

2、 MoveIt control the real machine

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MoveIt website: http://docs.ros.org/en/melodic/api/moveit_tutorials/html/index.html

2.1、 Prepare

According to different models, you only need to set the purchased model in [.bashrc], X1 (ordinary four-wheel drive) X3 (Mike wheel) X3plus (Mike wheel mechanical arm) R2 (Ackerman differential) and so on. Section takes X3 as an example

Open the [.bashrc] file

```
sudo vim .bashrc
```

Find the [ROBOT_TYPE] parameter and modify the corresponding model

```
export ROBOT_TYPE=X3plus    # ROBOT_TYPE: X1 X3 X3plus R2 X7
```

This lesson applies to all MoveIT cases for robots; MoveIT is mainly for robots with robotic arms.

2.2. Simulation startup

Just control the robot in the simulation under the MoveIT simulation.

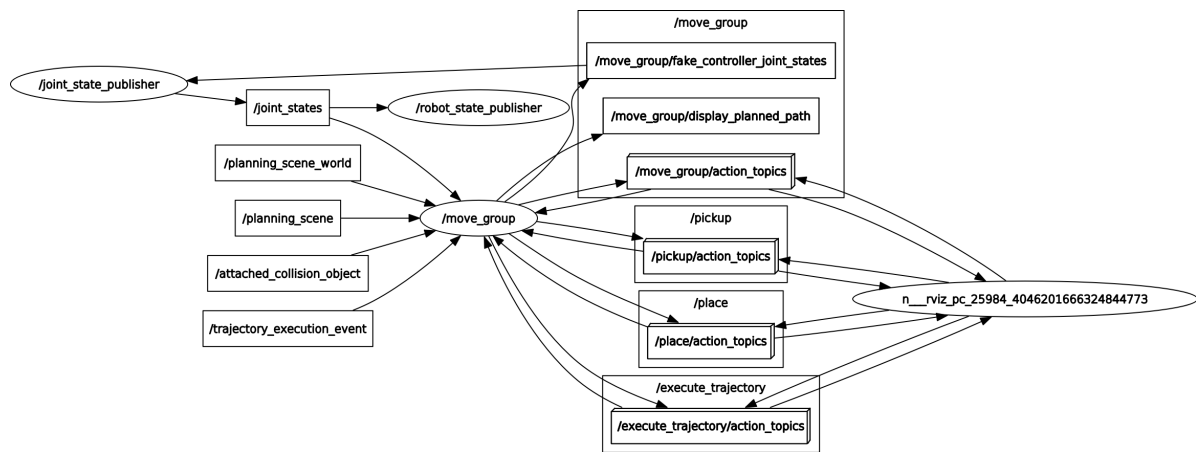
```
roslaunch arm_moveit_demo x3plus_moveit_demo.launch sim:=true # Recommended  
virtual machine
```

Parameter use_rviz: Whether to enable rviz, if true, enable.

Parameter use_gui: Whether to open the GUI control interface, if true, this parameter is only valid when sim is true.

```
rqt_graph
```

Node diagram is as follows:



2.3. Control real machine

Controlling the real machine is to control the real robot in combination with MoveIT.

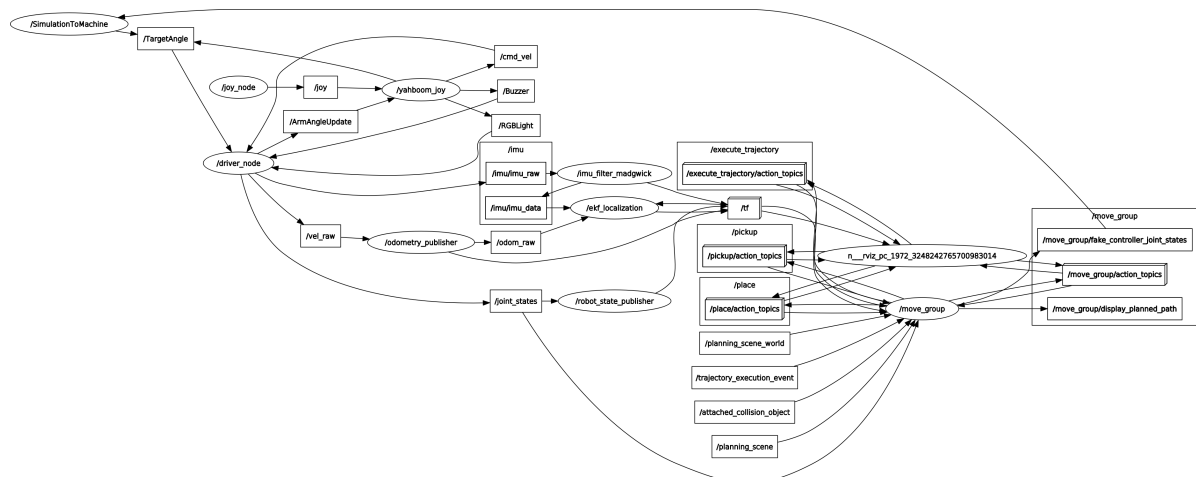
- Host by robots

```
roslaunch yahboomcar_bringup bringup.launch # robot end
roslaunch arm_moveit_demo x3plus_moveit_demo.launch sim:=false # Recommended
virtual machine
```

- Host virtual machine

```
roscore # virtual
machine
roslaunch yahboomcar_bringup bringup.launch # robot end
roslaunch arm_moveit_demo x3plus_moveit_demo.launch sim:=false # Recommended
virtual machine
```

Node diagram is as follows:



Corresponding relationship between robotic arm servos and joints: from the lowest end of the robotic arm to the end of the gripper.

Robotic Arm Servo	joint	joint
The first servo	joint1	joint1
The second servo	joint2	joint2
The third servo	joint3	joint3
The fourth servo	joint4	joint4
The fifth servo	joint5	joint5
Servo that controls the gripper	grip_joint	Gripper

Handle to control robotic arm

Button	Robotic Arm	Button	Robotic Arm
X	Joint 1 turn left (data reduce)	B	Joint 1 turn right (data increase)
A	Joint 2 down (data reduce)	Y	Joint 2 up (data increase)
Left row left button	Joint 3 down (data reduce)	left row right button	Joint 3 up (data increase)
Left row down button	Joint 4 down (data reduce)	Left row up button	Joint 4 up (data increase)
L1 (default)	Joint 5 turn left (data increase)	L2 (default)	Joint 5 turn right (data increase)
L1	Gripper tightening (data increase)	L2	Gripper release (data reduce)

Handle **【R2】** button: Get the current joint angle of the mechanical arm.

Use the handle **【SELECT】** button to switch control **【joint 5】** or control **【gripper】** .

At this point, use the handle to control the robotic arm, and you will find that the real machine runs synchronously with the MoveIT simulation.

2.4.matters needing attention

Note: There may be problems, not necessarily.

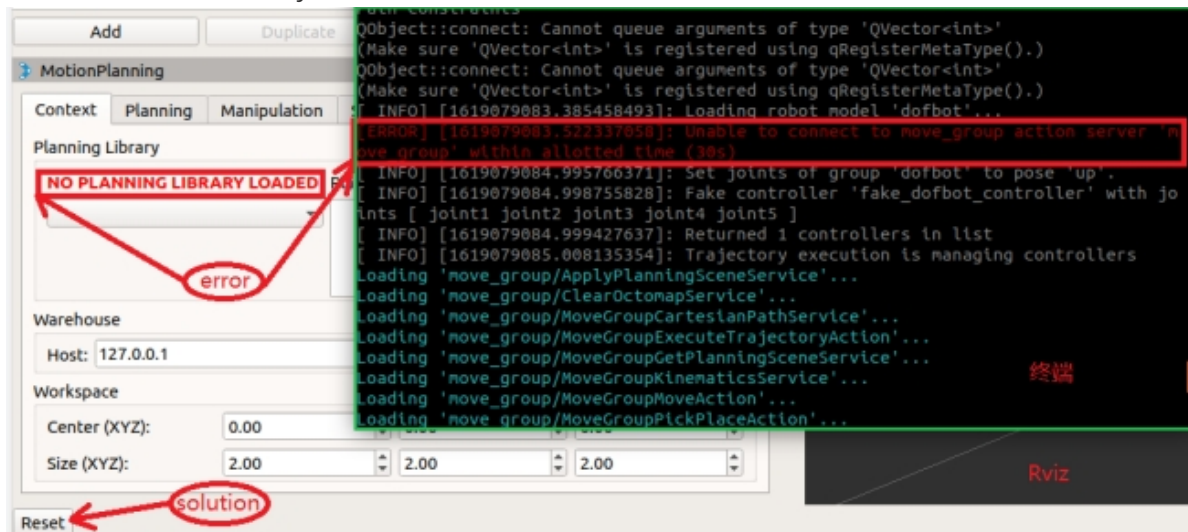
2.4.1. Start the robotic arm

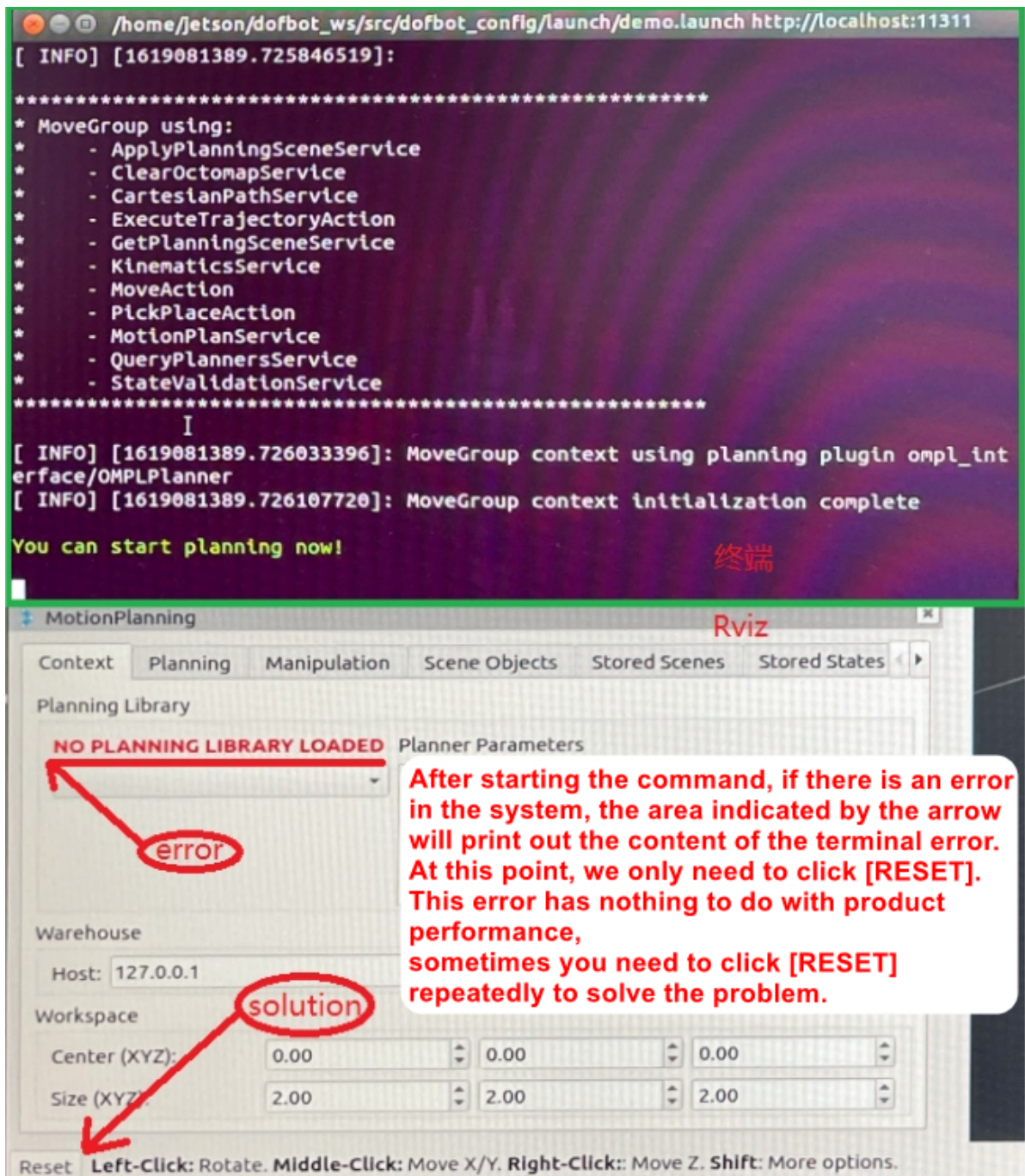
Regardless of whether you are using MoveIT or not, when you start the handle to control the real robot, the handle state is connected, but the robot cannot be controlled. In this case, the handle control node may be acquiring the current position of the manipulator, and the current position data of the manipulator is [-1] (out of range or read failure).

Solution: Click the [START] button of the handle several times, and at the same time grab the gripper and gently shake the mechanical arm up and down until the buzzer sounds.

2.4.2.Start the MoveIt

The MoveIt simulation environment starts slowly, wait patiently and observe the terminal. An error as shown in the figure below occurs. The solution is shown in the figure. If the terminal reports an error and the motion planning library is not loaded, click [Reset] in the lower left corner to reload. At first, during the loading process, don't click [Reset] in a hurry. If you click it before it is loaded, the system will be reloaded, so it can't be started.





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

```
[INFO] [1619079085.126261894]: MoveGroup context using planning plugin ompl_interface/OMPLPlanner
[INFO] [1619079085.126296501]: MoveGroup context initialization complete

You can start planning now!

[INFO] [1619079144.018331969]: Stopping planning scene monitor
[WARN] [1619079144.058627471]: SEVERE WARNING!!! Attempting to unload library while objects created by this loader exist in the heap! You should delete your objects before attempting to unload the library or destroying the ClassLoader. The library will NOT be unloaded.
[INFO] [1619079144.060378130]: Loading robot model 'dofbot'...
[INFO] [1619079153.366458947]: Starting planning scene monitor
[INFO] [1619079153.368822804]: Listening to '/move_group/monitored_planning_scene'
[INFO] [1619079156.233051823]: Constructing new MoveGroup connection for group 'dofbot' in namespace ''
[INFO] [1619079157.321685434]: Ready to take commands for planning group dofbot.
[INFO] [1619079157.321798709]: Looking around: yes
[INFO] [1619079157.321866431]: Replanning: yes
```

