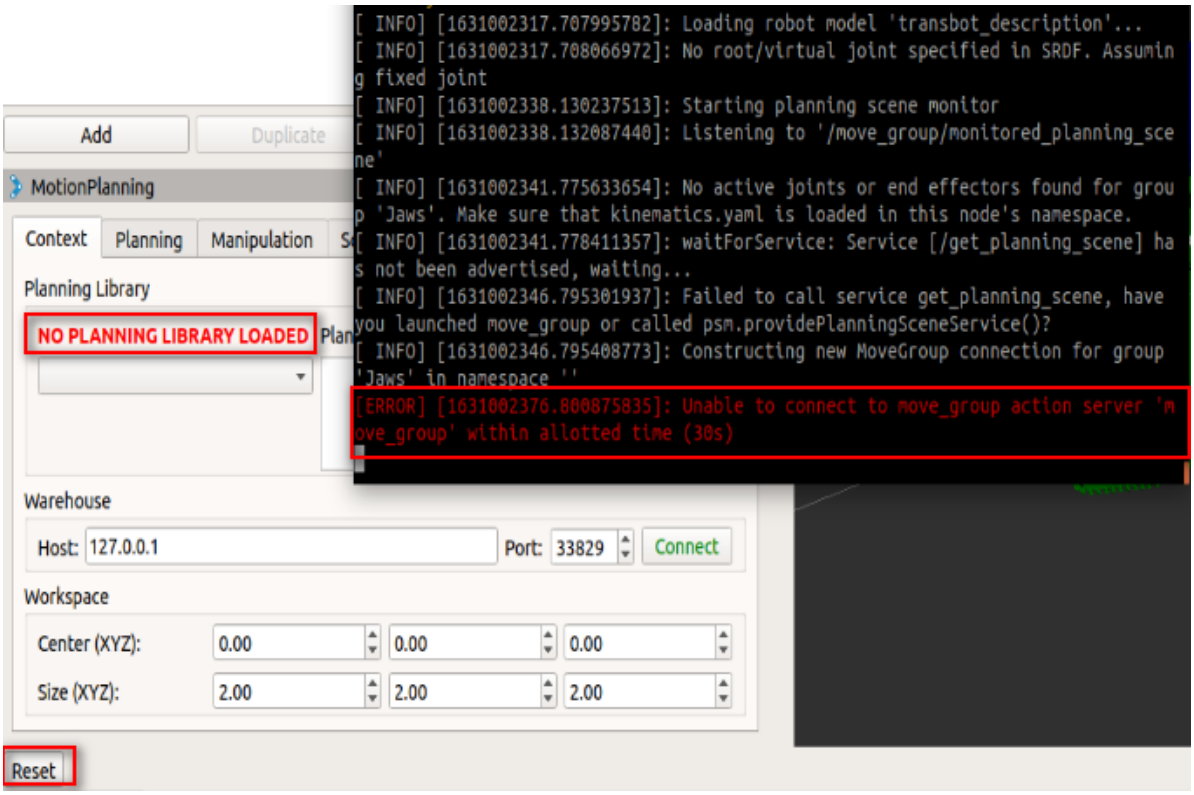
Enter the workspace where the configuration file is located and execute the following command

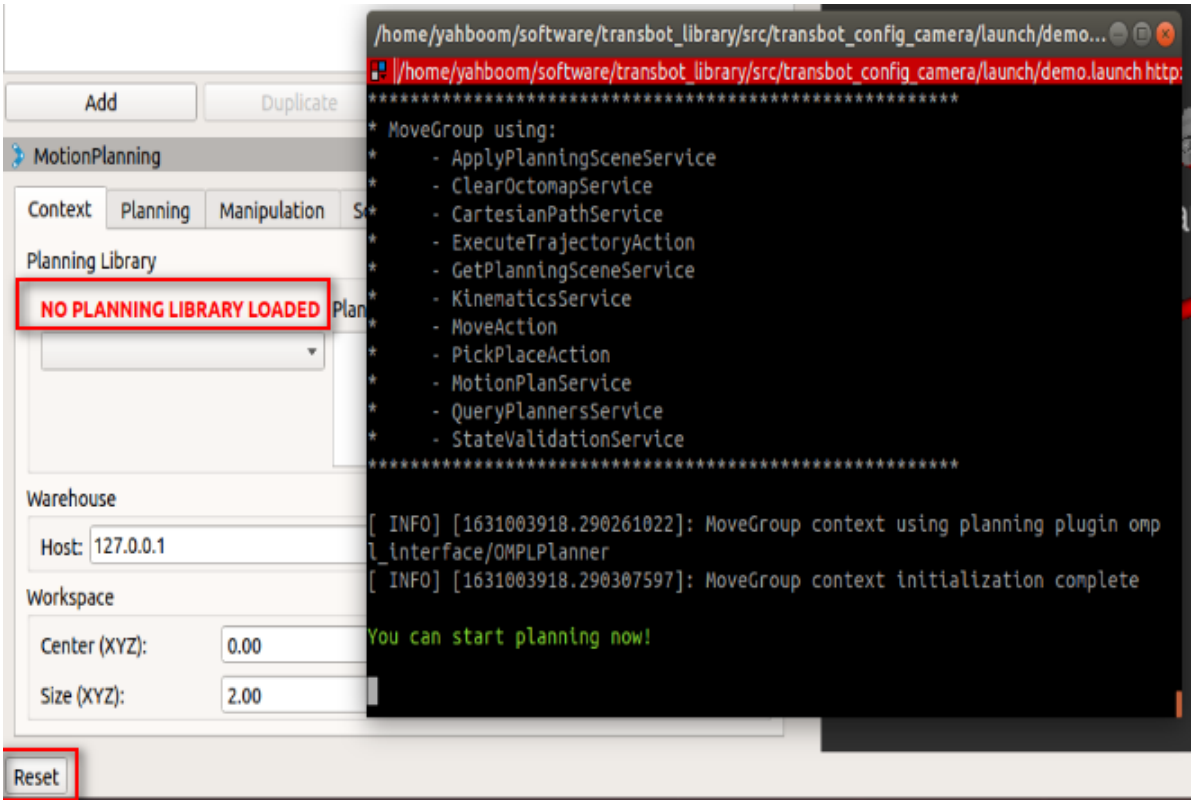
```
cd ~/software/transbot_library                  # Enter the workspace
catkin_make                                     # Compile
source devel/setup.bash                         # Update system
roslaunch transbot_config_camera demo.launch  # Start the ROS node
```

FAQ

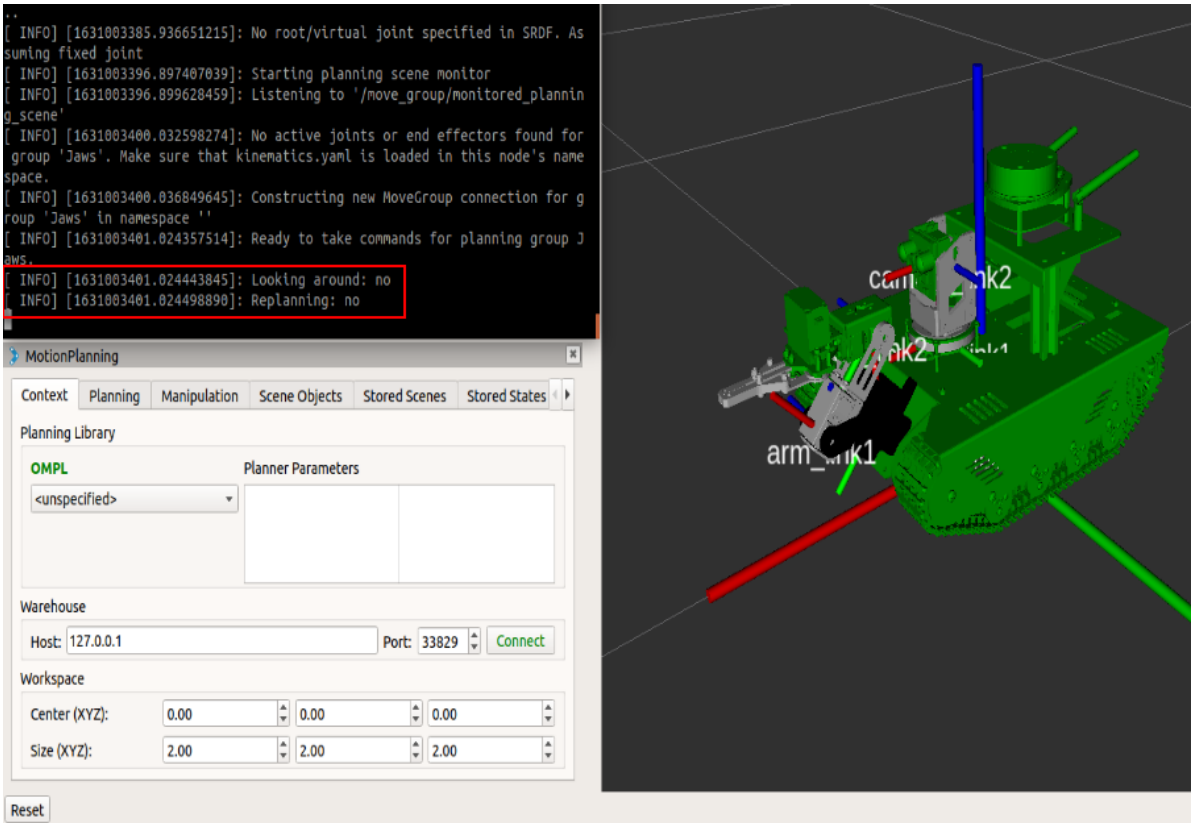
The MoveIt simulation environment starts slowly, wait patiently, observe the terminal, an error as shown in the figure below appears, an error is reported and the motion planning library is not loaded.
Click [Reset] in the lower left corner and reload it. At first, during the loading process, don't worry about clicking [Reset].

If you click before loading, the system will reload, which will cause the system to fail to load completely.

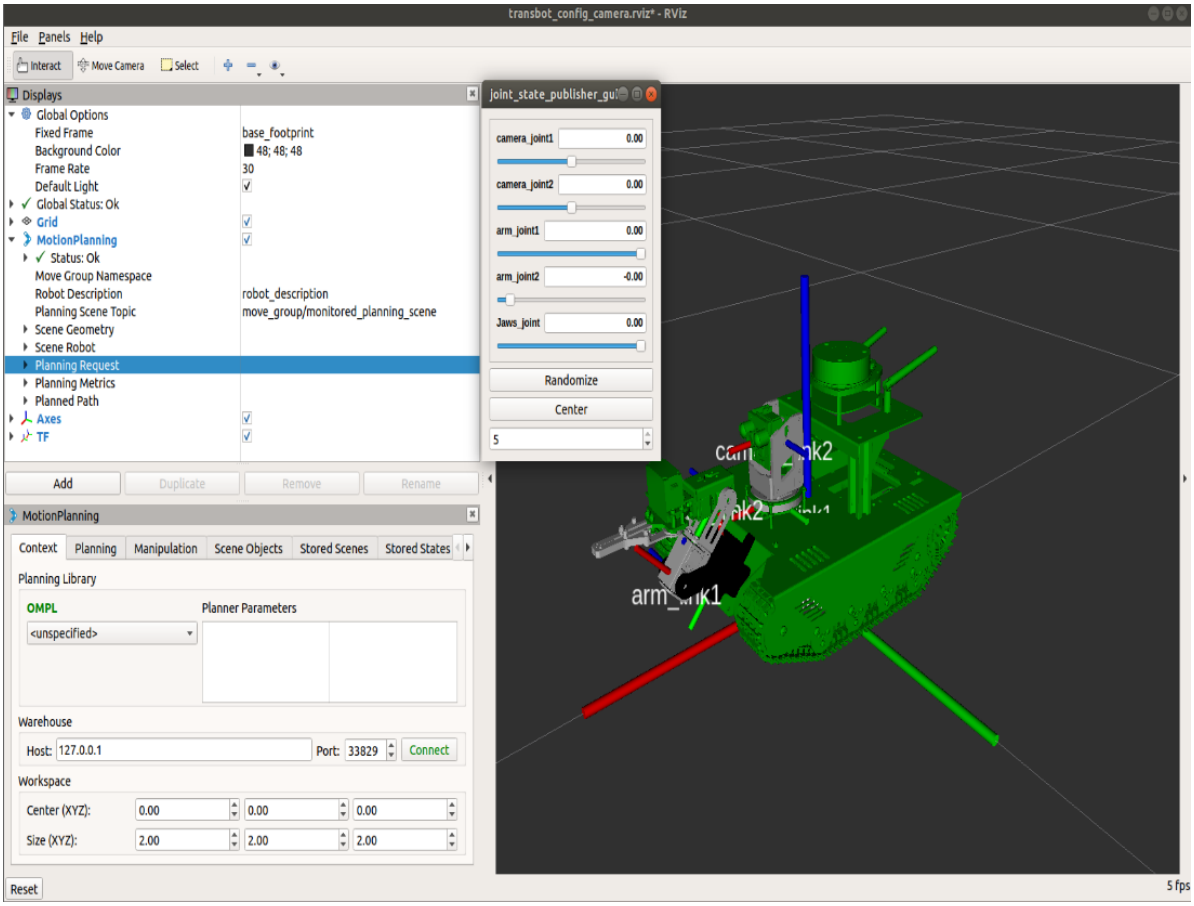




As shown in the figure below, if [Replanning: yes] appears on the terminal and a green [OMPL] appears under Planning Library, the startup is successful.



Sample picture


transbot_config_camera.rviz* - RViz
File Panels Help
Interact
Move Camera
Select
Displays
Global Options
Fixed Frame
base_footprint
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
move_group/monitored_planning_scene
Scene Geometry
Scene Robot
Planning Request
Planning Metrics
Planned Path
Axes
TF
Add
Duplicate
Remove
Rename
MotionPlanning
Context
Planning
Manipulation
Scene Objects
Stored Scenes
Stored States
Planning Library
OMPL
Planner Parameters
<unspecified>
Warehouse
Host: 127.0.0.1
Port: 33829
Connect
Workspace
Center (XYZ):
0.00
0.00
0.00
Size (XYZ):
2.00
2.00
2.00
Reset
joint_state_publisher_gui
camera_joint1
0.00
camera_joint2
0.00
arm_joint1
0.00
arm_joint2
-0.00
Jaws_joint
0.00
Randomize
Center
5
arm_link1
5 fps