If you use Yahboom image, you can skip this step.

1. Start the configuration program

Input following command to start up roscore.

roscore

Open another terminal and enter the following command to start MoveIt.

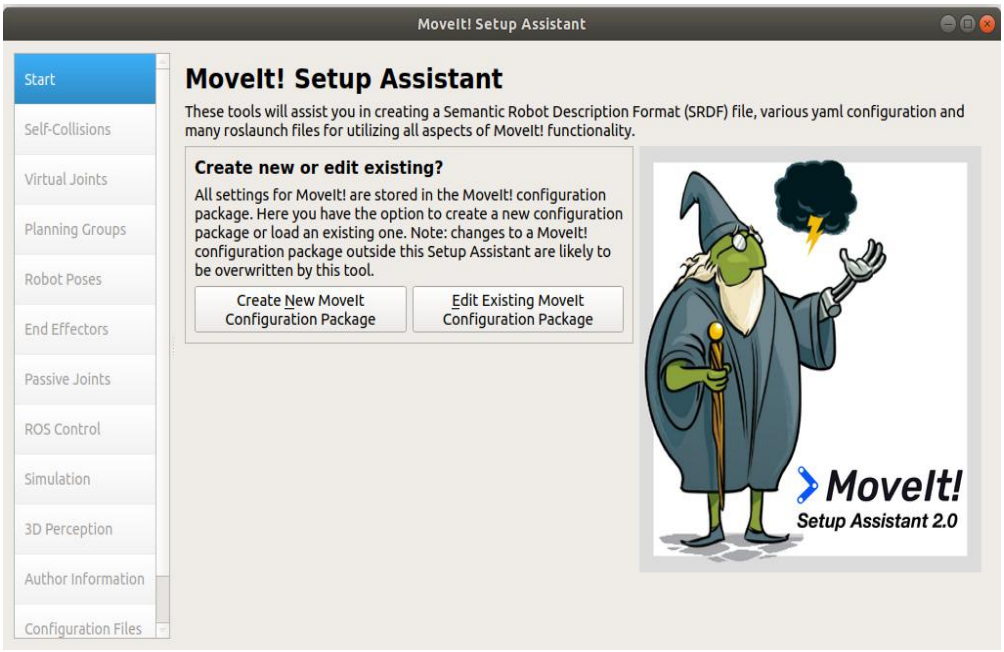
rosrun moveit_setup_assistant moveit_setup_assistant

2. Configuration process

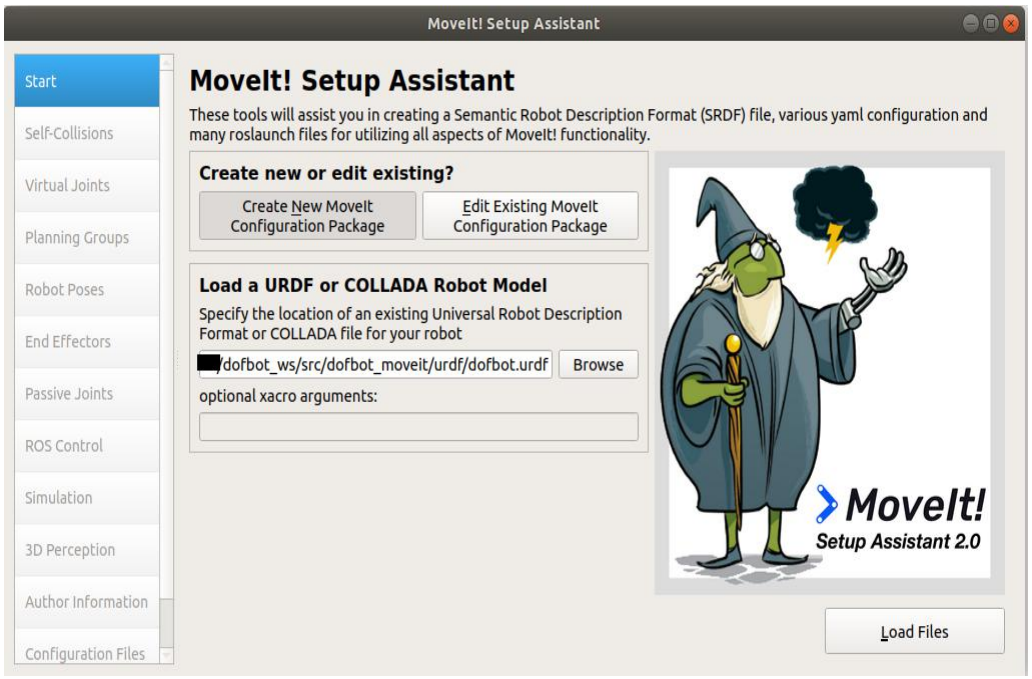
- Load URDF model

If it is the first time to load the model generation configuration, select the left side.

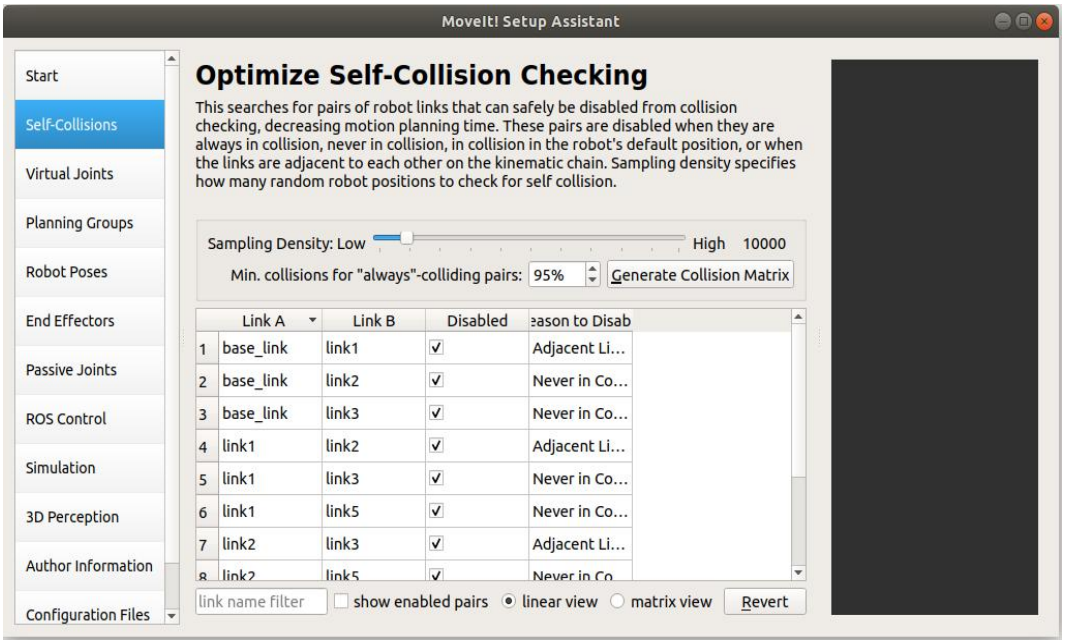
If it is to modify the generated configuration file, select the right side.



Click the Browse button, find the URDF model file, and click the lower right corner to load it.



- Create collision avoidance matrix (Avoid Collision Matrix, ACM), click “Generate Collision Matrix” button.



- Add virtual joints.

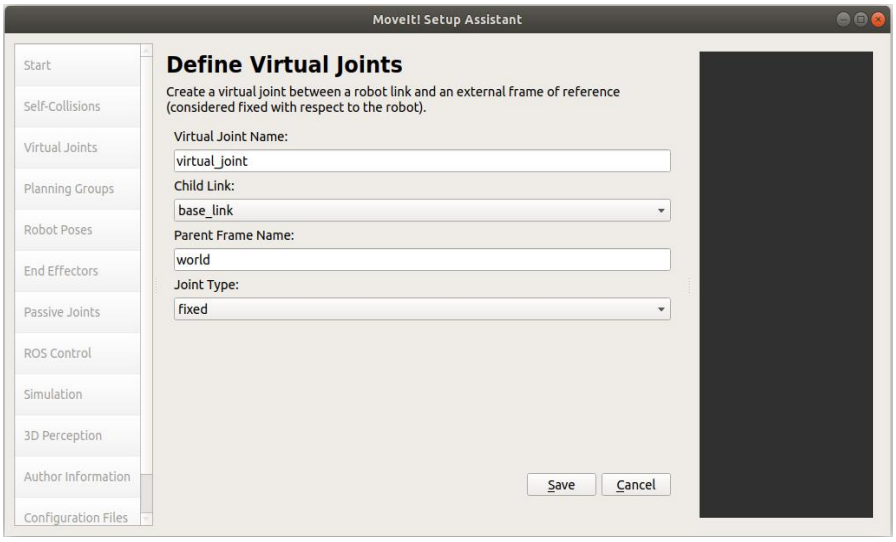
We named Virtual Joint Name virtual_joint.

Child Link refers to the part where we want to connect the ‘world’ to the robot, and we choose base_link.

Parent Frame Name, is the name of the world coordinate, generally called world in ROS.

Joint Type Joint type, select 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), which is used for mobile robots

such as PR2; there is also a Floating, which refers to the floating base (xyz position+orientation), such as humanoid robots.



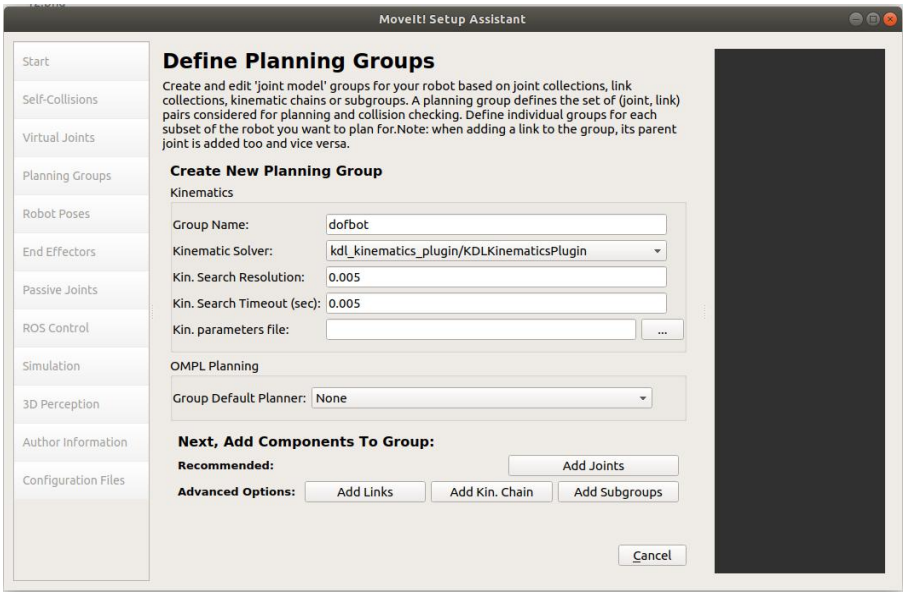
- Creating a motion planning group Planning Group is one of the cores of MoveIt.

Group Name: Create a group name, we call it dofbot.

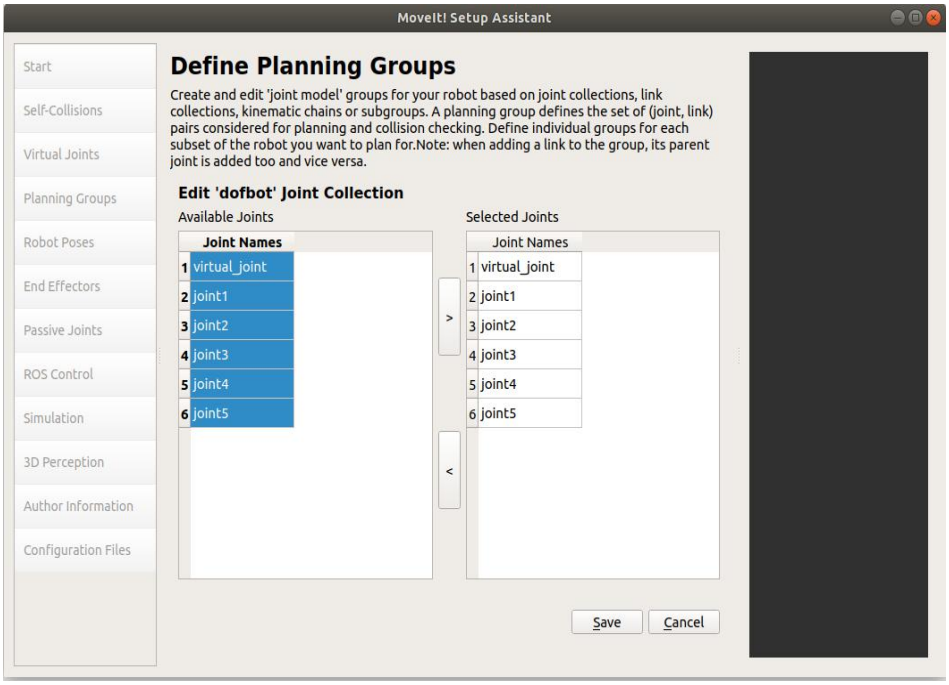
Kinematic Solver: Kinematics solving tool, this is responsible for solving forward kinematics (Forward Kinematics) and inverse kinematics (IK). Generally we choose KDL, The Kinematics and Dynamics Library. This is a library of kinematics and dynamics, which can solve the forward and inverse kinematics problems of single-chain mechanical structures with more than 6 degrees of freedom. Of course, you can also use other IK Solver, such as SRV or IK_FAST, or even you can develop a new Solver by yourself and plug it in.

Kin. Search Resolution: Sampling density of joint space

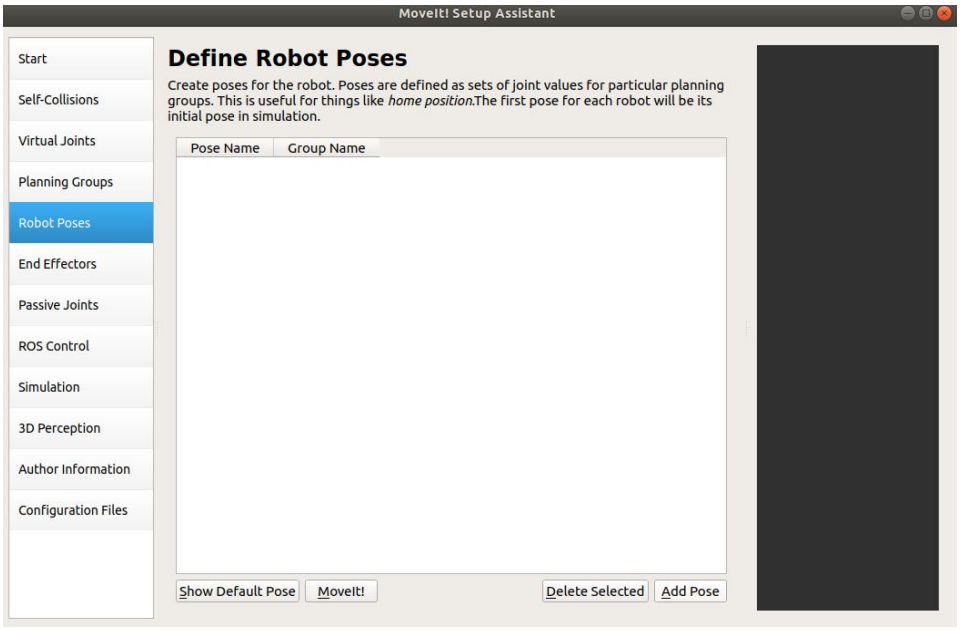
Kin. Search TImeout: Solving time



- Define planning group



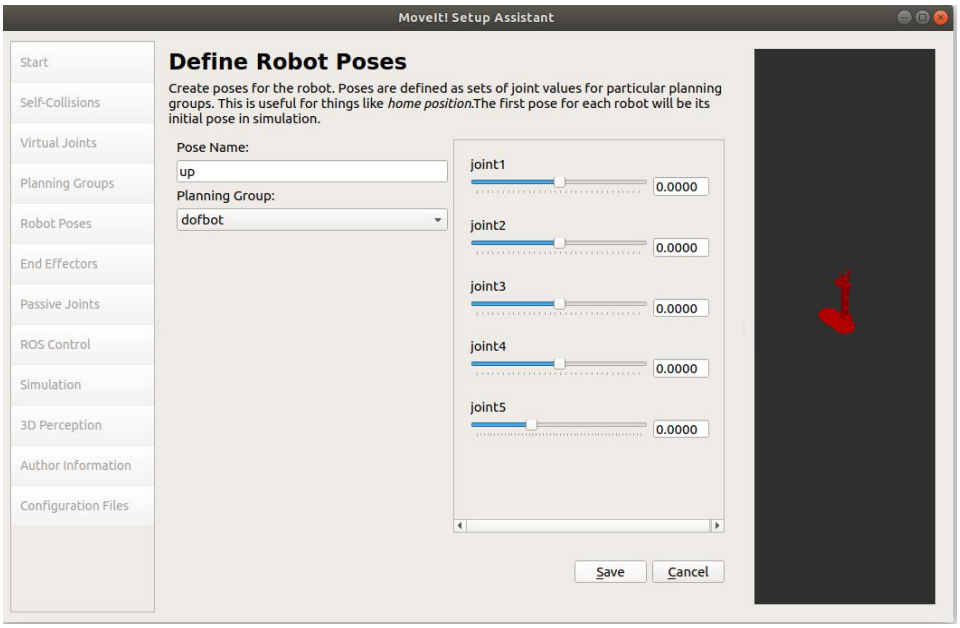
- Create preset robot poses (Robot Poses)



Click Add Pose, we create an upright pose for the robotic arm, and select the Planning Group as dofbot.

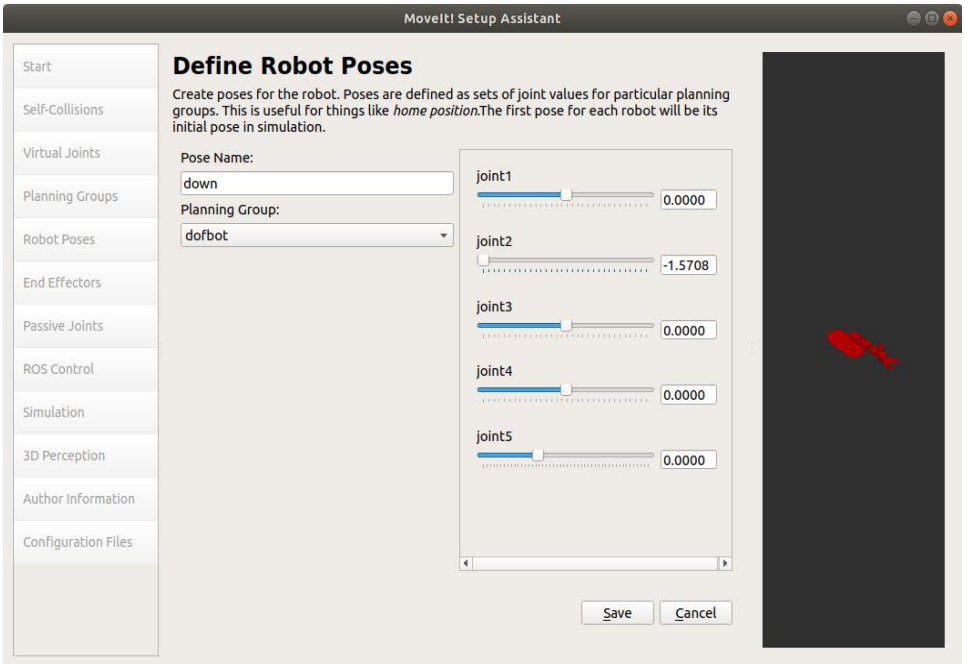
You can see a lot of scroll bars on the left.

If you set all parameter to 0, it will become a vertical upward pose. Then click “Save”.

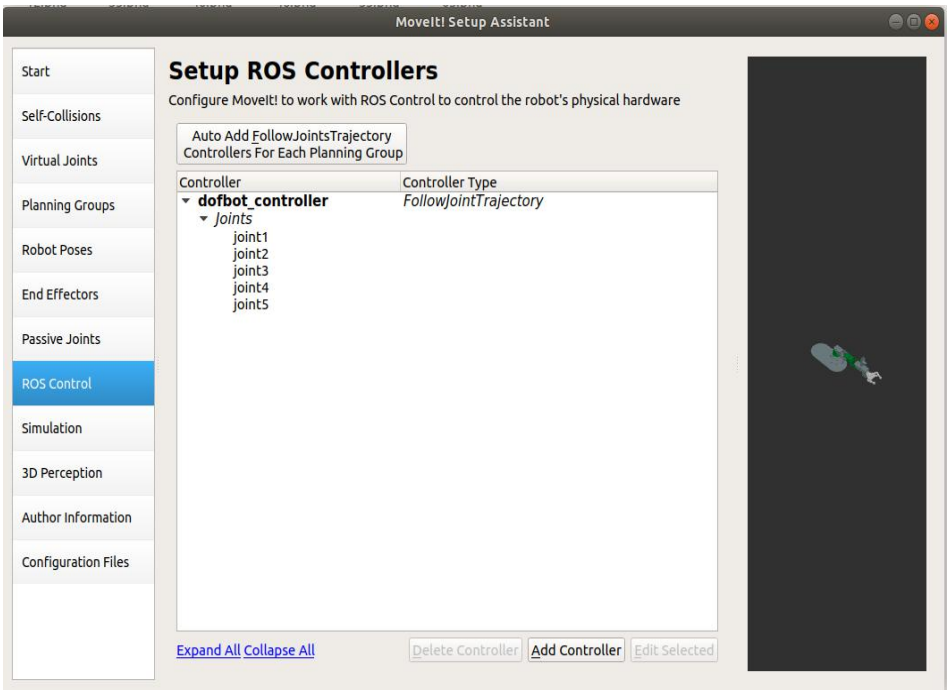


Click “Add Pose”, we create a horizontal pose down for the robotic arm, and select the Planning Group as dofbot.

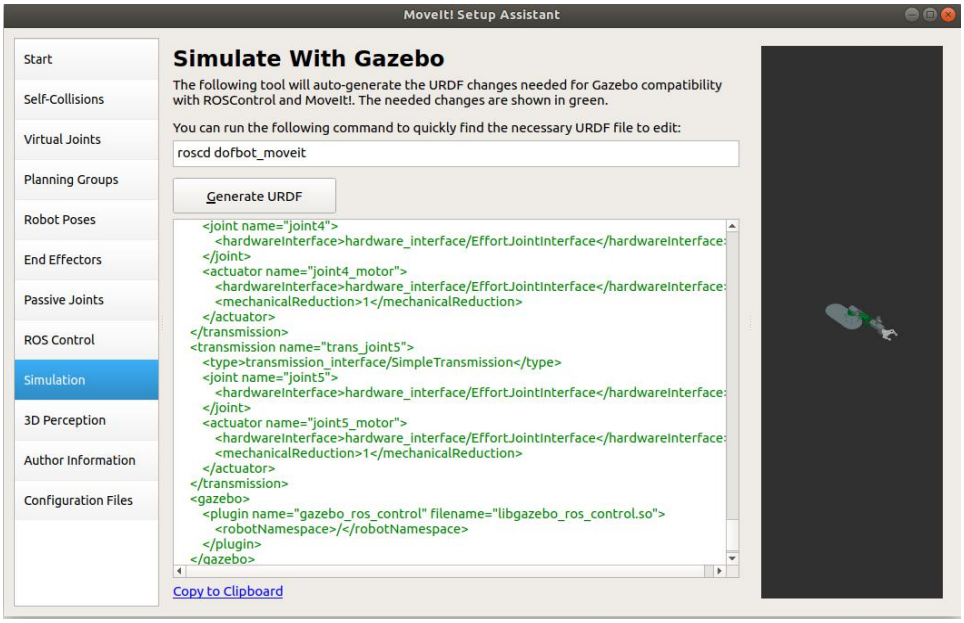
Slide joint2 to the far left.



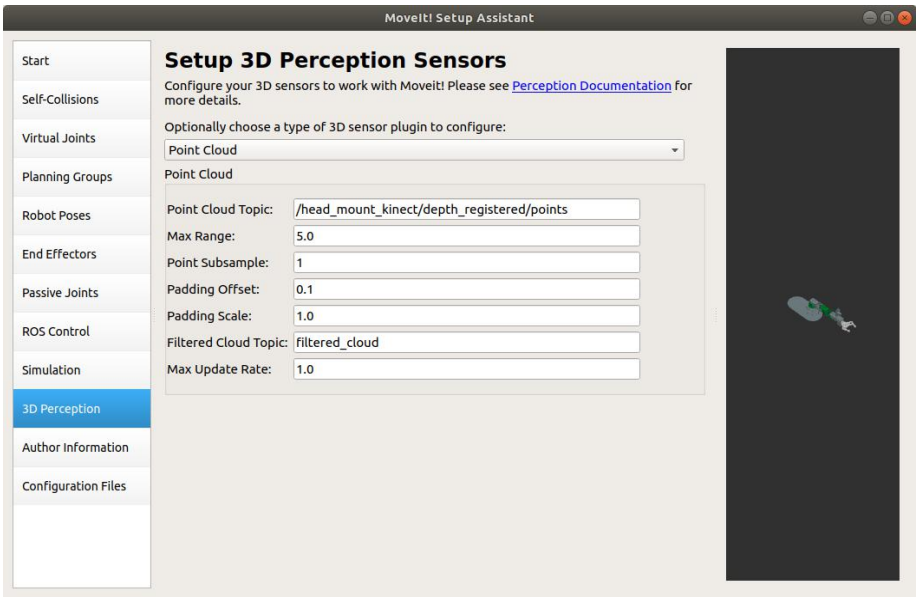
- Establish ROS controller



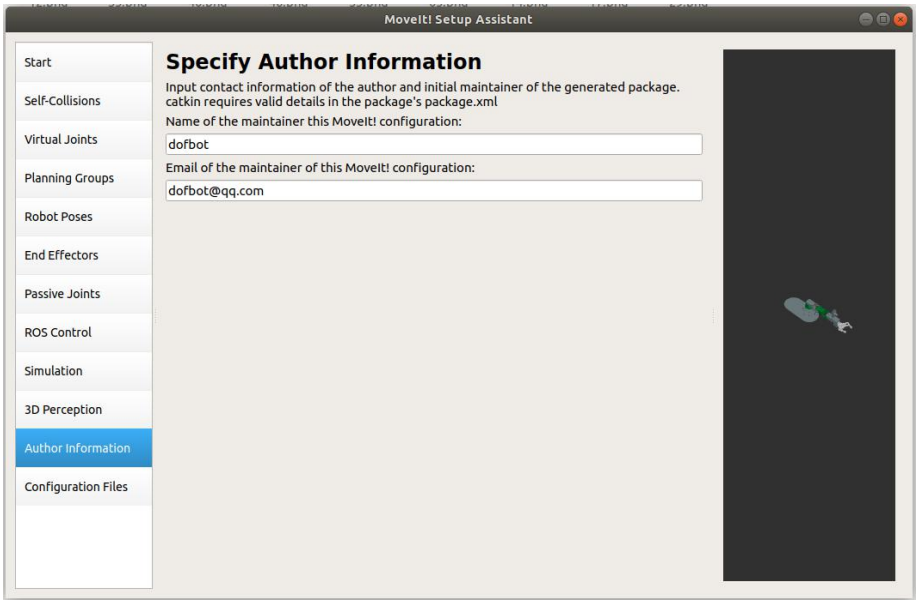
- Add available gazebo simulation



- Create 3D information, which can be ignored



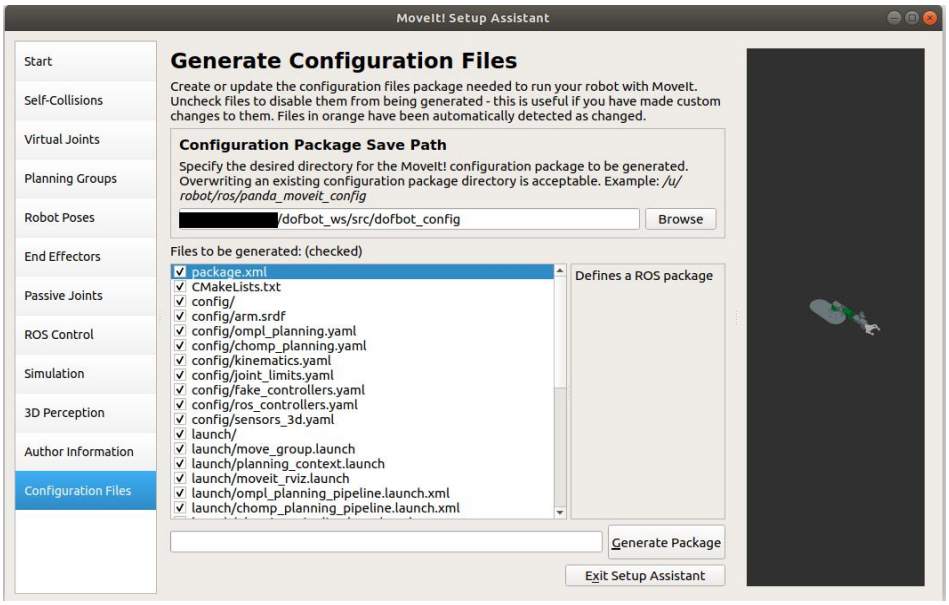
- Add author information, if you don't add it, it will not be generated



- Generate configuration files

Create a new dofbot_config folder, put the configuration file in this folder, click the “Browse” button.

Select the folder, click the “Generate Package” button, and generate the configuration file.



3. Detailed explanation of MoveIt 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 input the following command

```
cd ~/dofbot_ws/    # Enter the workspace
catkin_make      # Compile
```

```
source devel/setup.bash # Update system environment
roslaunch dofbot_config demo.launch # Start the ROS node
```

As shown below.