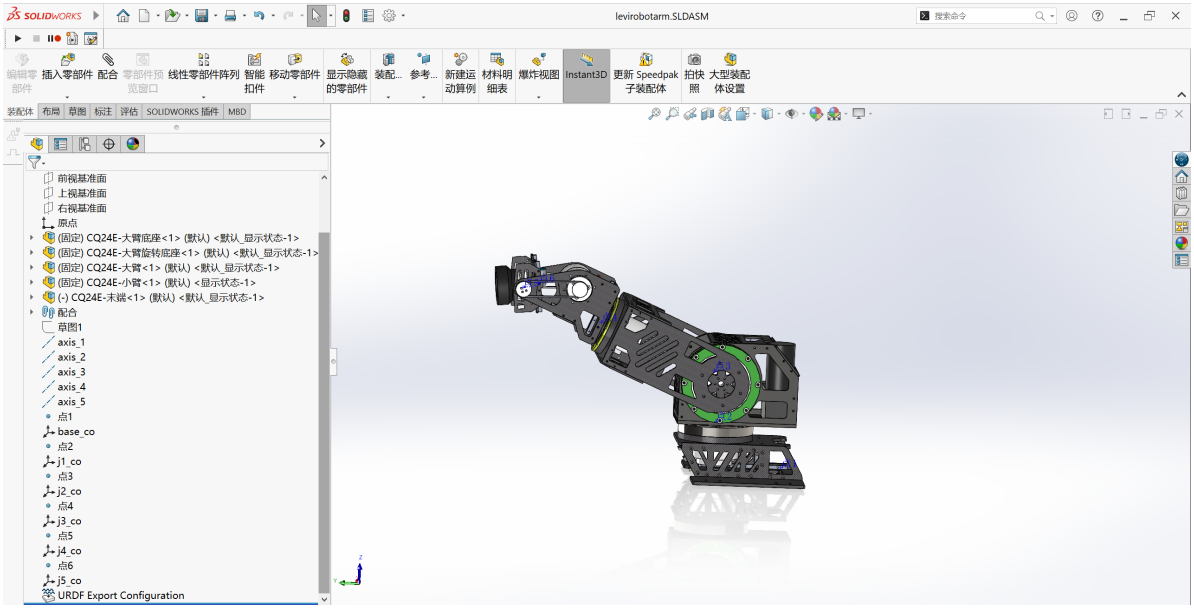
URDF

> 最终文件 `~/catkin_ws/src/levirobotarm`

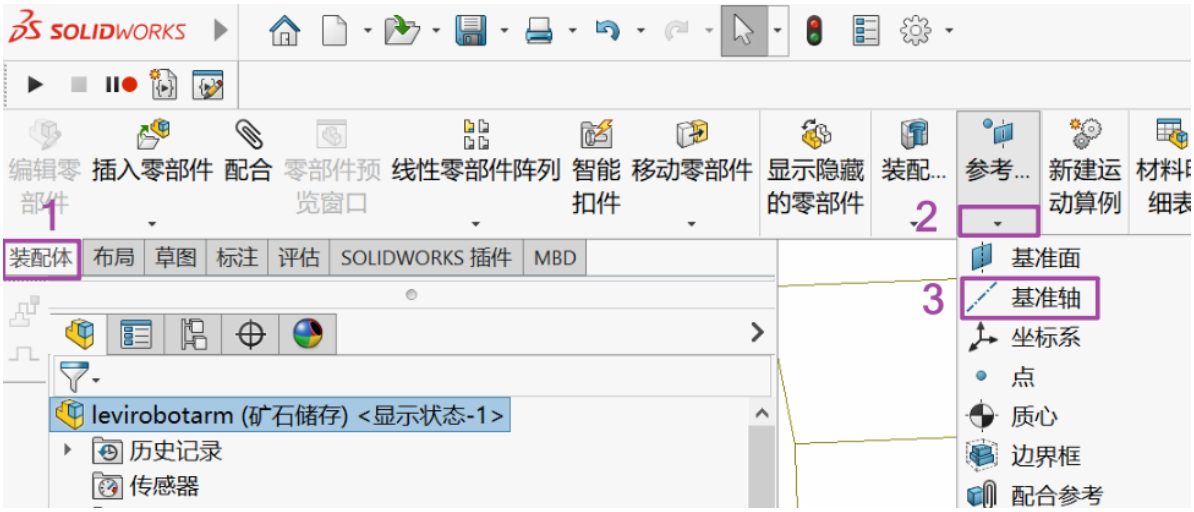
> 参考资料
> **【CSDN】特别章节-0.1 SolidWorks导出机械臂的URDF模型各个关节坐标系设置_sw2urdf导入模型如何正确设置坐标系**
> **【哔哩哔哩】3.如何从零创建一个机器人模型_古月居**
> **【哔哩哔哩】Xarm6机械臂——从SolidWorks导出urdf全过程【上科大 STAR中心 RIM LAB】**
> **【哔哩哔哩】solidworks导出urdf文件操作流程**
> **【哔哩哔哩】Solidworks 插件导出 URDF**

打开CQ24E-机械臂运动装配.SLDASM

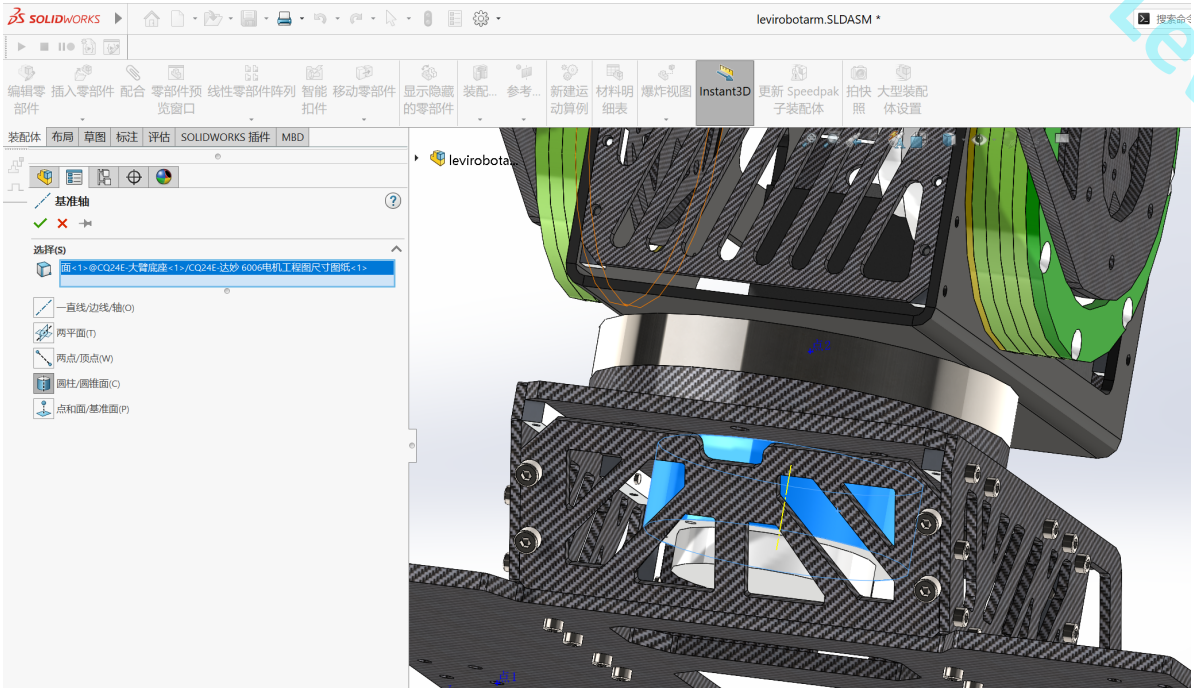


添加参考轴

添加基准轴目的是让关节围绕基准轴旋转，步骤如下

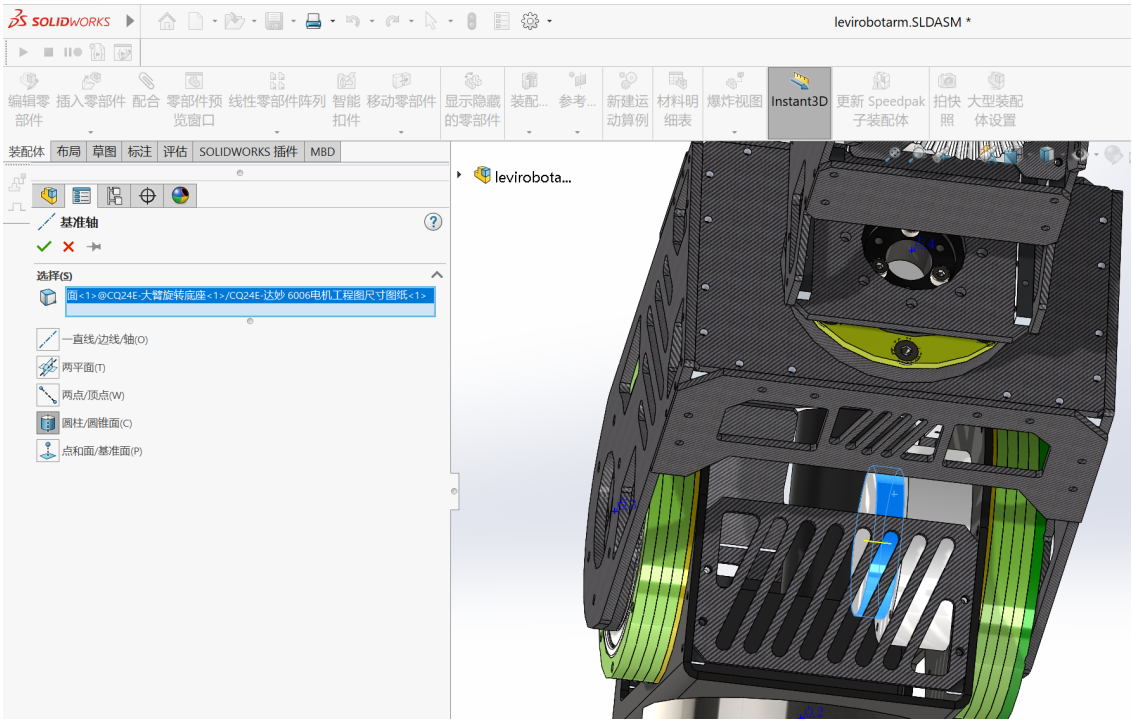


选择后，点击关节处电机，会生成一个轴，点击对号，工程树中选中生成的轴，右键重命名树项目为 `axis_1`

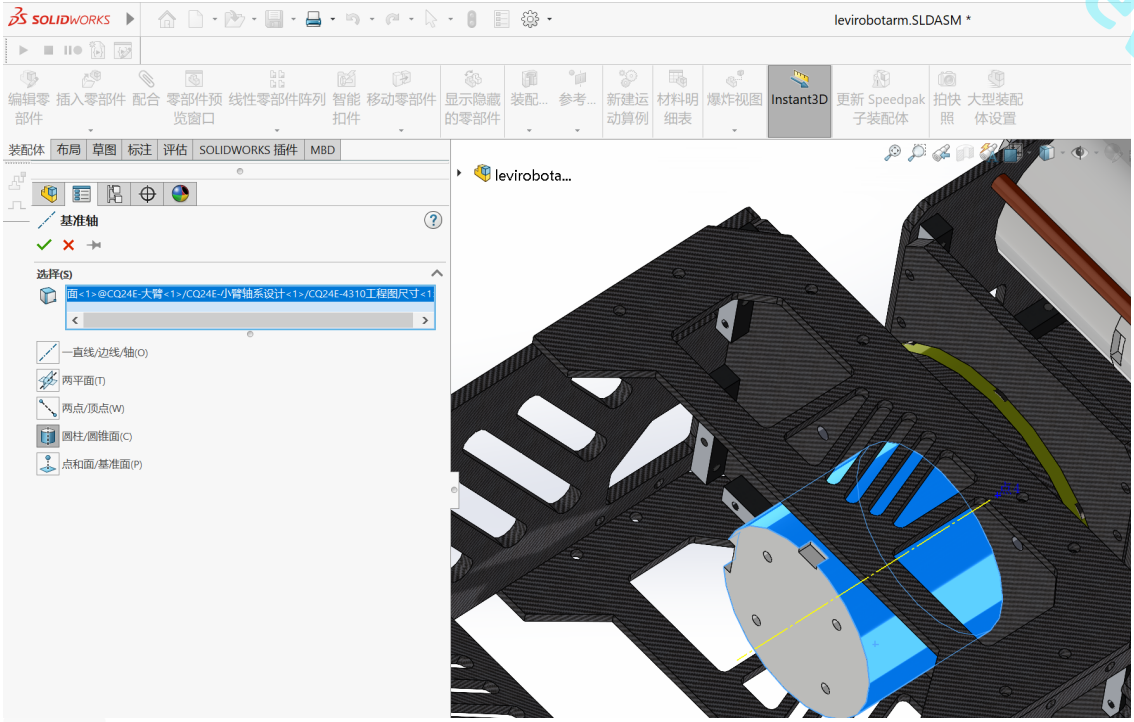


依次添加参考轴

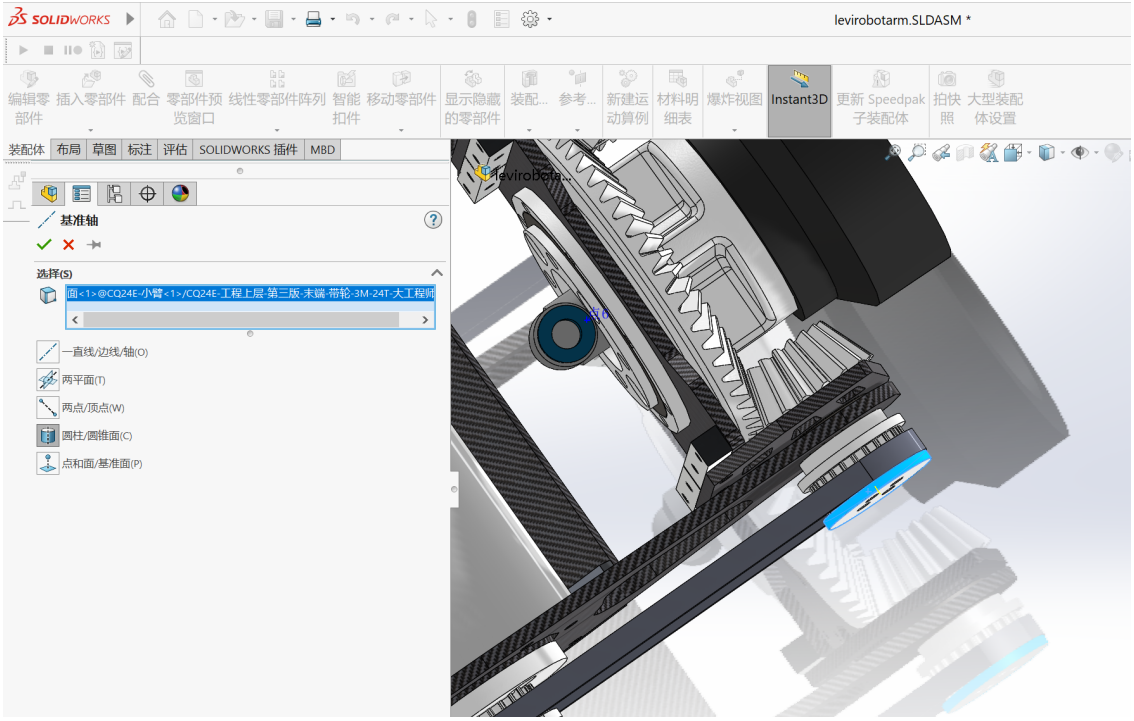
- axis_2



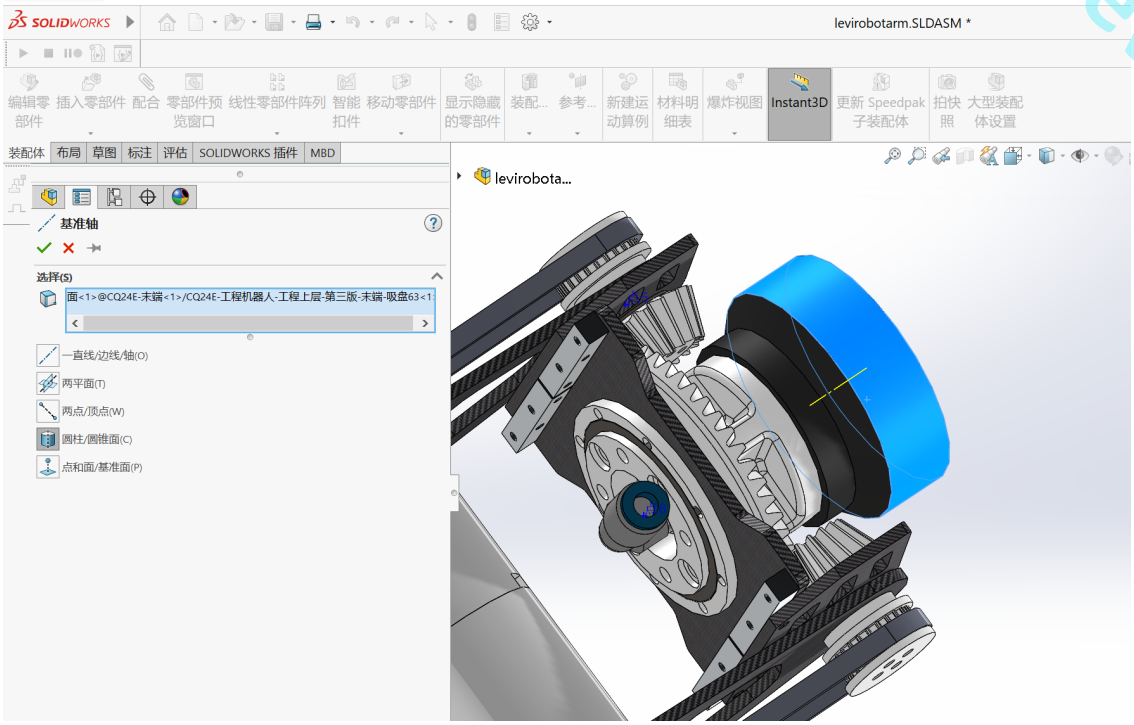
- axis_3



- axis_4

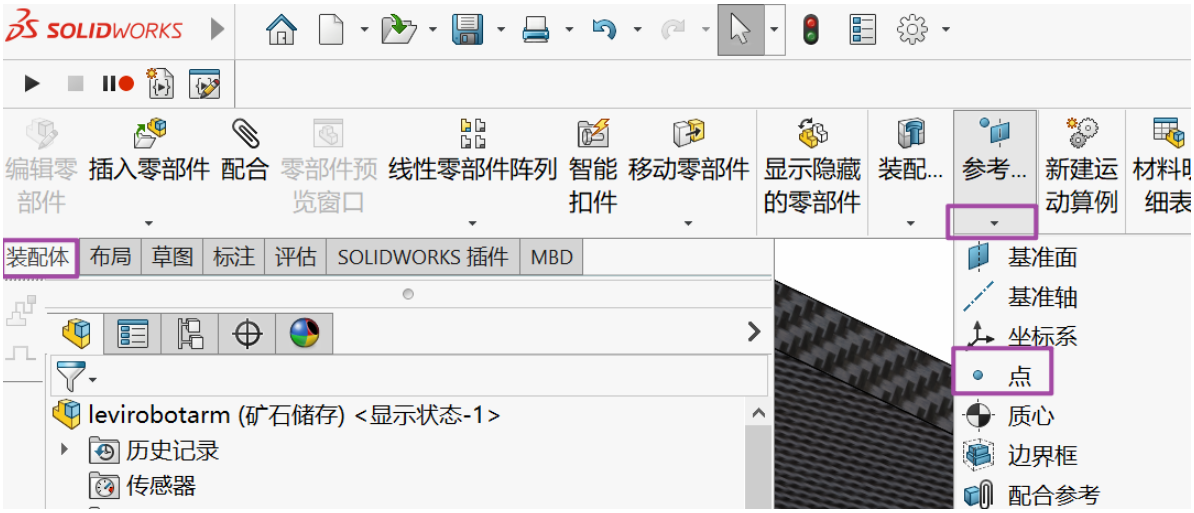


- axis_5

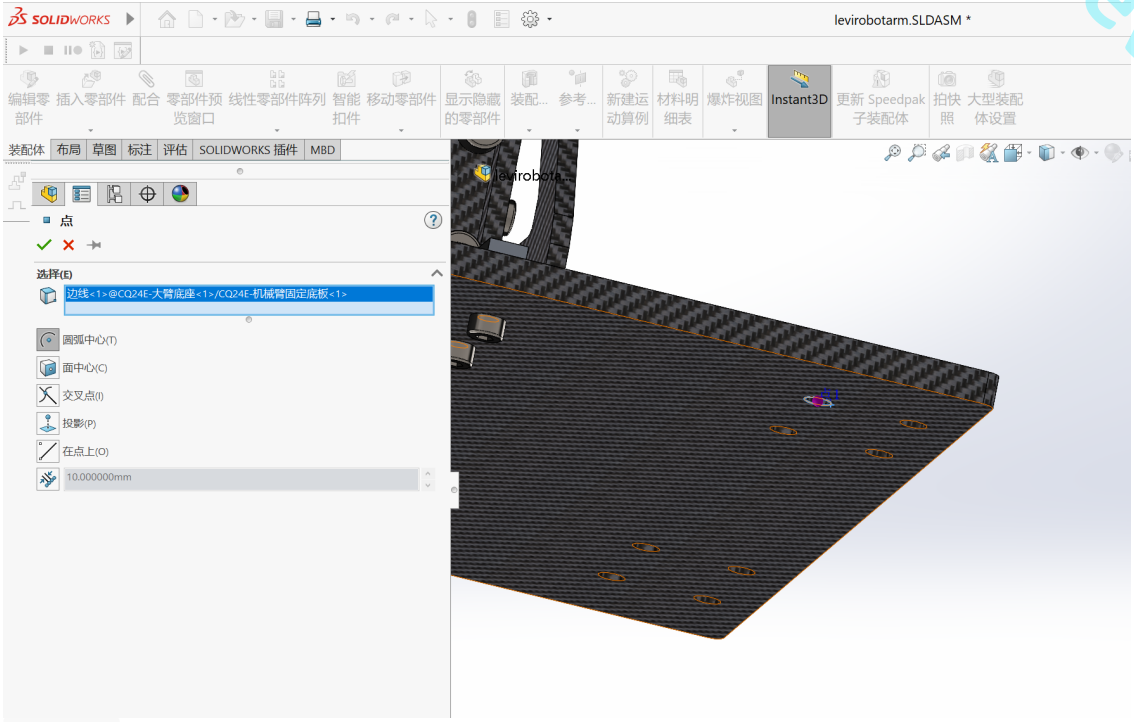


添加原点

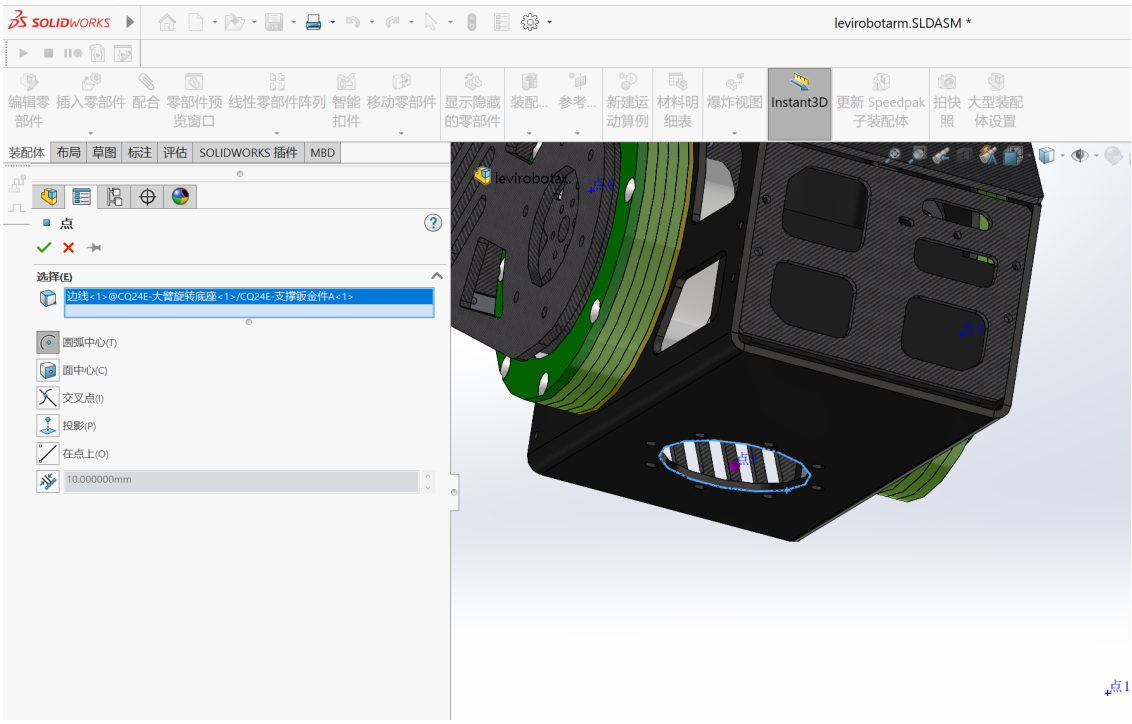
添加点目的是建立坐标系原点，步骤如下



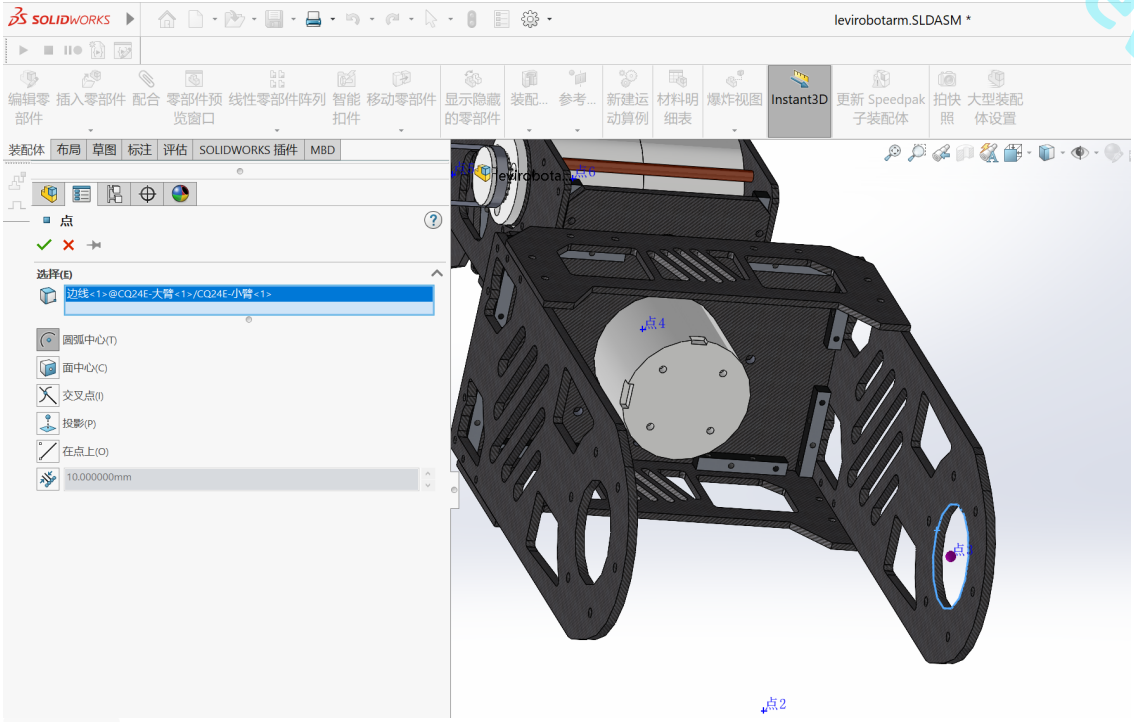
- point_1



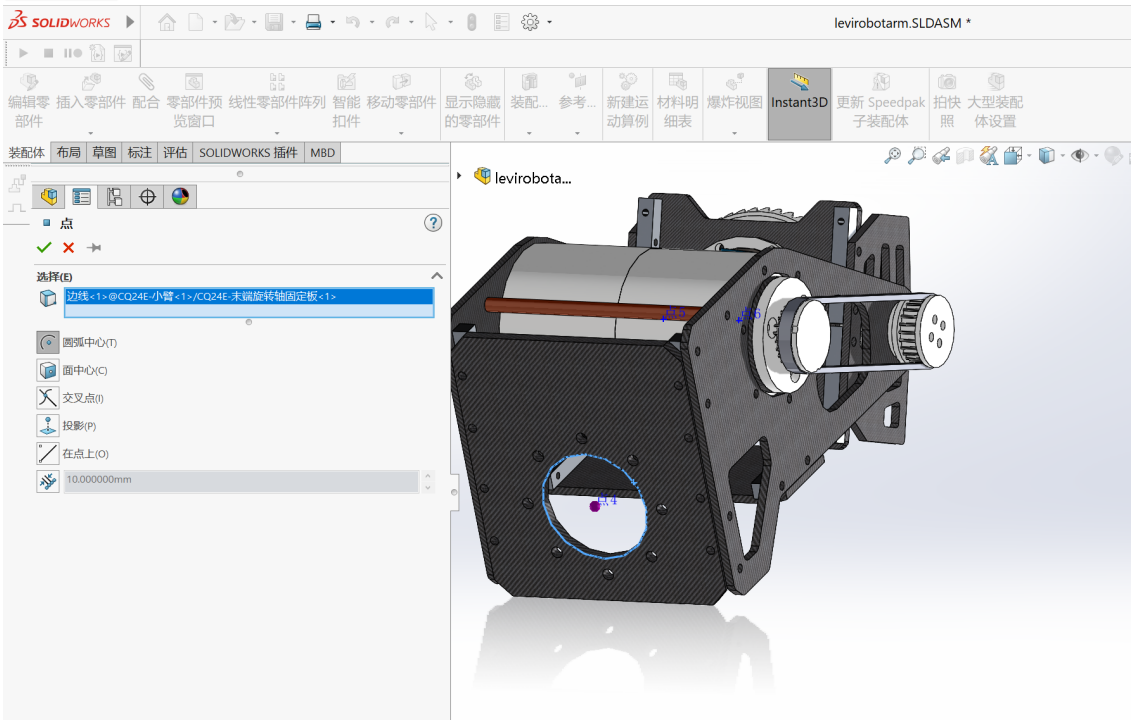
- point_2



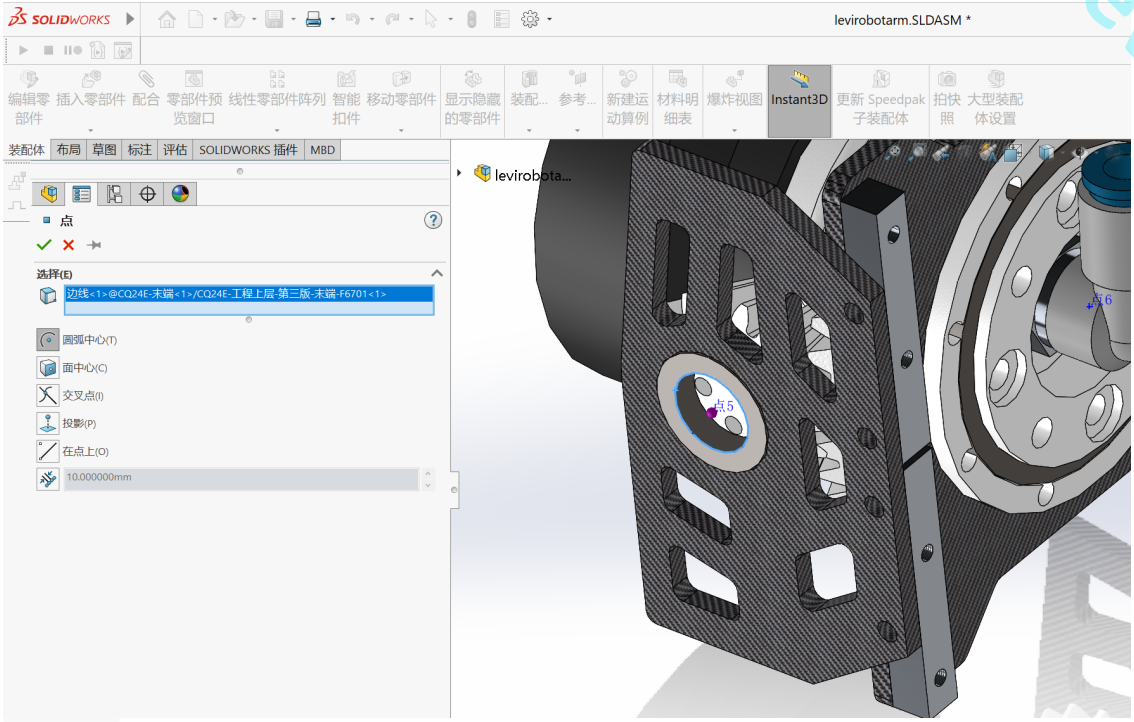
- point_3



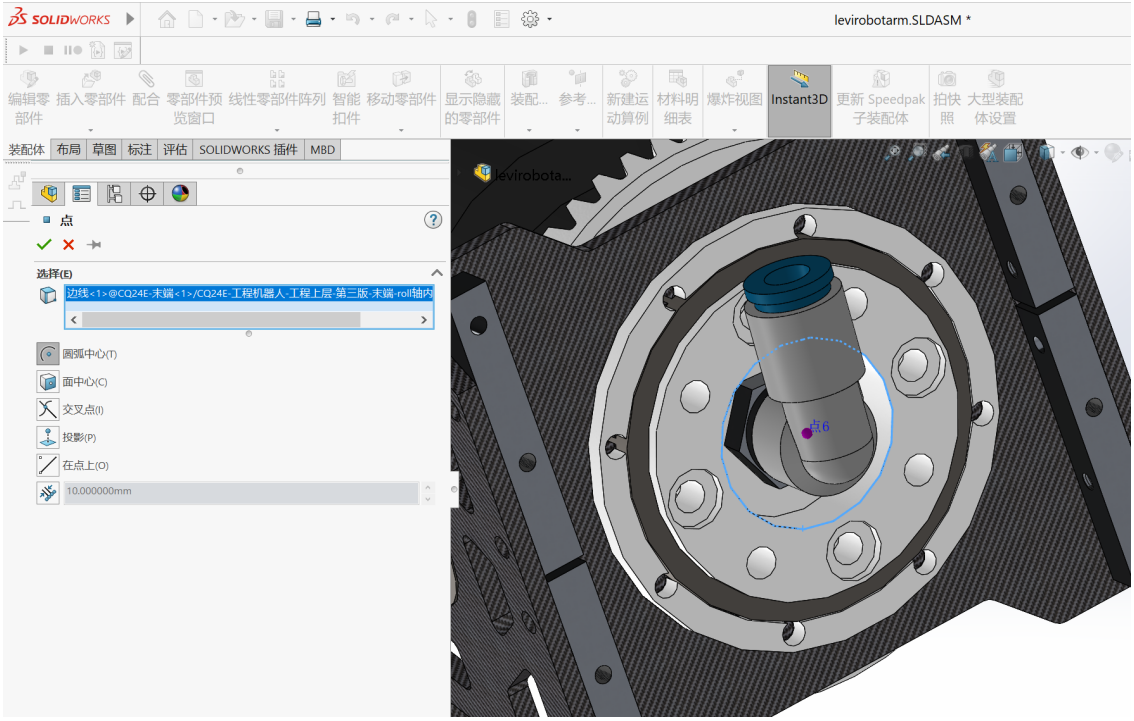
- point_4



- point_5



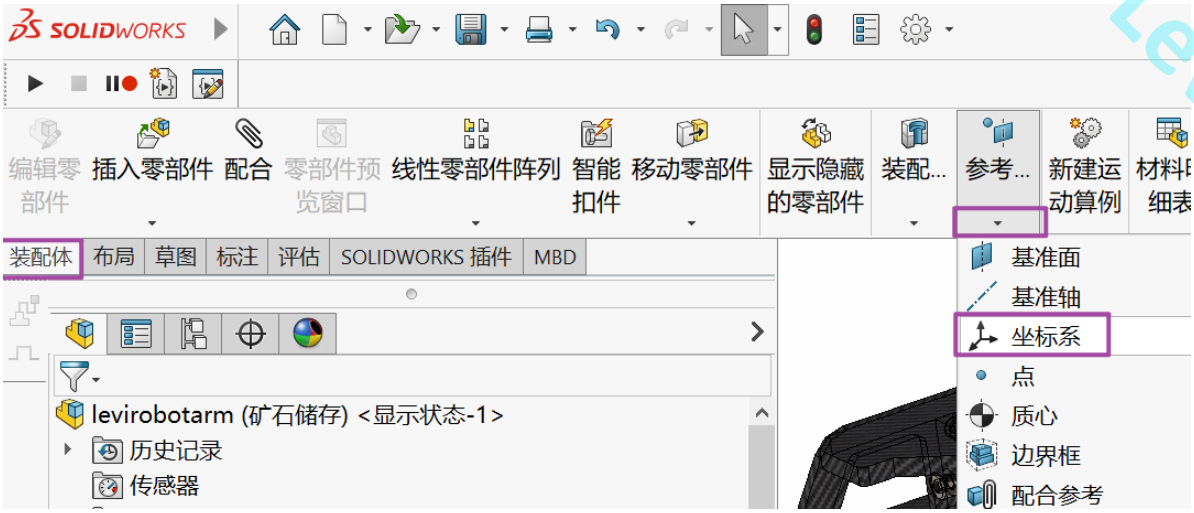
- point_6



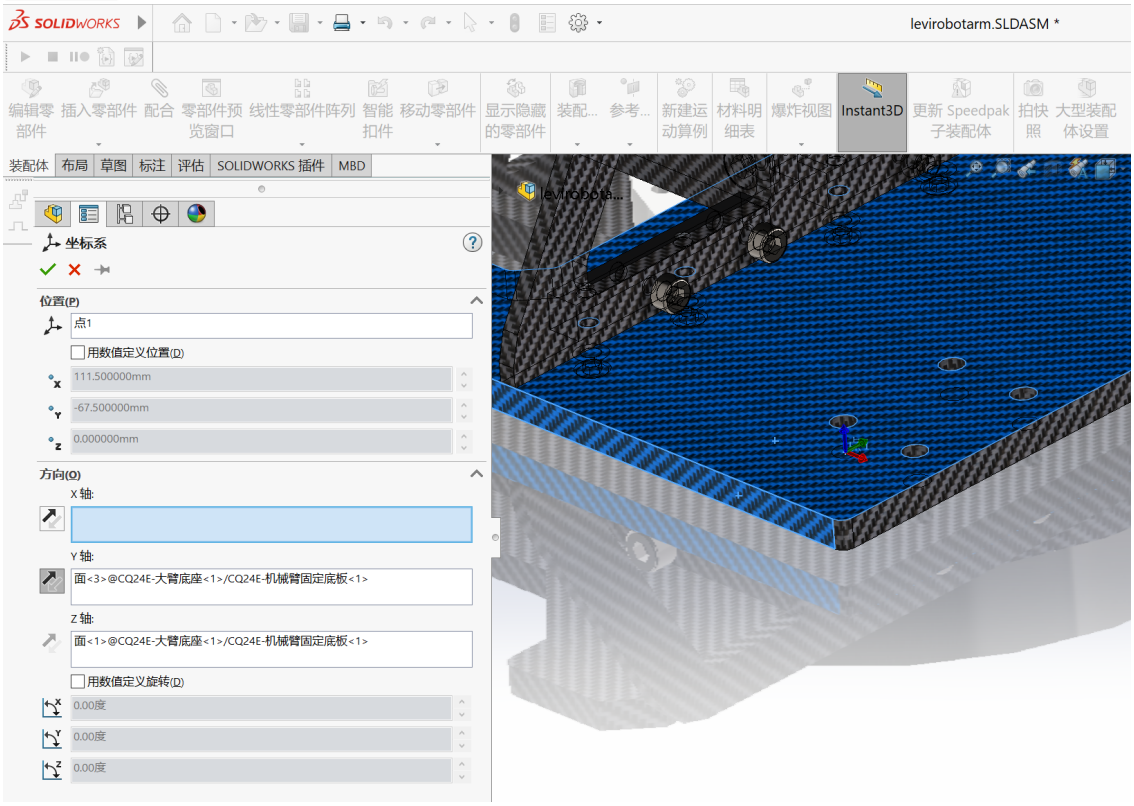
建立坐标系

注意事项:
Z轴要和旋转轴重合
X轴垂直相交于上一个link旋转轴

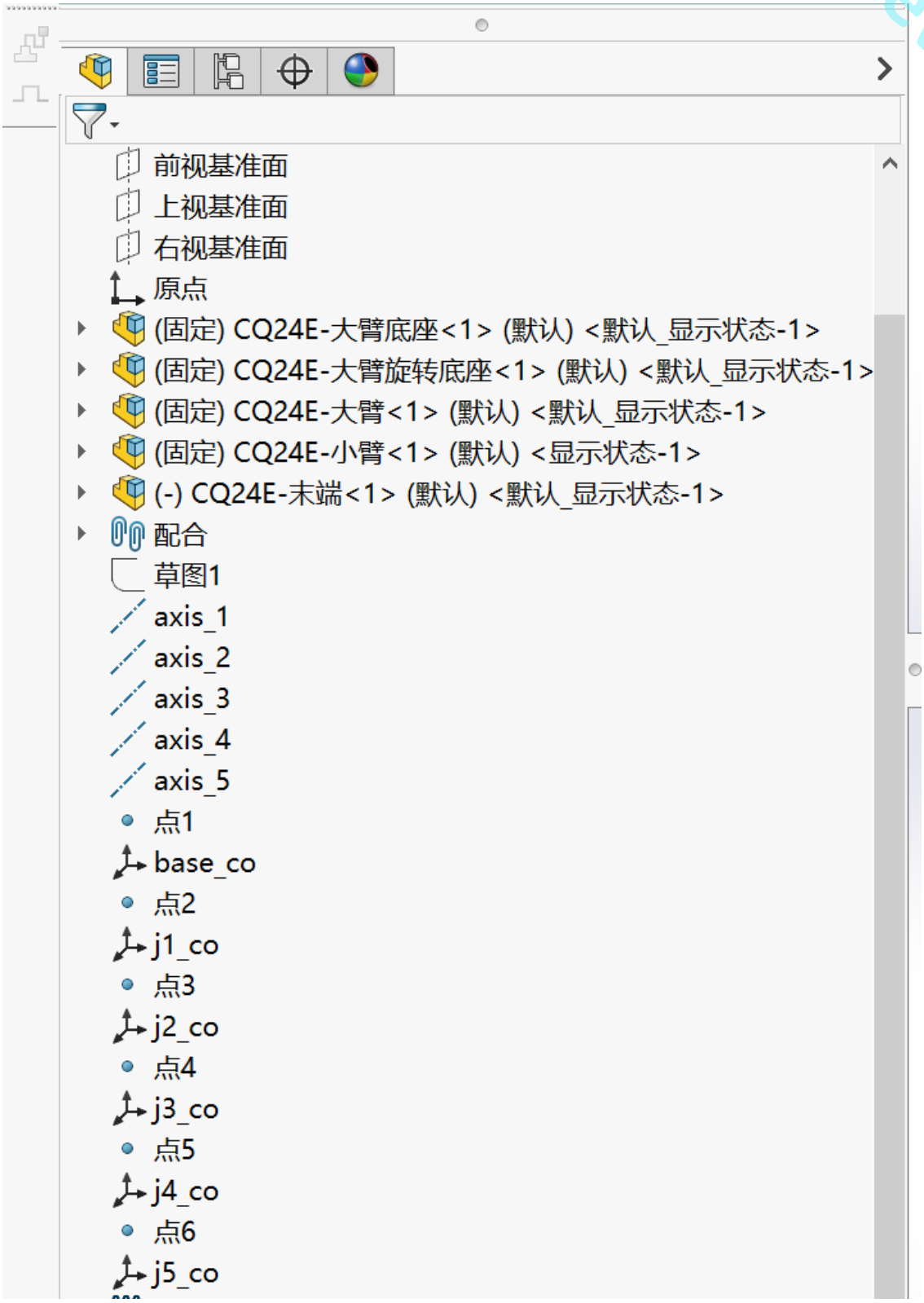
> 详情内容参考
>
> 👉 **【CSDN】特别章节-0.1 SolidWorks导出机械臂的URDF模型各个关节坐标系设置_sw2urdf导入模型如何正确设置坐标系** 👈


编辑零部件
插入零部件
配合
零部件预览窗口
线性零部件阵列
智能扣件
移动零部件
显示隐藏的零部件
装配...
参考...
新建运动算例
装配体
布局
草图
标注
评估
SOLIDWORKS 插件
MBD
levirobotarm (矿石储存) <显示状态-1>
历史记录
传感器
基准面
基准轴
坐标系
点
质心
边界框
配合参考

- base_co

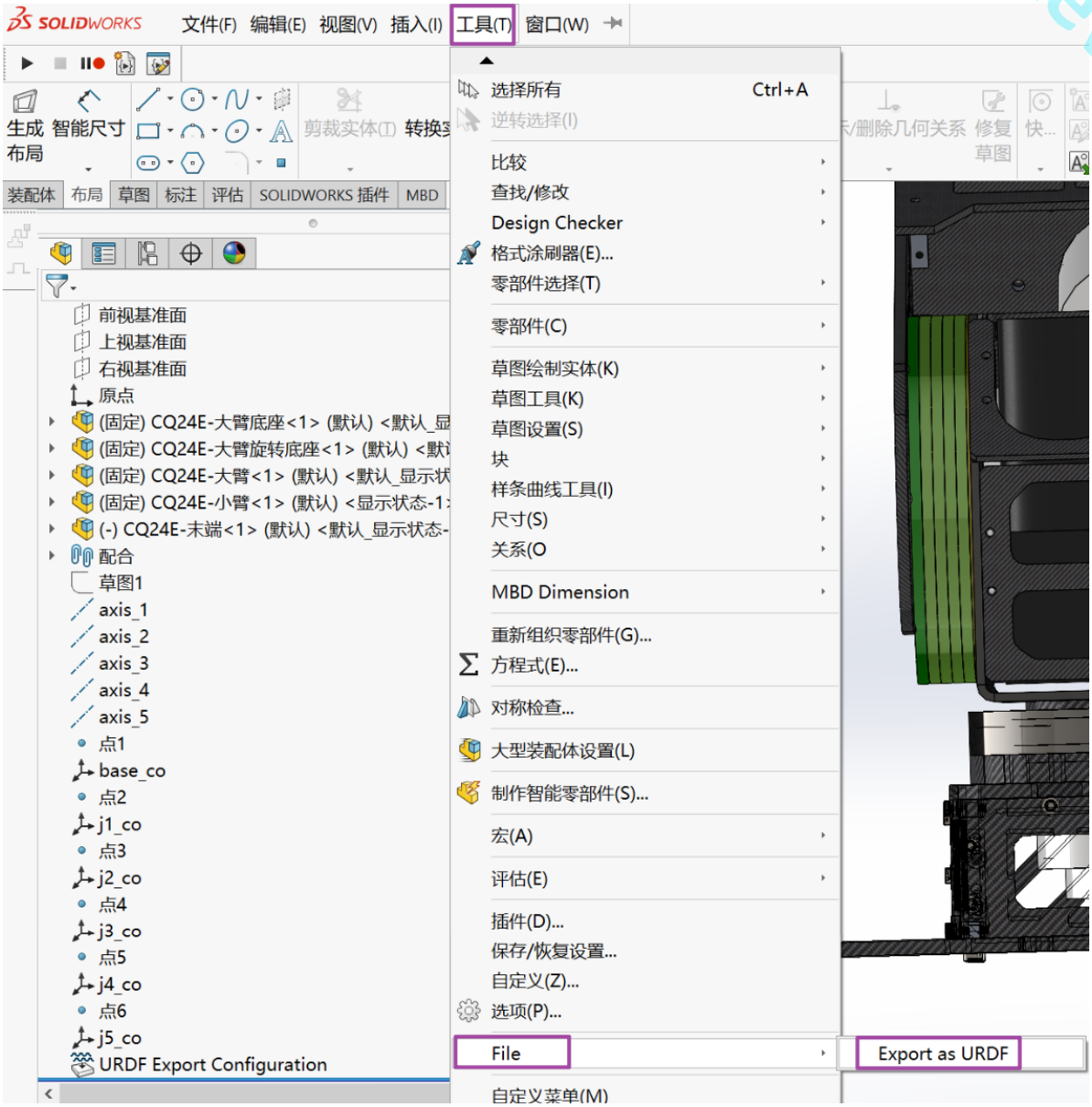

levirobotarm.SLDASM *
Instant3D
坐标系
位置(P)
点1
用数值定义位置(D)
111.500000mm
-67.500000mm
0.000000mm
方向(O)
X 轴:
Y 轴:
面<3>@CQ24E-大臂底座<1>/CQ24E-机械臂固定底板<1>
Z 轴:
面<1>@CQ24E-大臂底座<1>/CQ24E-机械臂固定底板<1>
用数值定义旋转(D)
0.00度
0.00度
0.00度

最终工程树结构如下

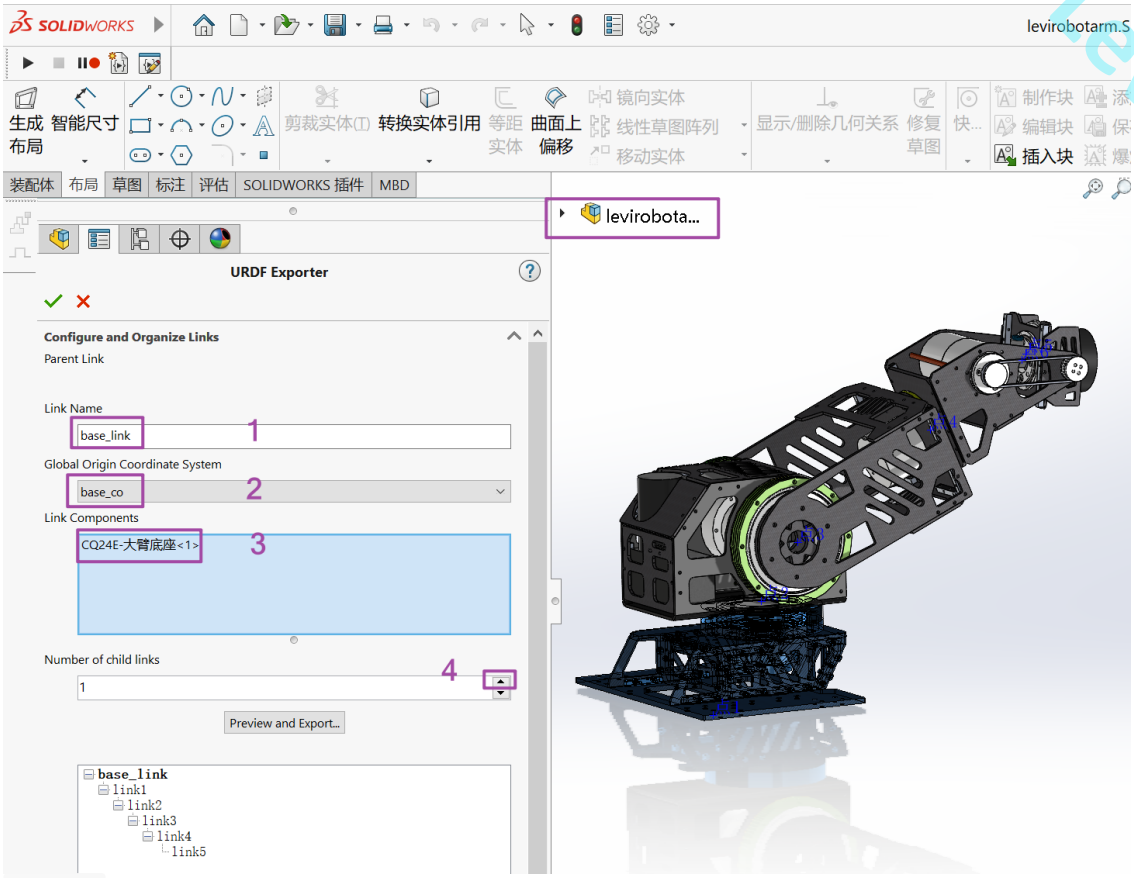


sw2urdf

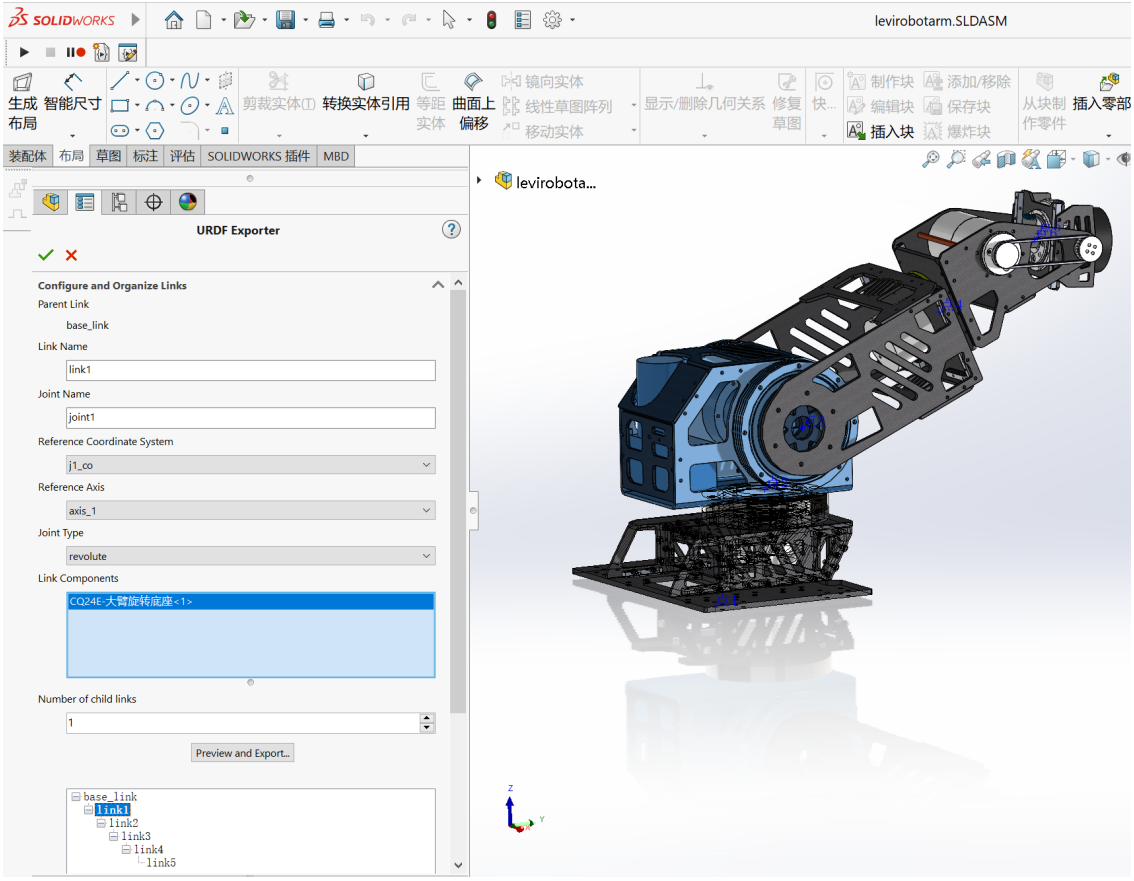
打开插件工具



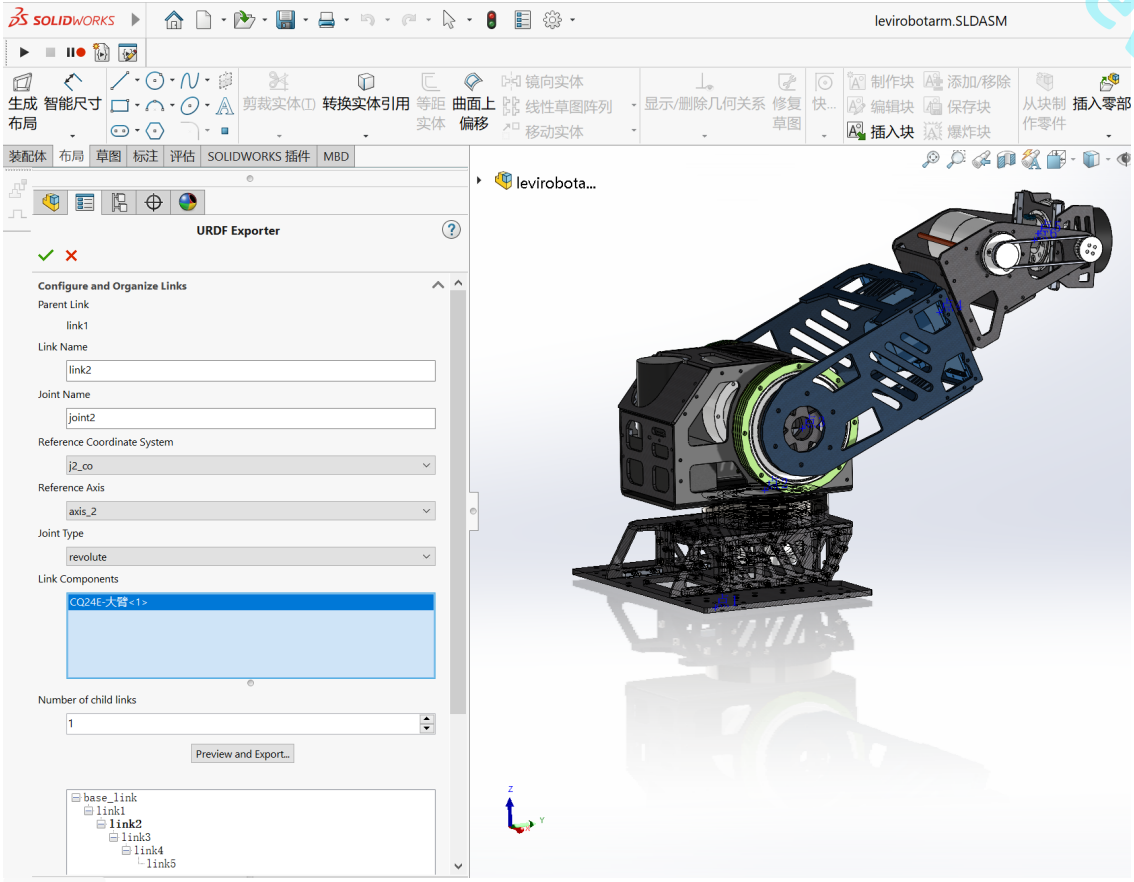
- `base_link`
  点击右侧展开模型视图，选择大臂底座



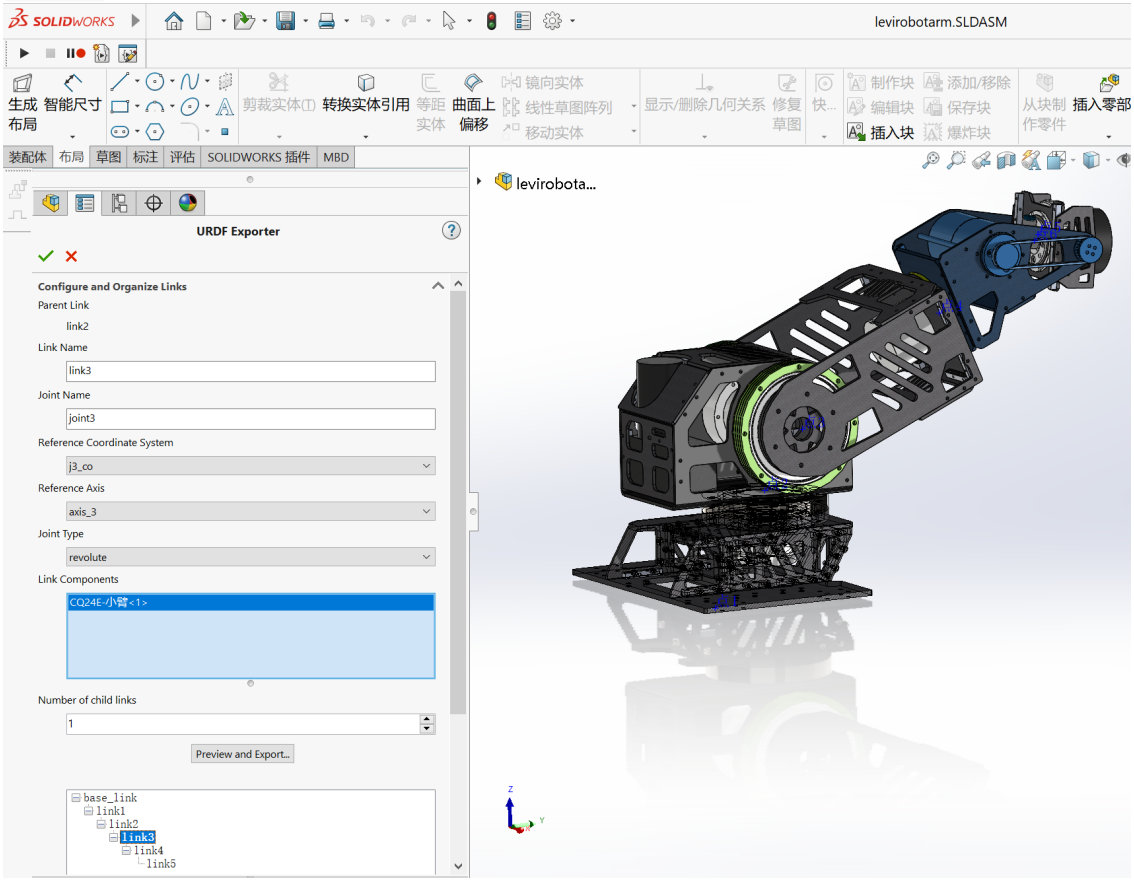
- link_1



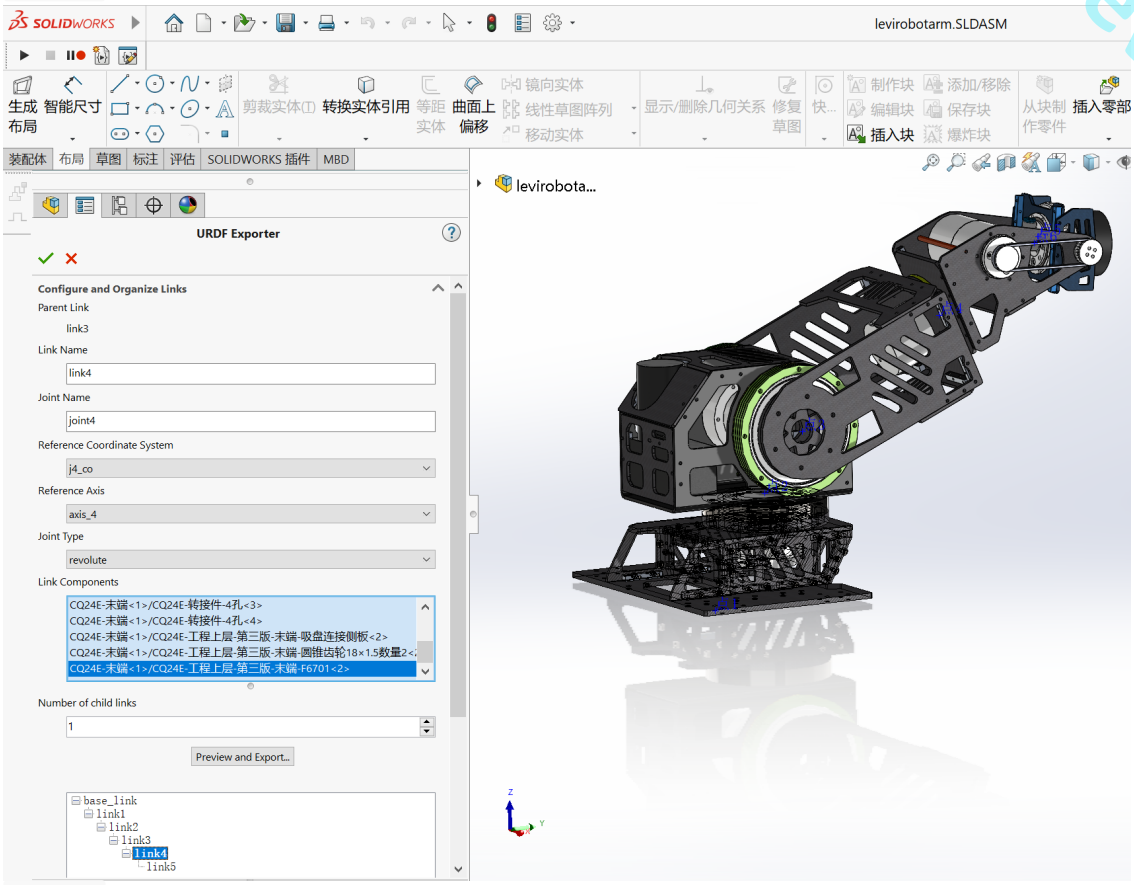
- link_2



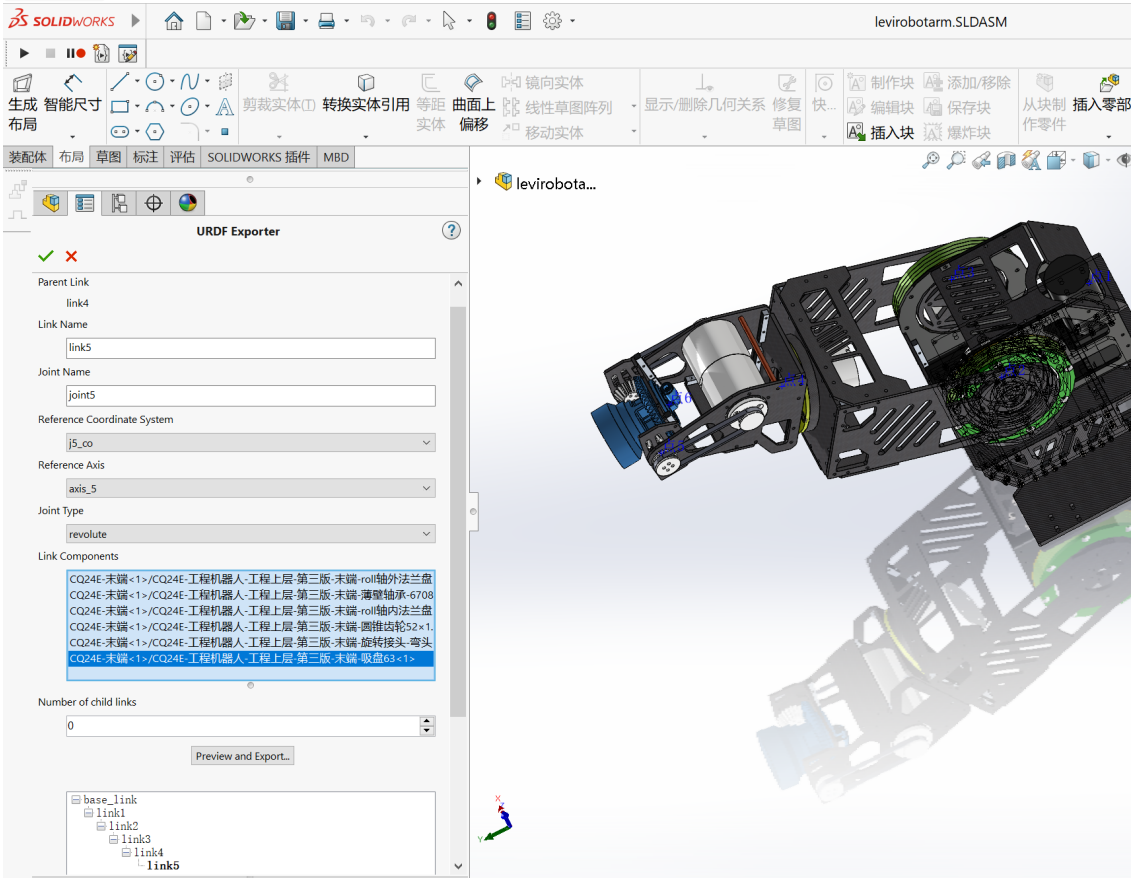
- link_3



- link_4



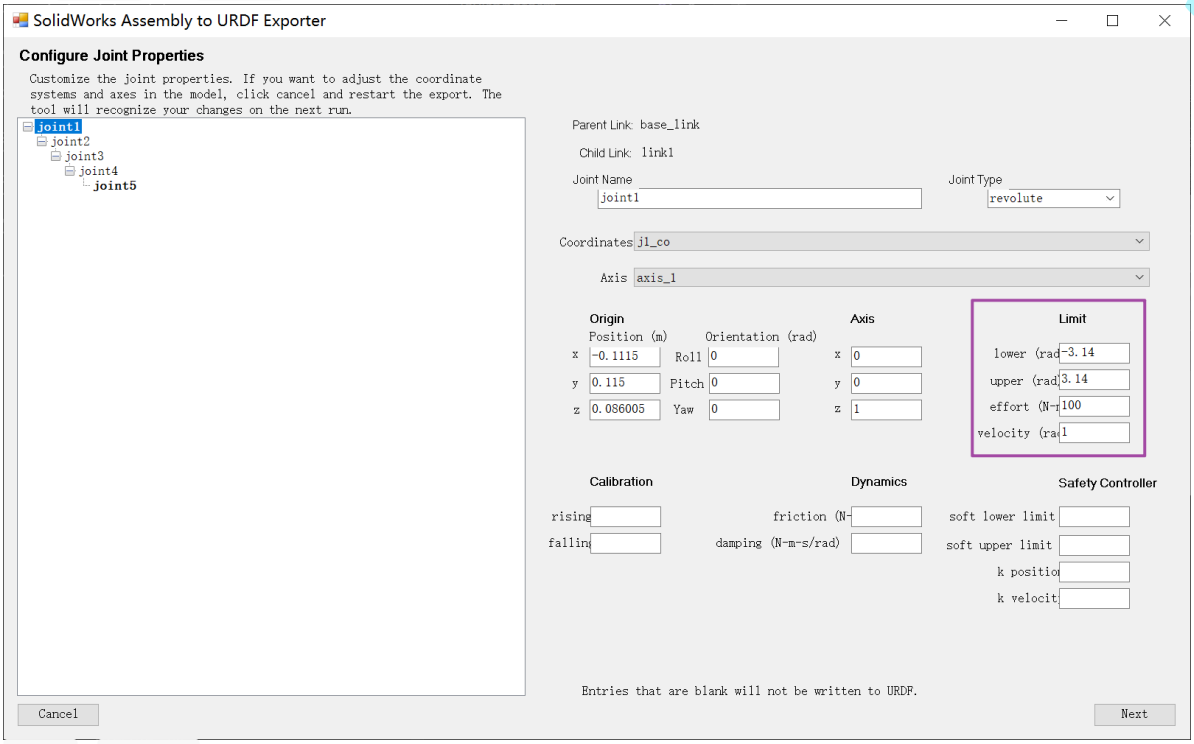
- link_5



> link4和link5包含在一个总体里，要分开选

`preview and export`

每个`joint`添加`limit`



`next` -> `finish`

保存名为`levirobotarm`

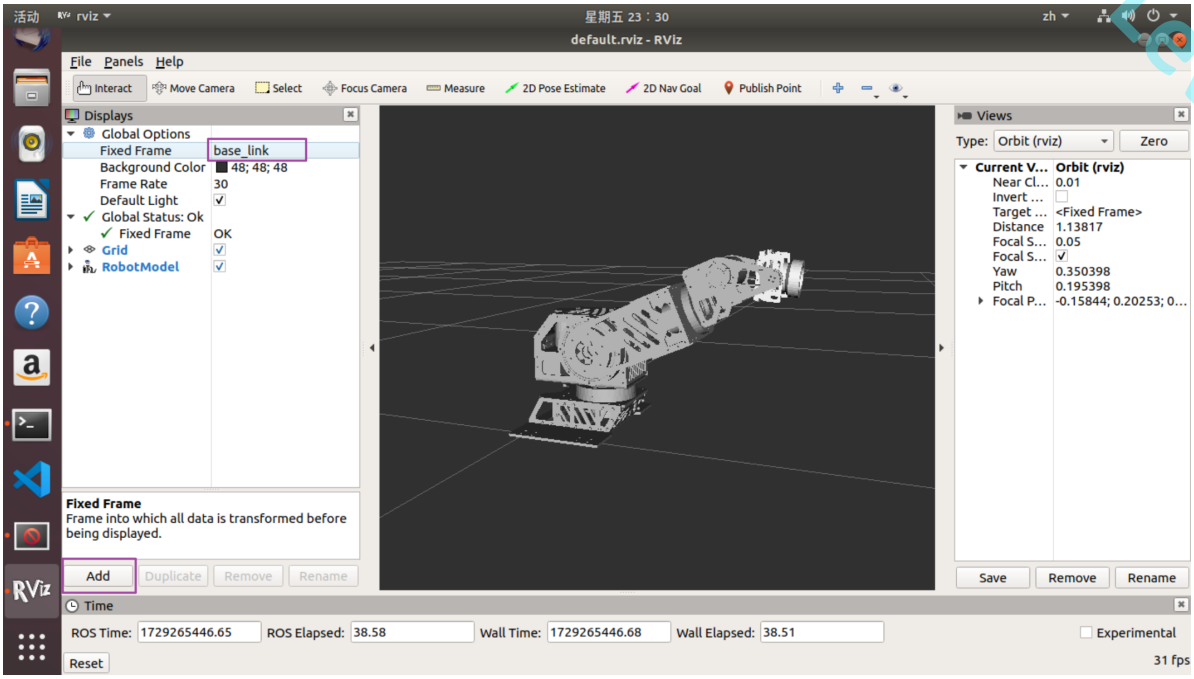
- 将`/levirobotarm/launch`文件夹下`display.launch`和`gazebo.launch`内`/robots/`改为`/urdf/`
- 将`/levirobotarm`文件夹下`package.xml`内`me2email.com`改为`me@email.com`
- 编译

```
cd ~/catkin_ws
catkin_make
```

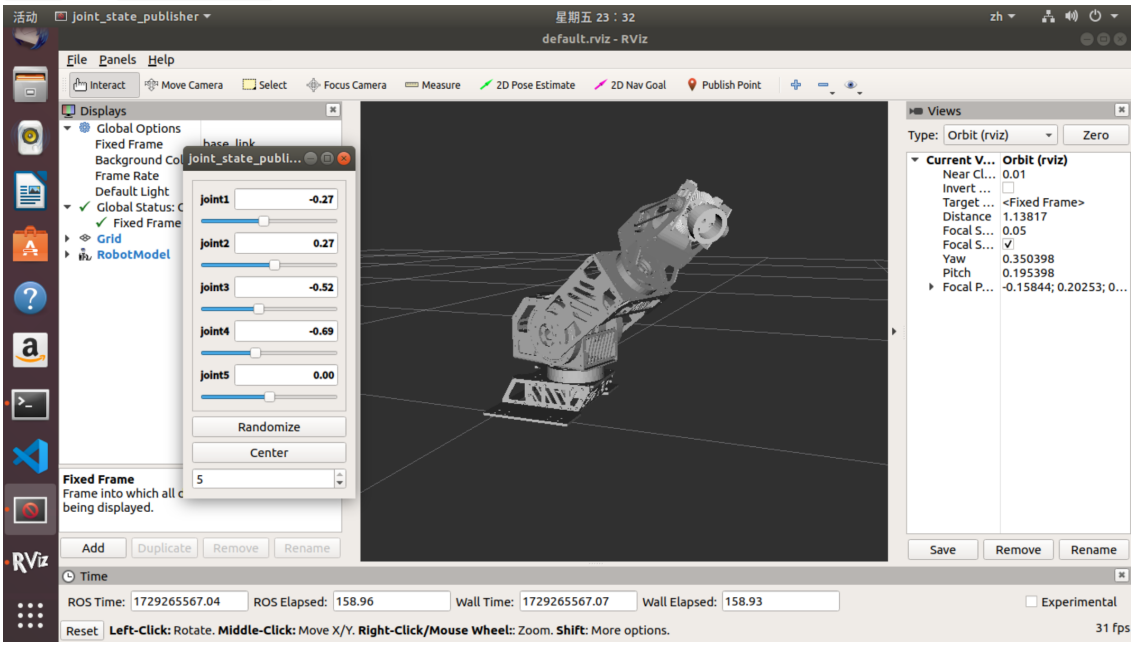
- 运行

```
roslaunch levirobotarm display.launch
```

```
roslaunch levirobotarm gazebo.launch
```



- `fixed frame` 下拉选择 `base_link`
- `add` 添加 `robotmodel`



如要保存配置

```
su
cd ~/catkin_ws
catkin_make
source devel/setup.bash
```

然后再保存

xacro

1. 创建xacro文件

```
cd ~/catkin_ws/src/levirobotarm/urdf
touch levirobotarm.xacro
```

复制`levirobotarm.urdf`内容到`levirobotarm.xacro`
将urdf开头

```
<robot
  name="levirobotarm">
```

修改为xacro开头

```
<?xml version="1.0"?>
<robot name="levirobotarm" xmlns:xacro="http://ros.org/wiki/xacro">
```

2. 修改launch文件
   `~/catkin_ws/src/levirobotarm/launch/display.launch`

```
<param
    name="robot_description"
    textfile="$(find levirobotarm)/urdf/levirobotarm.urdf" />
```

修改为

```
<!-- 加载机器人模型参数 -->
  <param name="robot_description" command="$(find xacro)/xacro --inorder $(find
levirobotarm)/urdf/levirobotarm.xacro" />
```

MoveIt

> 最终文件`~/catkin_ws/src/levirobotarm_moveit_config`

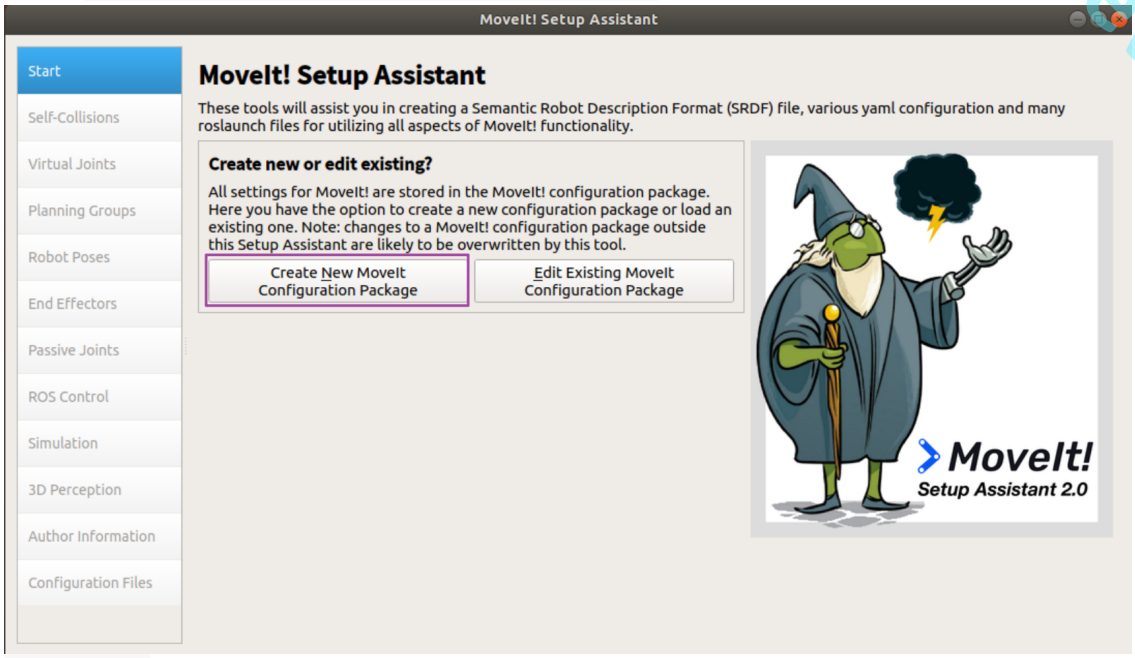
创建包

1. `MoveIt Setup Assistant`

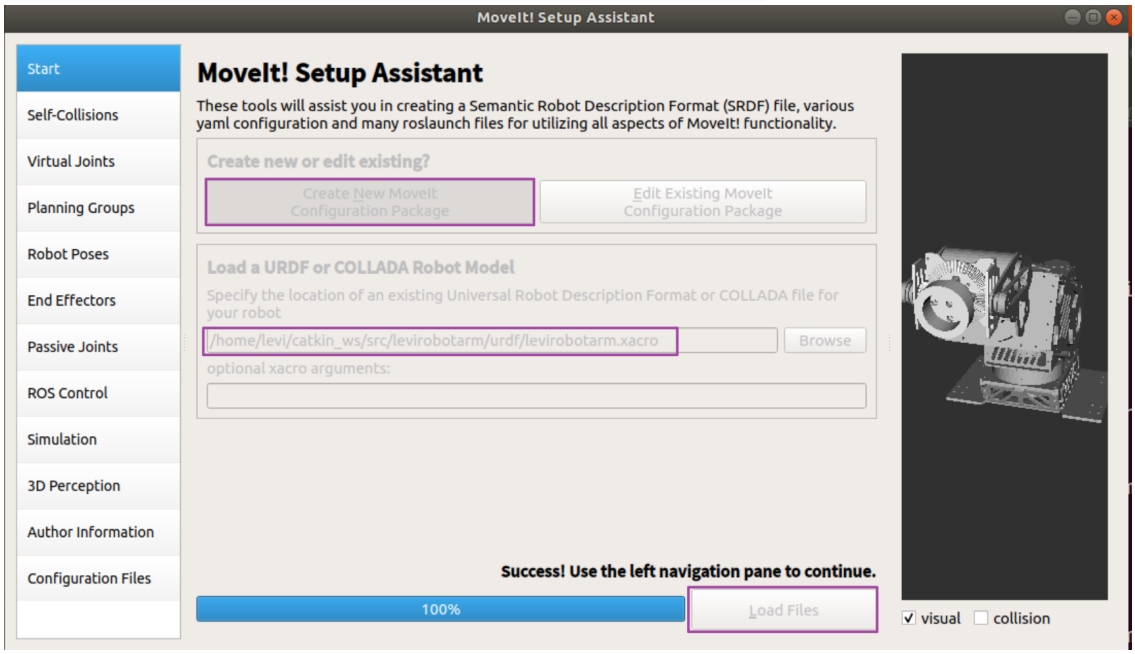
```
roslaunch moveit_setup_assistant setup_assistant.launch
```

2. 选择模型

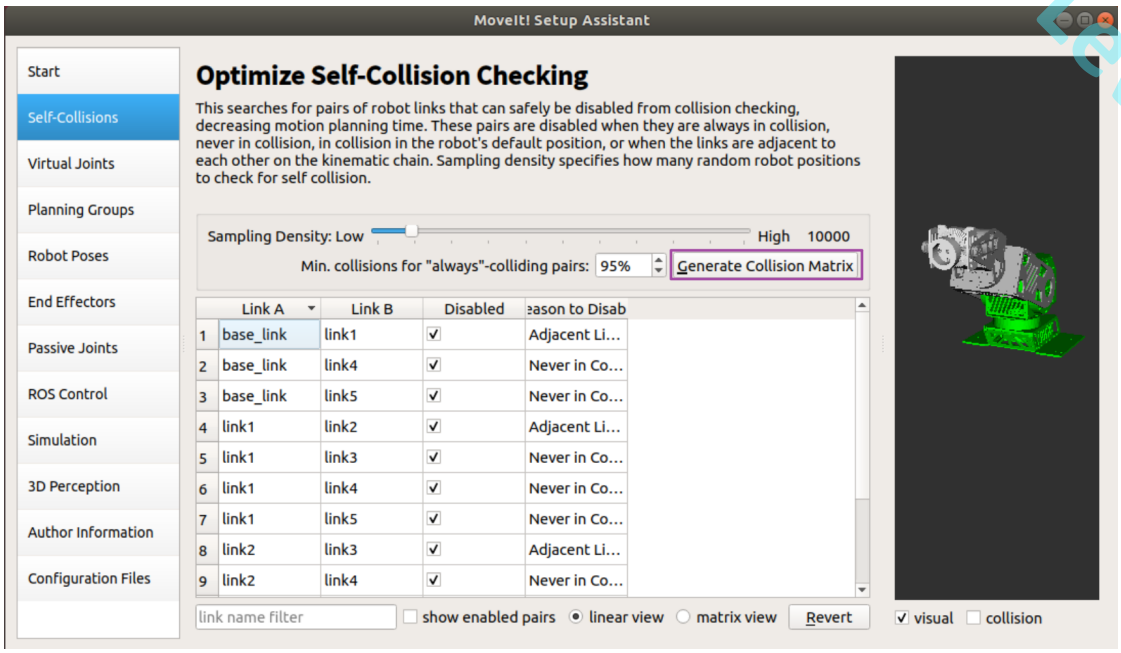
- 创建包 `create new moveit configuration package`



- `load file`
  `~/catkin_ws/src/levirobotarm/urdf/levirobotarm.xacro`



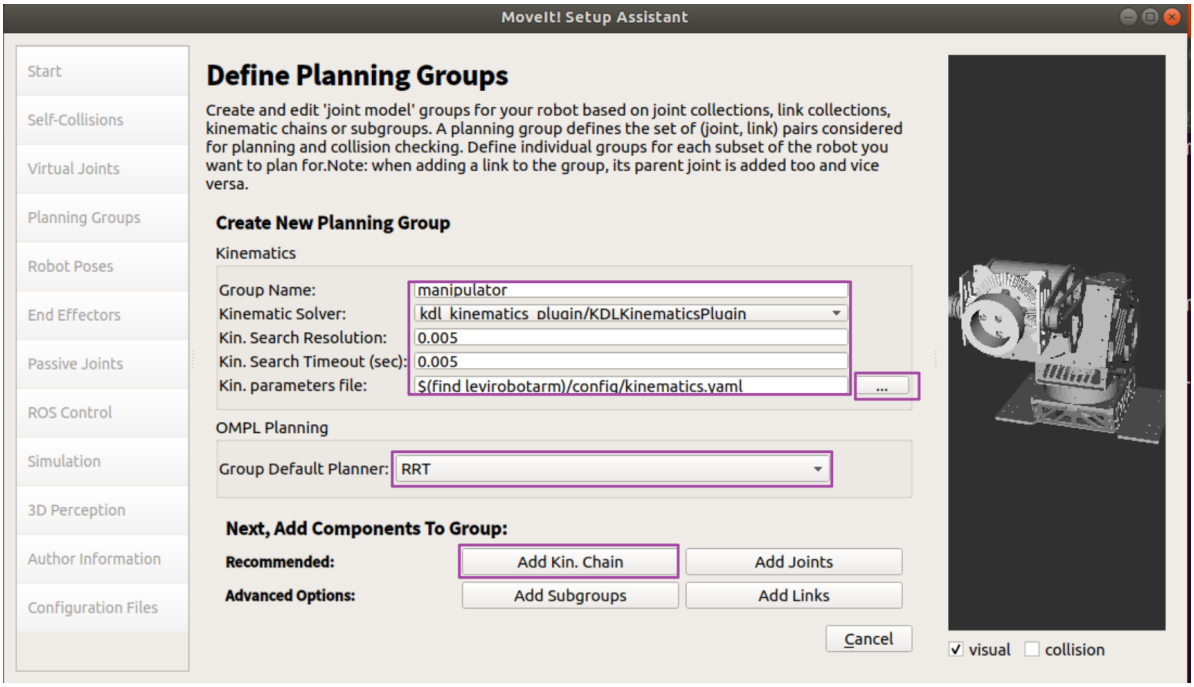
3. 自碰撞检测
   `generate collision matrix`



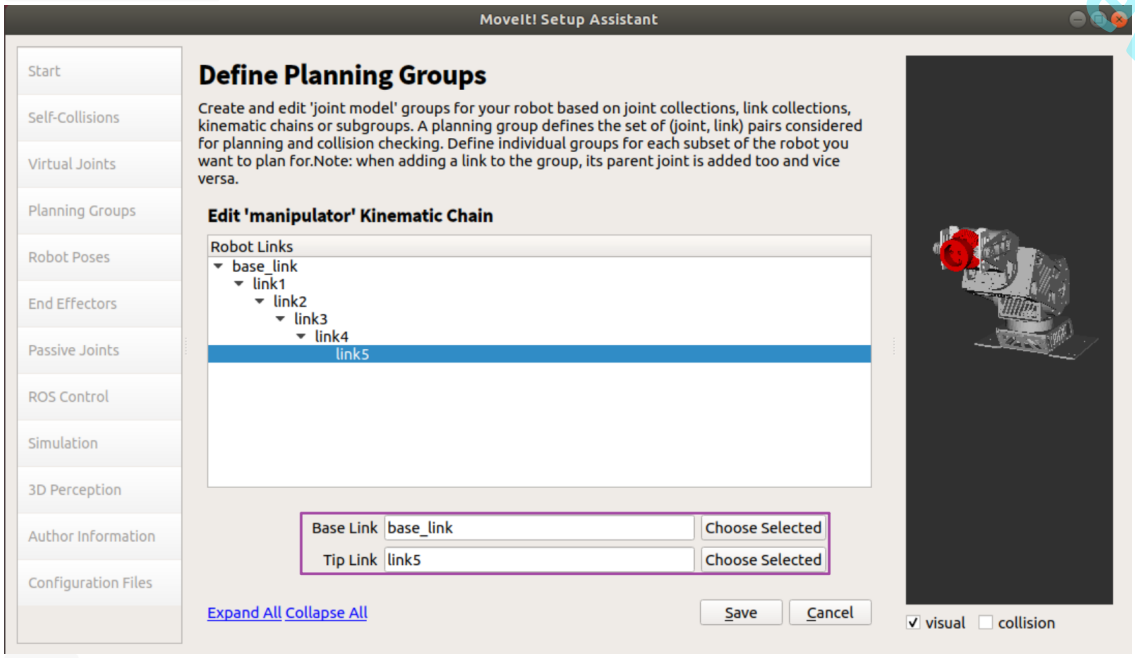
4. 规划组

- `add group`
  `~/catkin_ws/src/levirobotarm/config/kinematics.yaml`
  内容如下

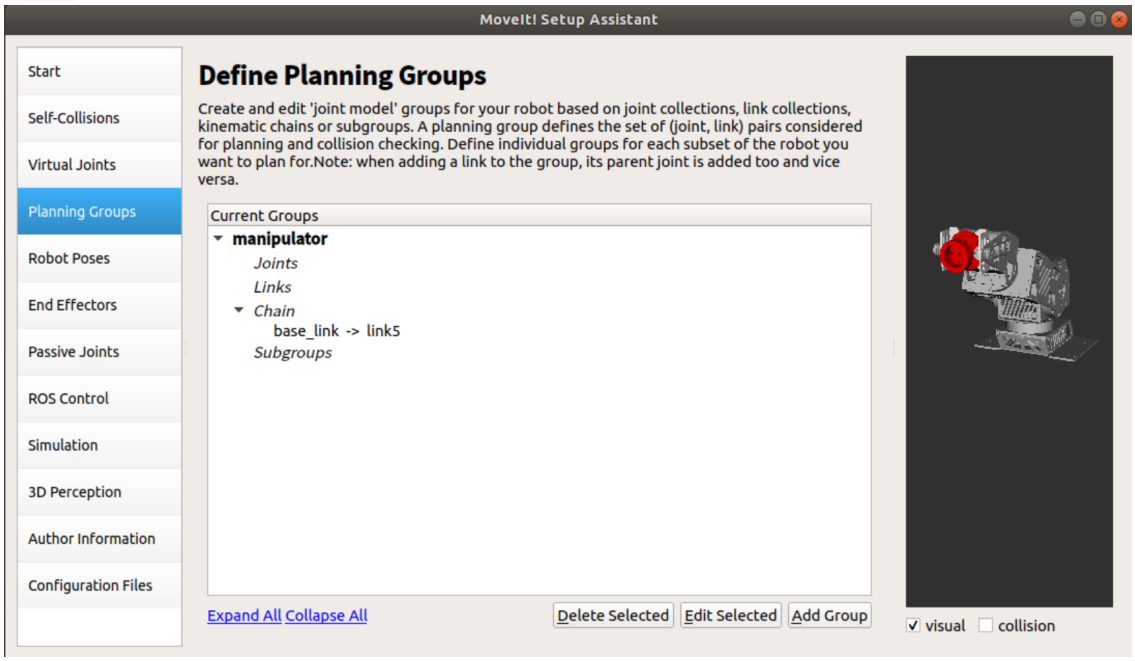
```
manipulator:
  kinematics_solver: kdl_kinematics_plugin/KDLKinematicsPlugin
  kinematics_solver_search_resolution: 0.005
  kinematics_solver_timeout: 0.005
  kinematics_solver_attempts: 3
```



- `add kin. chain`

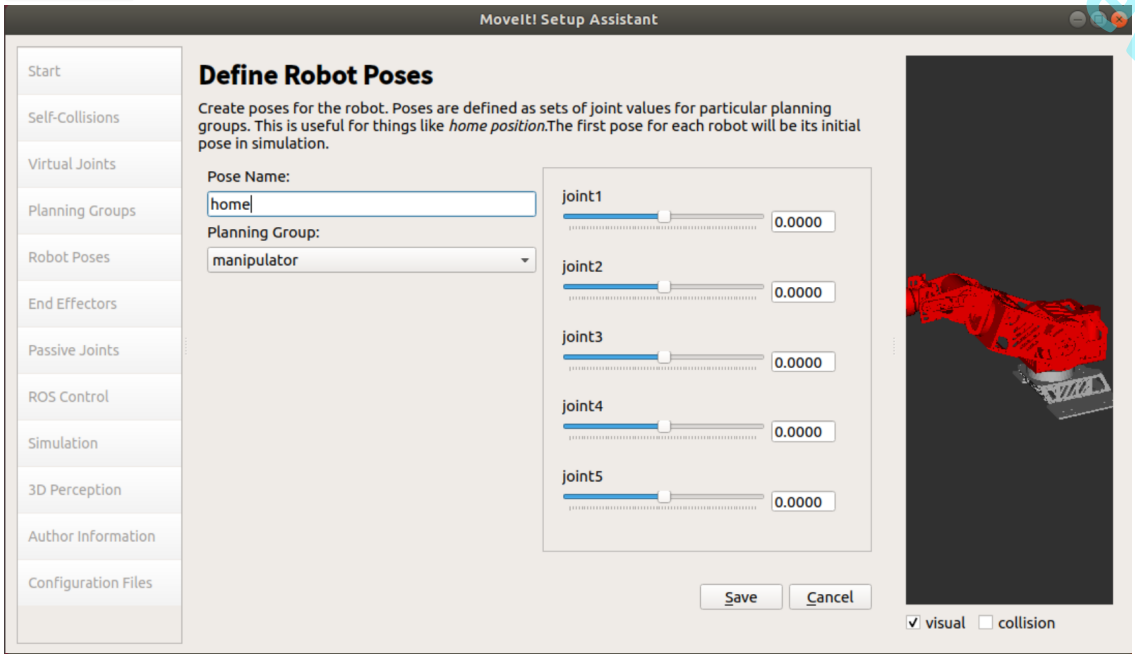


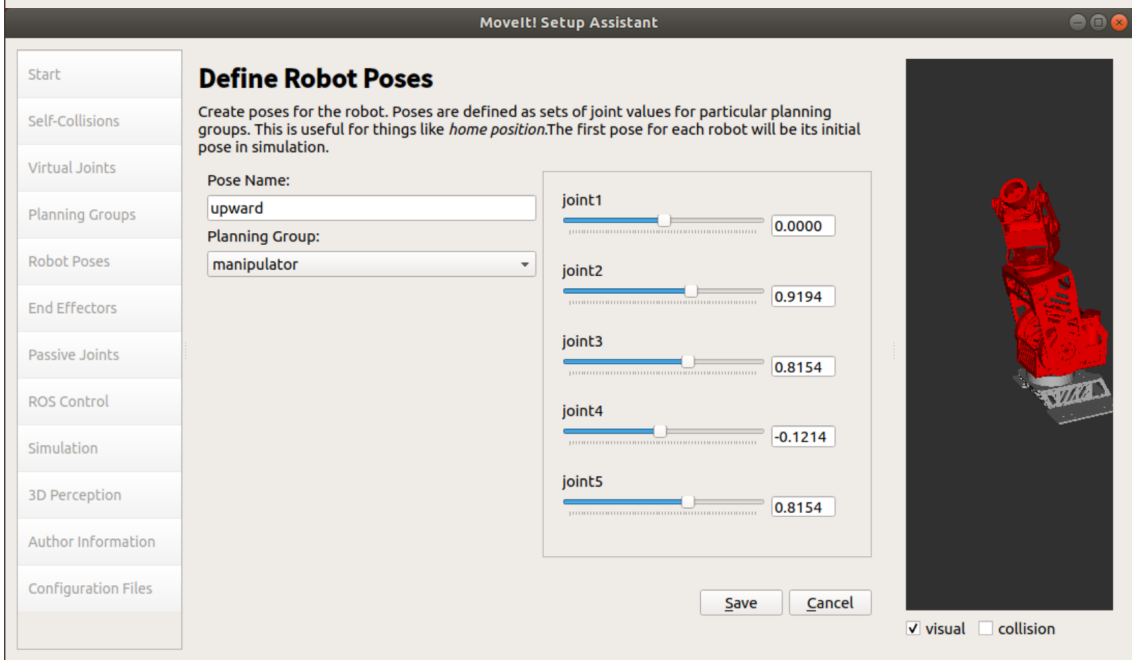
- `save`



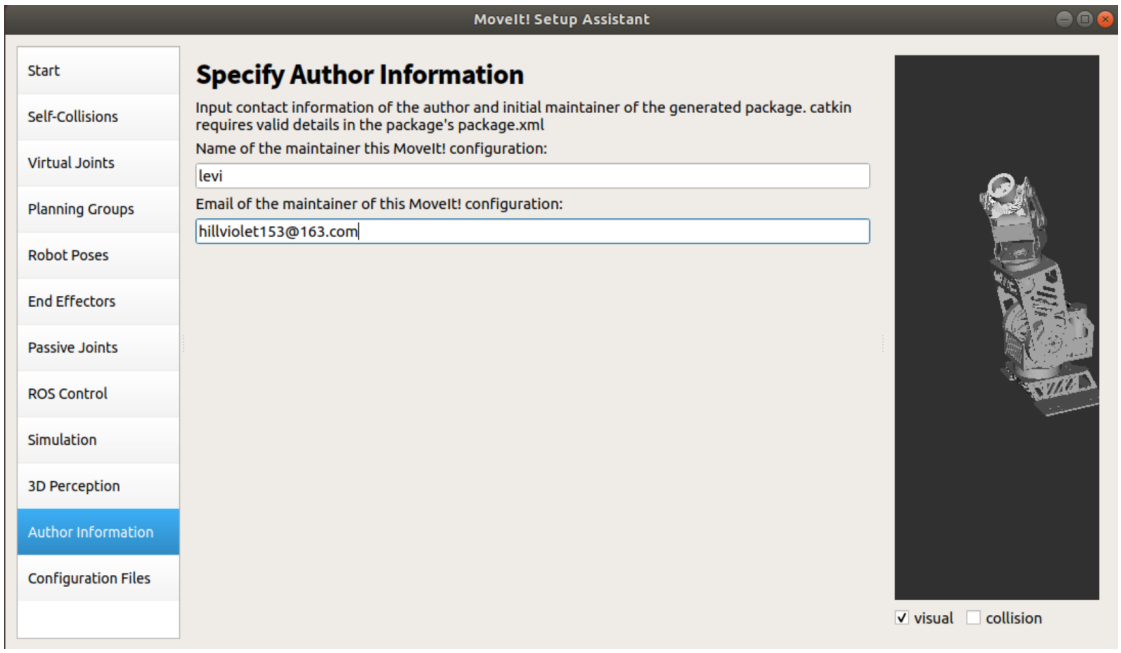
5. 预定义姿态

- `add pose`



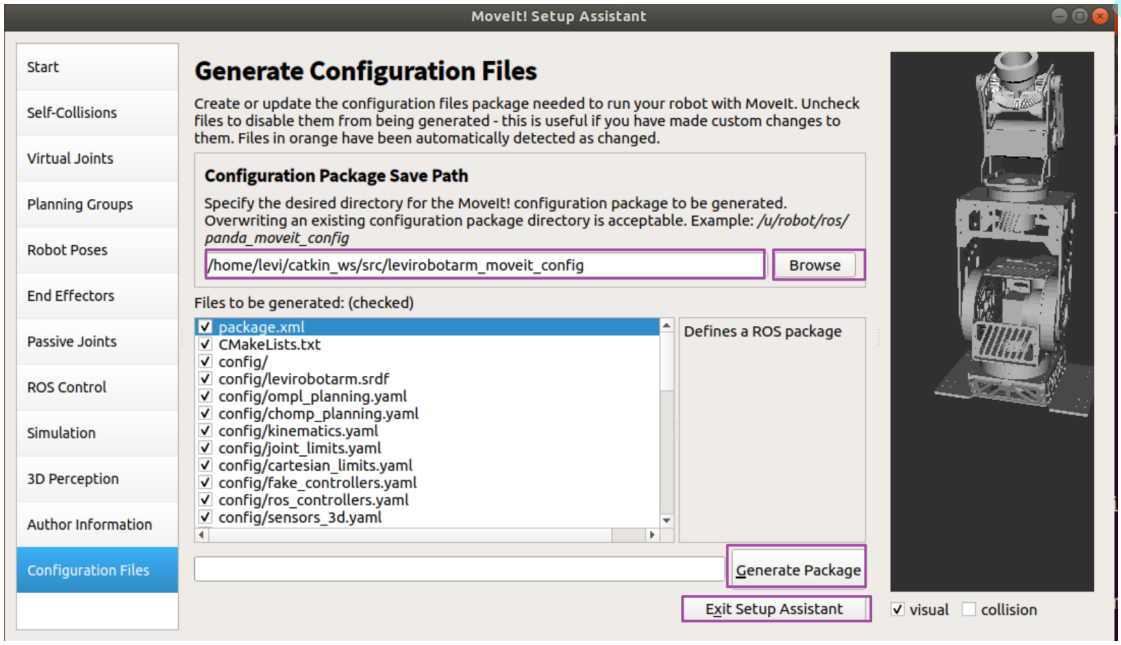


6. 作者信息



7. 生成配置功能包

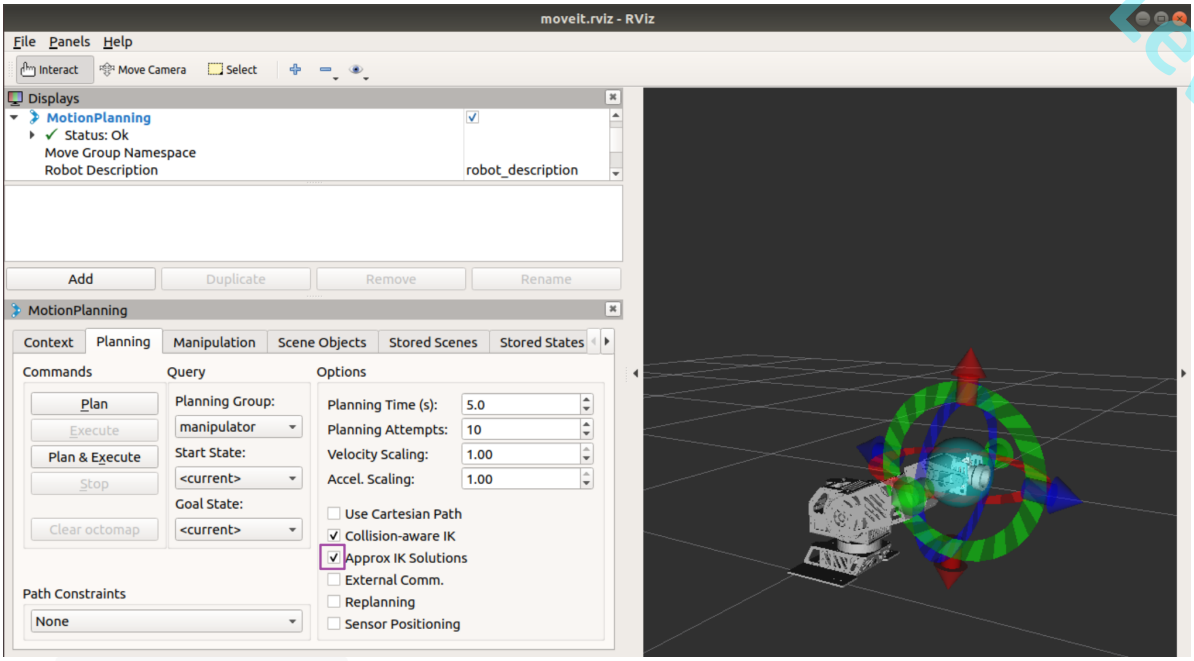
`~/catkin_ws/src/levirobotarm_moveit_config`



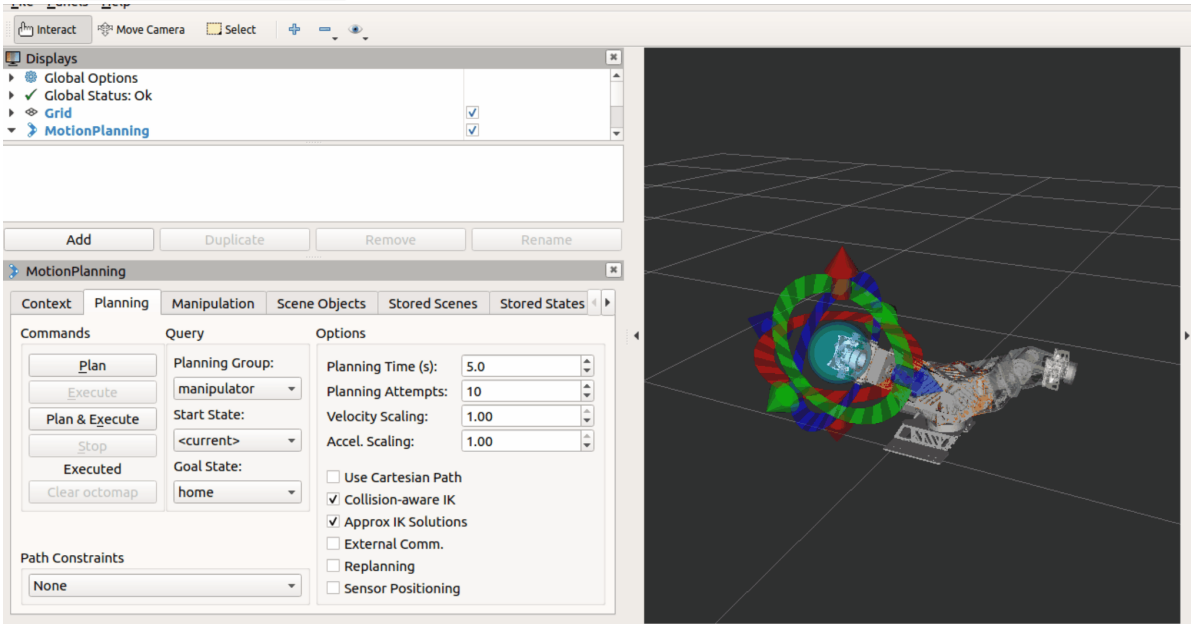
编译测试

```
cd ~/catkin_ws
catkin_make
```

```
roslaunch levirobotarm_moveit_config demo.launch
```



勾选 `Approx IK Solutions`，否则无法拖动轨迹球



如要保存配置

```
su
cd ~/catkin_ws
source devel/setup.bash
```

然后再保存

Gazebo

> 最终文件 `~/catkin_ws/src/levirobotarm_gazebo`

完善模型

1. 为link添加惯性参数和碰撞属性
   打开 `~/catkin_ws/src/levirobotarm/urdf/levirobotarm.xacro`

修改mass value, ixx, ixy, ixz, iyy, iyz, izz

```
<link
    name="base_link">
    <inertial>
      <origin
        xyz="-0.111499999999999 0.0918805537950462 0.0365980539672176"
        rpy="0 0 0" />
      <mass
        value="0.00001" />
      <inertia
        ixx="10"
        ixy="0.0"
        ixz="0.0"
        iyy="10"
        iyz="0.0"
        izz="10" />
    </inertial>
    <visual>
      <origin
        xyz="0 0 0"
        rpy="0 0 0" />
      <geometry>
        <mesh
          filename="package://levirobotarm/meshes/base_link.STL" />
      </geometry>
      <material
        name="">
        <color
          rgba="0.752941176470588 0.752941176470588 0.752941176470588 1" />
      </material>
    </visual>
    <collision>
      <origin
        xyz="0 0 0"
        rpy="0 0 0" />
      <geometry>
        <mesh
          filename="package://levirobotarm/meshes/base_link.STL" />
      </geometry>
    </collision>
  </link>
```

2. 为joint添加传动装置

   打开`~/catkin_ws/src/levirobotarm/urdf/levirobotarm.xacro`，在最后一个joint标签后添加

```
<!-- Transmissions for ROS Control -->
  <xacro:macro name="transmission_block" params="joint_name">
    <transmission name="tran1">
      <type>transmission_interface/SimpleTransmission</type>
      <joint name="${joint_name}">

 <hardwareInterface>hardware_interface/PositionJointInterface</hardwareInterface>
      </joint>
      <actuator name="motor1">
```

```
 <hardwareInterface>hardware_interface/PositionJointInterface</hardwareInterface>
       <mechanicalReduction>1</mechanicalReduction>
     </actuator>
   </transmission>
  </xacro:macro>

  <xacro:transmission_block joint_name="joint1"/>
  <xacro:transmission_block joint_name="joint2"/>
  <xacro:transmission_block joint_name="joint3"/>
  <xacro:transmission_block joint_name="joint4"/>
  <xacro:transmission_block joint_name="joint5"/>
```

3. 添加gazebo控制器插件
   紧接上文，在后面添加

```
<!-- ros_control plugin -->
  <gazebo>
    <plugin name="gazebo_ros_control" filename="libgazebo_ros_control.so">
      <robotNamespace>/levirobotarm</robotNamespace>
      <robotSimType>gazebo_ros_control/DefaultRobotHWSim</robotSimType>
      <legacyModeNS>true</legacyModeNS>
    </plugin>
  </gazebo>
```

Gazebo文件夹

1. 创建文件夹
   复制 `~/catkin_ws/src/levirobotarm` 并重命名为
   `~/catkin_ws/src/levirobotarm_gazebo`
   删除meshes, textures, urdf文件夹
2. 修改CMakeLists.txt文件
   `levirobotarm` 改为 `levirobotarm_gazebo`

```
project(levirobotarm_gazebo)
```

3. 修改package.xml
   `levirobotarm` 改为 `levirobotarm_gazebo`

```
<name>levirobotarm_gazebo</name>
```

4. 执行文件
   `~/catkin_ws/src/levirobotarm_gazebo`

```
cd ~/catkin_ws/src/levirobotarm_gazebo/launch
touch levirobotarm_gazebo.launch
```

`levirobotarm_gazebo.launch` 内容如下

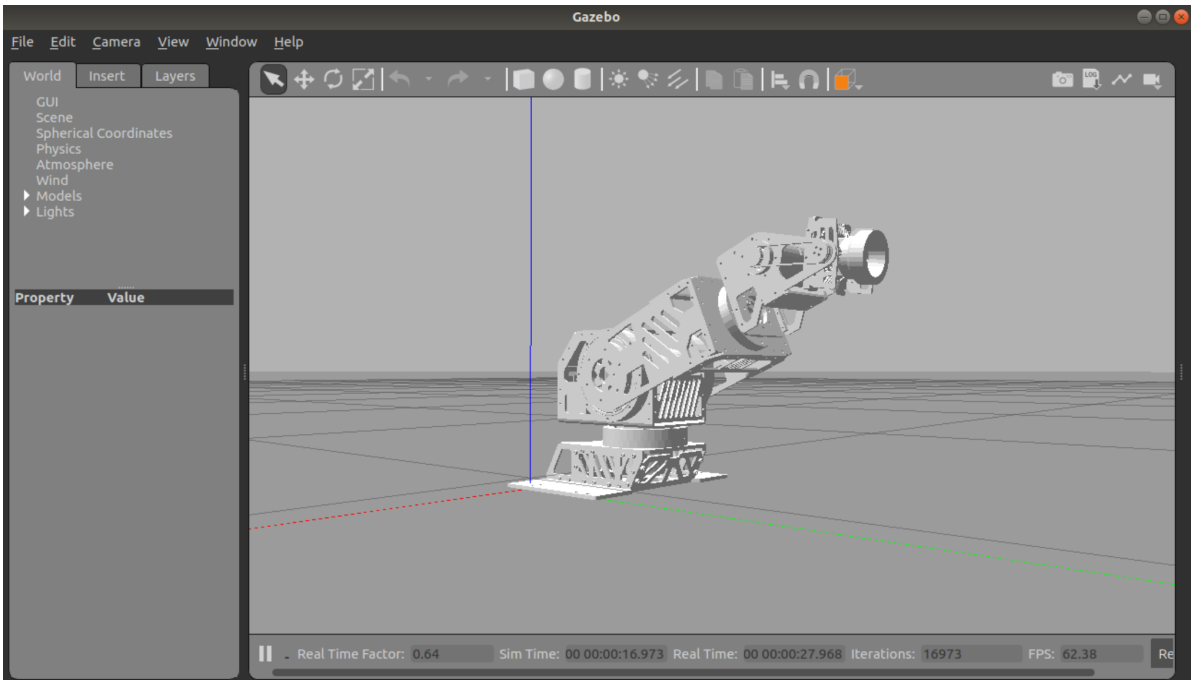
```
<launch>
  <!-- these are the arguments you can pass this launch file, for example paused:=true
-->
  <arg name="paused" default="false"/>
```

```
  <arg name="use_sim_time" default="true"/>
  <arg name="gui" default="true"/>
  <arg name="headless" default="false"/>
  <arg name="debug" default="false"/>
  <!-- We resume the logic in empty_world.launch -->
  <include file="$(find gazebo_ros)/launch/empty_world.launch">
    <arg name="debug" value="$(arg debug)" />
    <arg name="gui" value="$(arg gui)" />
    <arg name="paused" value="$(arg paused)"/>
    <arg name="use_sim_time" value="$(arg use_sim_time)"/>
    <arg name="headless" value="$(arg headless)"/>
  </include>
  <!-- Load the URDF into the ROS Parameter Server -->
  <param name="robot_description" command="$(find xacro)/xacro --inorder '$(find
levirobotarm)/urdf/levirobotarm.xacro'" />
  <!-- Run a python script to the send a service call to gazebo_ros to spawn a URDF
robot -->
  <node name="urdf_spawner" pkg="gazebo_ros" type="spawn_model" respawn="false"
output="screen"
    args="-urdf -model levirobotarm -param robot_description"/>
</launch>
```

编译测试

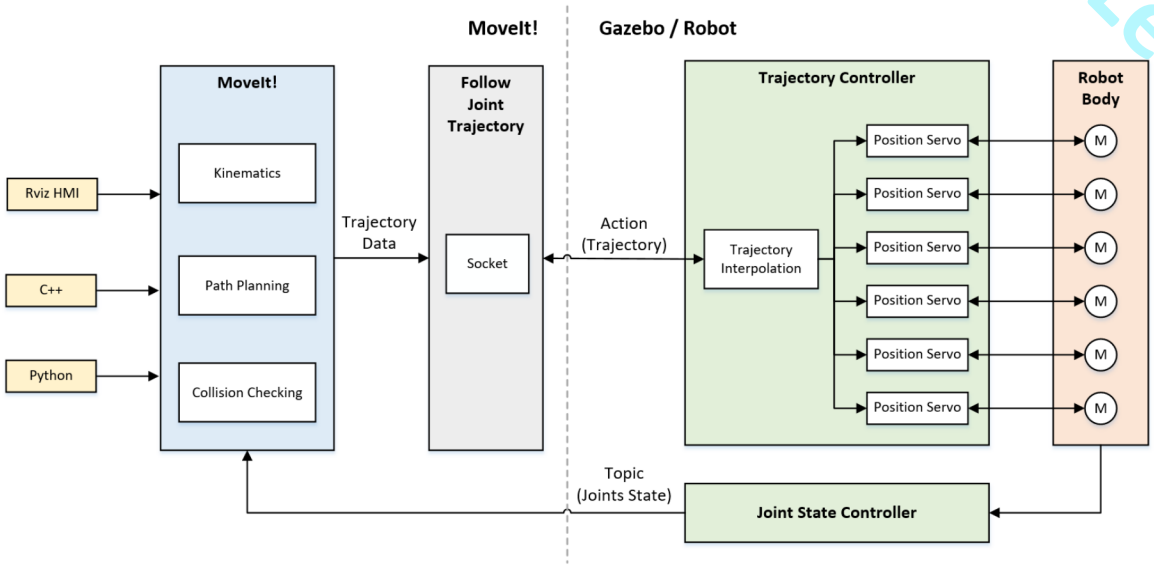
```
cd ~/catkin_ws
catkin_make
```

```
roslaunch levirobotarm_gazebo levirobotarm_gazebo.launch
```



MoveIt + Gazebo

> Unable to identify any set of controllers that can actuate the specified joints:-CSDN博客



MoveIt!机器人控制框架

> 最终文件 `~/catkin_ws/src/levirobotarm_gazebo`

joint trajectory controller

- 配置文件
  `~/catkin_ws/src/levirobotarm_gazebo/config`

```
cd ~/catkin_ws/src/levirobotarm_gazebo/config
touch levirobotarm_trajectory_control.yaml
```

`levirobotarm_trajectory_control.yaml` 内容如下

```yaml
levirobotarm:
  arm_joint_controller:
    type: "position_controllers/JointTrajectoryController"
    joints:
      - joint1
      - joint2
      - joint3
      - joint4
      - joint5

    gains:
      joint1:   {p: 1000.0, i: 0.0, d: 0.1, i_clamp: 0.0}
      joint2:   {p: 1000.0, i: 0.0, d: 0.1, i_clamp: 0.0}
      joint3:   {p: 1000.0, i: 0.0, d: 0.1, i_clamp: 0.0}
      joint4:   {p: 1000.0, i: 0.0, d: 0.1, i_clamp: 0.0}
      joint5:   {p: 1000.0, i: 0.0, d: 0.1, i_clamp: 0.0}
```

- 启动文件
  `~/catkin_ws/src/levirobotarm_gazebo/launch`

```
cd ~/catkin_ws/src/levirobotarm_gazebo/launch
touch levirobotarm_trajectory_controller.launch
```

`levirobotarm_trajectory_controller.launch` 内容如下

```
<launch>

    <rosparam file="$(find
levirobotarm_gazebo)/config/levirobotarm_trajectory_control.yaml" command="load"/>

    <node name="arm_controller_spawner" pkg="controller_manager" type="spawner"
respawn="false"
          output="screen" ns="/levirobotarm" args="arm_joint_controller"/>

</launch>
```

joint state controller

- 配置文件
  `~/catkin_ws/src/levirobotarm_gazebo/config`

```
cd ~/catkin_ws/src/levirobotarm_gazebo/config
touch levirobotarm_joint_states.yaml
```

`levirobotarm_joint_states.yaml` 内容如下

```
levirobotarm:
  # Publish all joint states -----------------------------------
  joint_state_controller:
    type: joint_state_controller/JointStateController
    publish_rate: 50
```

- 启动文件
  `~/catkin_ws/src/levirobotarm_gazebo/launch`

```
cd ~/catkin_ws/src/levirobotarm_gazebo/launch
touch levirobotarm_states.launch
```

`levirobotarm_states.launch` 内容如下

```
<launch>
    <!-- 将关节控制器的配置参数加载到参数服务器中 -->
    <rosparam file="$(find levirobotarm_gazebo)/config/levirobotarm_joint_states.yaml"
command="load"/>

    <node name="joint_controller_spawner" pkg="controller_manager" type="spawner"
respawn="false"
          output="screen" ns="/levirobotarm" args="joint_state_controller" />

    <!-- 运行robot_state_publisher节点，发布tf  -->
    <node name="robot_state_publisher" pkg="robot_state_publisher"
type="robot_state_publisher"
        respawn="false" output="screen">
        <remap from="/joint_states" to="/levirobotarm/joint_states" />
    </node>
</launch>
```

follow joint trajectory

- 配置文件
  `~/catkin_ws/src/levirobotarm_moveit_config/config`

```
cd ~/catkin_ws/src/levirobotarm_moveit_config/config
touch levirobotarm_controllers_gazebo.yaml
```

`levirobotarm_controllers_gazebo.yaml` 内容如下

```
controller_manager_ns: controller_manager
controller_list:
  - name: levirobotarm/arm_joint_controller
    action_ns: follow_joint_trajectory
    type: FollowJointTrajectory
    default: true
    joints:
      - joint1
      - joint2
      - joint3
      - joint4
      - joint5
```

报错

```
[ERROR] [1729342811.504048590, 26.258000000]: Unable to identify any set of
controllers that can actuate the specified joints: [ joint1 joint2 joint3 joint4
joint5 ]
[ERROR] [1729342811.504222788, 26.258000000]: Known controllers and their joints:
[ERROR] [1729342811.504361887, 26.258000000]: Apparently trajectory initialization
failed
```

修改 `ros_controllers.yaml` 内容如下

```
# Simulation settings for using moveit_sim_controllers
moveit_sim_hw_interface:
  joint_model_group: controllers_initial_group_
  joint_model_group_pose: controllers_initial_pose_
# Settings for ros_control_boilerplate control loop
generic_hw_control_loop:
  loop_hz: 300
  cycle_time_error_threshold: 0.01
# Settings for ros_control hardware interface
hardware_interface:
  joints:
    - joint1
    - joint2
    - joint3
    - joint4
    - joint5
  sim_control_mode: 1  # 0: position, 1: velocity
# Publish all joint states
# Creates the /joint_states topic necessary in ROS
joint_state_controller:
  type: joint_state_controller/JointStateController
```

```
  publish_rate: 50
#controller_list:
#  []
controller_list:
  - name: levirobotarm/arm_joint_controller
    action_ns: follow_joint_trajectory
    type: FollowJointTrajectory
    default: true
    joints:
      - joint1
      - joint2
      - joint3
      - joint4
      - joint5
```

- 启动文件
  `~/catkin_ws/src/levirobotarm_moveit_config/launch`

```
cd ~/catkin_ws/src/levirobotarm_moveit_config/launch
touch levirobotarm_moveit_controller_manager.launch
```

`levirobotarm_moveit_controller_manager.launch` 内容如下

```
<launch>
    <arg name="moveit_controller_manager"
default="moveit_simple_controller_manager/MoveItSimpleControllerManager"/>
    <param name="moveit_controller_manager" value="$(arg moveit_controller_manager)"/>

    <!-- gazebo Controller -->
    <rosparam file="$(find
levirobotarm_moveit_config)/config/levirobotarm_controllers_gazebo.yaml"/>

</launch>
```

`~/catkin_ws/src/levirobotarm_moveit_config/launch`

```
cd ~/catkin_ws/src/levirobotarm_moveit_config/launch
touch levirobotarm_moveit_planning_execution.launch
```

`levirobotarm_moveit_planning_execution.launch` 内容如下

```
<launch>
 # The planning and execution components of MoveIt! configured to
 # publish the current configuration of the robot (simulated or real)
 # and the current state of the world as seen by the planner
 <include file="$(find levirobotarm_moveit_config)/launch/move_group.launch">
  <arg name="publish_monitored_planning_scene" value="true" />
 </include>

 # The visualization component of MoveIt!
 <include file="$(find levirobotarm_moveit_config)/launch/moveit_rviz.launch">
  <arg name="config" value="true" />
 </include>

  <!-- We do not have a robot connected, so publish fake joint states -->
```

```
  <node name="joint_state_publisher" pkg="joint_state_publisher"
type="joint_state_publisher">
    <param name="/use_gui" value="false"/>
    <rosparam param="/source_list">[/levirobotarm/joint_states]</rosparam>
  </node>

</launch>
```

`moveit_rviz.launch` 内容如下

```
<launch>

  <arg name="debug" default="false" />
  <arg unless="$(arg debug)" name="launch_prefix" value="" />
  <arg     if="$(arg debug)" name="launch_prefix" value="gdb --ex run --args" />

  <arg name="config" default="false" />
  <arg unless="$(arg config)" name="command_args" default="" />
  <arg     if="$(arg config)" name="command_args" default="-d $(find
levirobotarm_moveit_config)/launch/moveit.rviz" />

  <node name="$(anon rviz)" launch-prefix="$(arg launch_prefix)" pkg="rviz"
type="rviz" respawn="false"
        args="$(arg command_args)" output="screen">
  <rosparam command="load" file="$(find
levirobotarm_moveit_config)/config/kinematics.yaml"/>
  </node>

</launch>
```

moveit_gazebo

启动文件
`~/catkin_ws/src/levirobotarm_gazebo/launch`

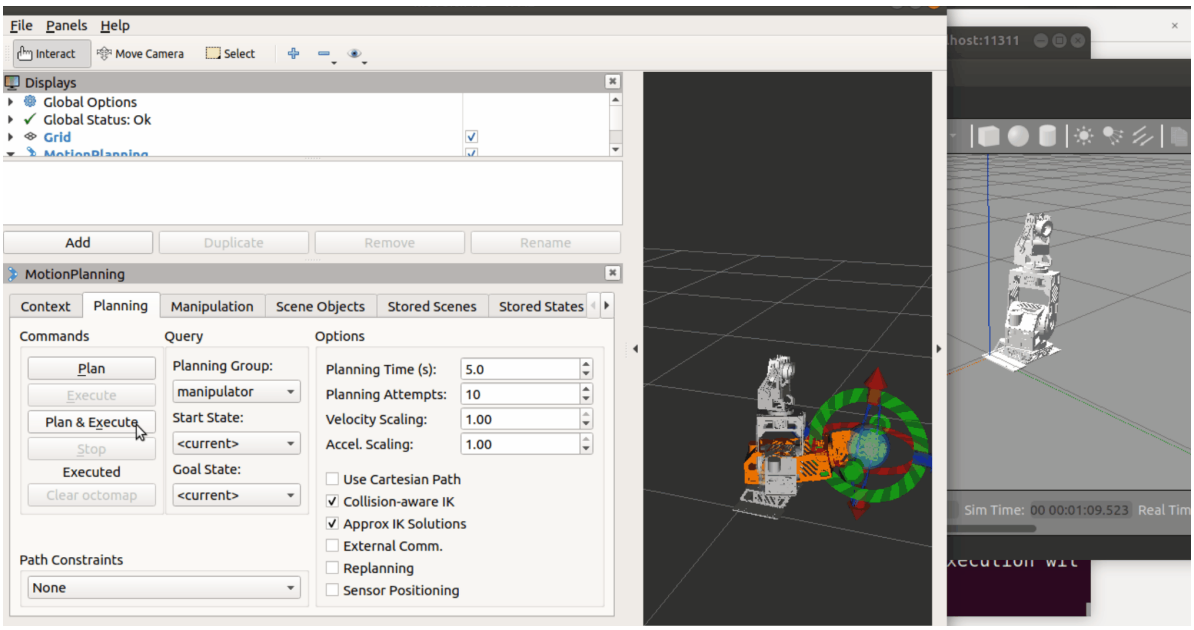
```
cd ~/catkin_ws/src/levirobotarm_gazebo/launch
touch levirobotarm_bringup_moveit.launch
```

`levirobotarm_bringup_moveit.launch` 内容如下

```
<launch>

    <!-- Launch Gazebo  -->
    <include file="$(find levirobotarm_gazebo)/launch/levirobotarm_gazebo.launch" />

    <!-- ros_control arm launch file -->
    <include file="$(find levirobotarm_gazebo)/launch/levirobotarm_states.launch" />

    <!-- ros_control trajectory control dof arm launch file -->
    <include file="$(find
levirobotarm_gazebo)/launch/levirobotarm_trajectory_controller.launch" />

    <!-- moveit launch file -->
```

```
    <include file="$(find
levirobotarm_moveit_config)/launch/levirobotarm_moveit_planning_execution.launch" />

</launch>
```

```
roslaunch levirobotarm_gazebo levirobotarm_bringup_moveit.launch
```



MoveIt编程

> 最终文件 `~/catkin_ws/src/levirobotarm_demo`
> 文件改自古月居 `probot_demo`

复制 `probot_demo` 文件并重命名为 `levirobotarm_demo`
将 `CMakeLists.txt` 和 `package.xml` 文件中 `probot_demo` 修改为 `levirobotarm_demo`

```
cd ~/catkin_ws
catkin_make
```

关节空间运动

正向运动学规划

- 程序
  `~/catkin_ws/src/levirobotarm_demo/scripts/moveit_fk_demo.py` 程序内容如下

```
# -*- coding: utf-8 -*-
import rospy, sys
import moveit_commander
class MoveItFkDemo:
    def __init__(self):
        # 初始化move_group的API
        moveit_commander.roscpp_initialize(sys.argv)
        # 初始化ROS节点
        rospy.init_node('moveit_fk_demo', anonymous=True)
```

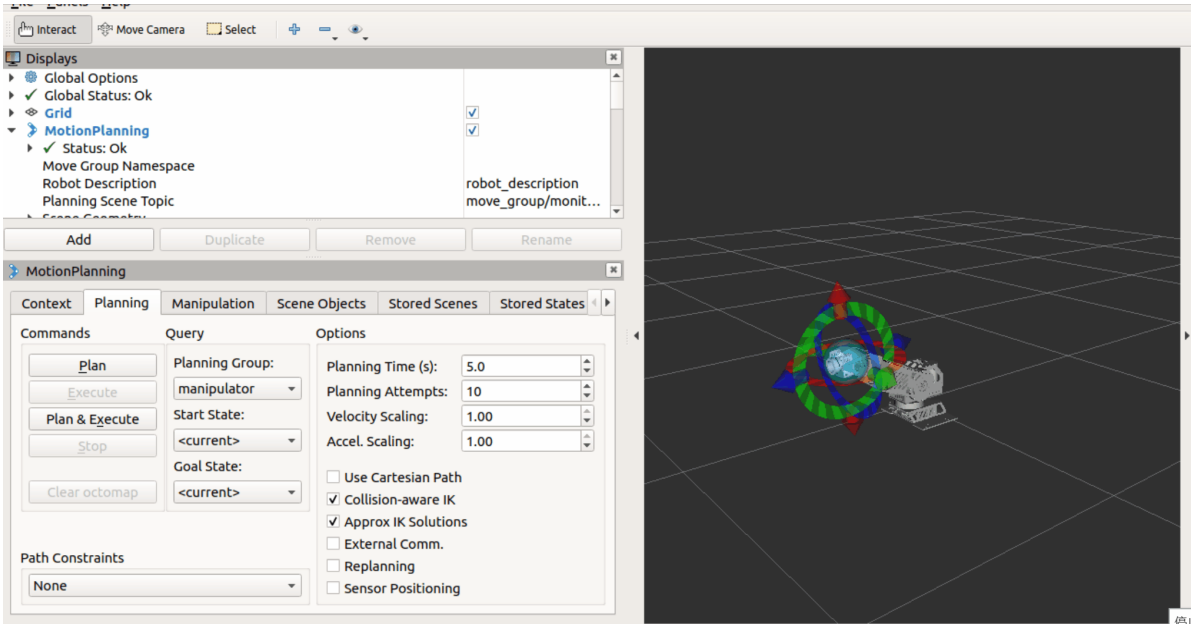
```
        # 初始化需要使用move group控制的机械臂中的arm group
        arm = moveit_commander.MoveGroupCommander('manipulator')
        # 设置机械臂运动的允许误差值
        arm.set_goal_joint_tolerance(0.001)
        # 设置允许的最大速度和加速度 0~1
        arm.set_max_acceleration_scaling_factor(0.5)
        arm.set_max_velocity_scaling_factor(0.5)
        # 控制机械臂先回到初始化位置
        arm.set_named_target('home')
        # plan execute
        arm.go()
        rospy.sleep(1)
        # 设置机械臂的目标位置，使用五轴的位置数据进行描述（单位：弧度）
        joint_positions = [0.391410, -0.676384, -0.376217, 0.0, 1.052834]
        arm.set_joint_value_target(joint_positions)
        # 控制机械臂完成运动
        arm.go()
        rospy.sleep(1)
        # 控制机械臂先回到初始化位置
        arm.set_named_target('home')
        arm.go()
        rospy.sleep(1)
        # 关闭并退出moveit
        moveit_commander.roscpp_shutdown()
        moveit_commander.os._exit(0)
if __name__ == "__main__":
    try:
        MoveItFkDemo()
    except rospy.ROSInterruptException:
        pass
```

- 运行
  运行rviz界面

```
roslaunch levirobotarm_moveit_config demo.launch
```

运行程序

```
rosrun levirobotarm_demo moveit_fk_demo.py
```



逆向运动学规划

- 程序

  `~/catkin_ws/src/levirobotarm_demo/scripts/moveit_ik_demo.py` 程序内容如下

```
# -*- coding: utf-8 -*-
import rospy, sys
import moveit_commander
from geometry_msgs.msg import PoseStamped, Pose
class MoveItIkDemo:
    def __init__(self):
        # 初始化move_group的API
        moveit_commander.roscpp_initialize(sys.argv)
        # 初始化ROS节点
        rospy.init_node('moveit_ik_demo')
        # 初始化需要使用move group控制的机械臂中的arm group
        arm = moveit_commander.MoveGroupCommander('manipulator')
        # 获取终端link的名称
        end_effector_link = arm.get_end_effector_link()
        # 设置目标位置所使用的参考坐标系
        reference_frame = 'base_link'
        arm.set_pose_reference_frame(reference_frame)
        # 当运动规划失败后，允许重新规划
        arm.allow_replanning(True)
        # 设置位置(单位：米)和姿态（单位：弧度）的允许误差
        arm.set_goal_position_tolerance(0.001)
        arm.set_goal_orientation_tolerance(0.01)
        # 设置允许的最大速度和加速度
        arm.set_max_acceleration_scaling_factor(0.5)
        arm.set_max_velocity_scaling_factor(0.5)
        # 控制机械臂先回到初始化位置
        arm.set_named_target('home')
        arm.go()
        rospy.sleep(1)
        # 设置机械臂工作空间中的目标位姿，位置使用x、y、z坐标描述，
        # 姿态使用四元数描述，基于base_link坐标系
        target_pose = PoseStamped()
        target_pose.header.frame_id = reference_frame
        target_pose.header.stamp = rospy.Time.now()
        target_pose.pose.position.x = -0.100901
        target_pose.pose.position.y = 0.192478
        target_pose.pose.position.z = 0.492304
        target_pose.pose.orientation.x = 0.523656
        target_pose.pose.orientation.y = -0.523583
        target_pose.pose.orientation.z = -0.475238
        target_pose.pose.orientation.w = -0.475178
        # 设置机器臂当前的状态作为运动初始状态
        arm.set_start_state_to_current_state()
        # 设置机械臂终端运动的目标位姿
        arm.set_pose_target(target_pose, end_effector_link)
        # 规划运动路径
        traj = arm.plan()
        # 按照规划的运动路径控制机械臂运动
        arm.execute(traj)
        # arm.go()
        rospy.sleep(1)
```

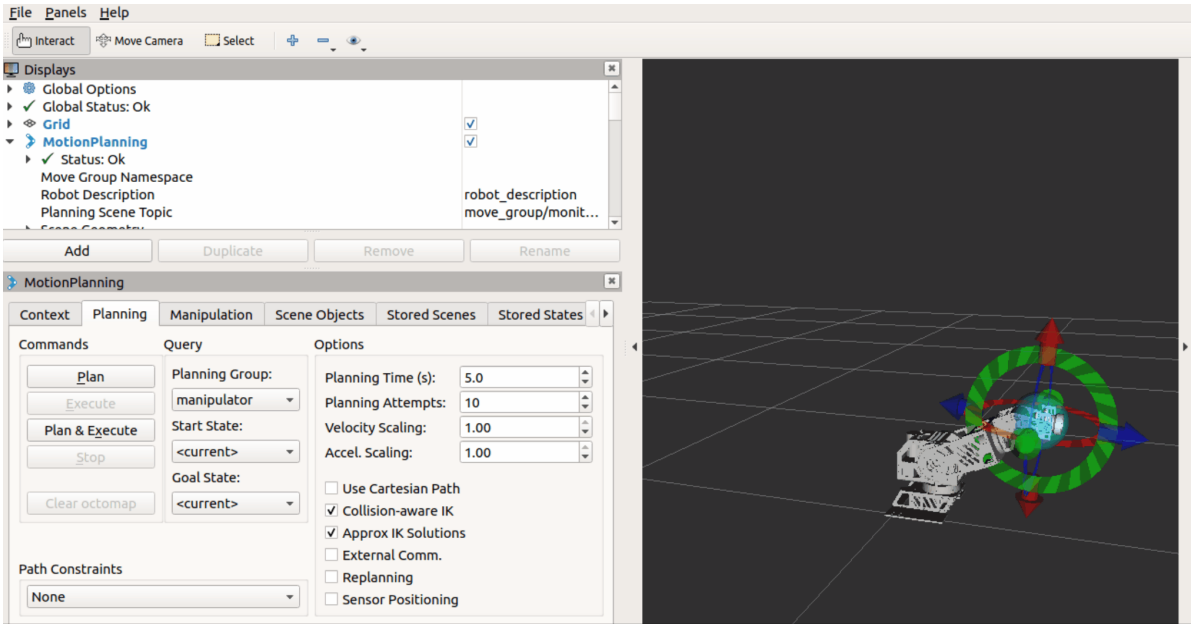
```
        # 控制机械臂回到初始化位置
        arm.set_named_target('home')
        arm.go()
        # 关闭并退出moveit
        moveit_commander.roscpp_shutdown()
        moveit_commander.os._exit(0)
if __name__ == "__main__":
    MoveItIkDemo()
```

- 运行
  运行rviz界面

```
roslaunch levirobotarm_moveit_config demo.launch
```

运行程序

```
rosrun levirobotarm_demo moveit_ik_demo.py
```



参考资料

> **【古月居】ROS机械臂开发：从入门到实战-哔哩哔哩**
>
> **【古月居】ROS机械臂开发：从入门到实战-代码** 提取码：1005
>
> **【哈萨克斯坦x】ROS机械臂入门教程-哔哩哔哩**
>
> **【哈萨克斯坦x】 ros机械臂入门教程-代码 version3.0** 提取码：8888