Gazebo and ROS

MoveIt Planning for Robot Arm, RViz Vizualization and Sample applications with Robot Arm
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More information: rosin-project.eu

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Annex_3_4_MoveIt_Application_eng.pptx

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What is MoveIt?

MoveIt, widely used for robot manipulation;

- developing advanced applications,
- evaluating new designs,
- creating integrated products

MoveIt provides an easy-to-use robotic platform.

MoveIt Contents

Thanks to the facilities it contains as MoveIt platform;

- Motion planning
- robot manipulation
- tnverse kinematic analysis
- robot control
- 3-D sensing
- Collision control

Applications can be realized.

MoveIt

MoveIt Content

With the plugin named “Rviz Motion Planning Plugin”, it is possible to try various planning algorithms in environments where there are obstacles.

Along with various planning libraries such as "OMPL", "CHOMP" and "STOMP", it is possible to use the current planning algorithms in the literature.

MoveIt Content

With the configuration wizard called “MoveIt Setup Assistant”, it is possible to configure any robot step by step or to use popular pre-configured structures.

By integrating Gazebo, ROS Control and MoveIt, a powerful robot development platform can be obtained.

MoveIt Installation

If ROS is successfully installed and MoveIt is not yet installed, installation can be done using the following command using pre-built binaries for Kinetic;

```
sudo apt install ros-kinetic-moveit
```

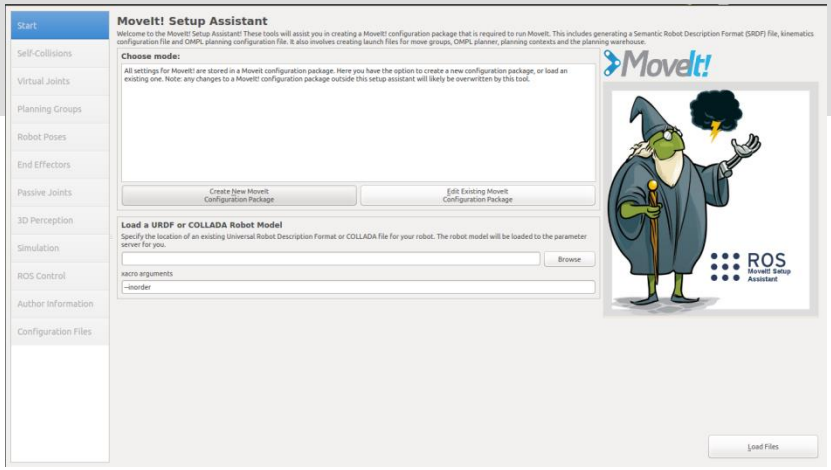
After this stage, catkin_workspace can be created. The workspace created earlier in this work can also be used for this work. Let's run the following commands in order to set the current working environment;

```
cd ~/catkin_ws/src/
mkdir myrobot_moveit_config
cd myrobot_moveit_config/
```

MoveIt Setup Assistant

"MoveIt Setup Assistant" is a user interface used to configure any robot to be used with MoveIt.

As a result of using this interface, the Semantic Robot Description Format (SRDF) file and other necessary configuration files are created to be used in the MoveIt pipeline.



MoveIt

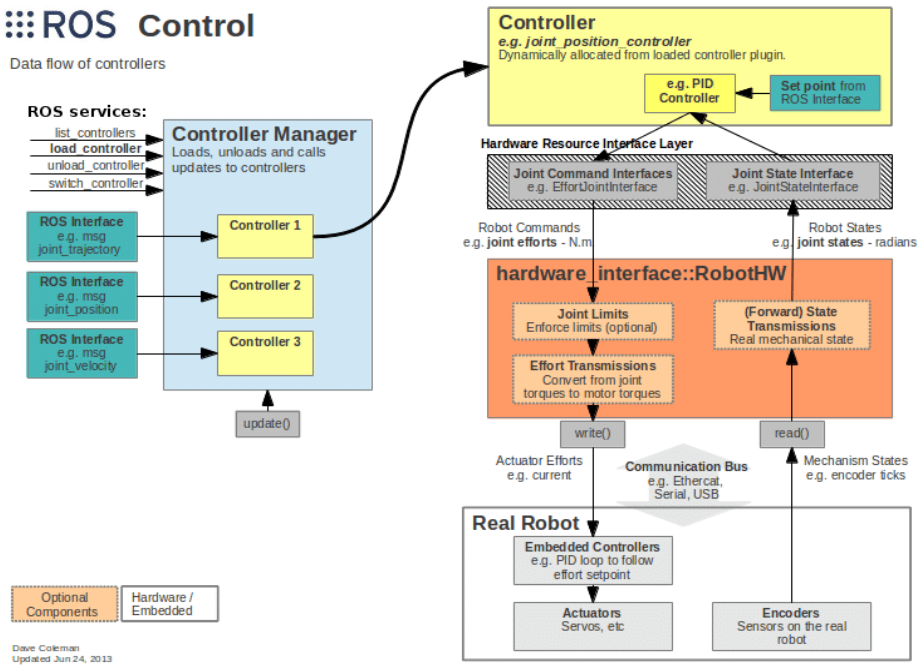
MoveIt Planning and Demonstration of Work on Gazebo with Rviz

When the MoveIt package is created correctly, it reveals the robot on both Rviz and Gazebo;

- With the "Rviz Motion Planning Plugin" plugin, motion planning can be done.
- By running the plan, the status of the robot can be observed on Gazebo..

Working on Real Robot

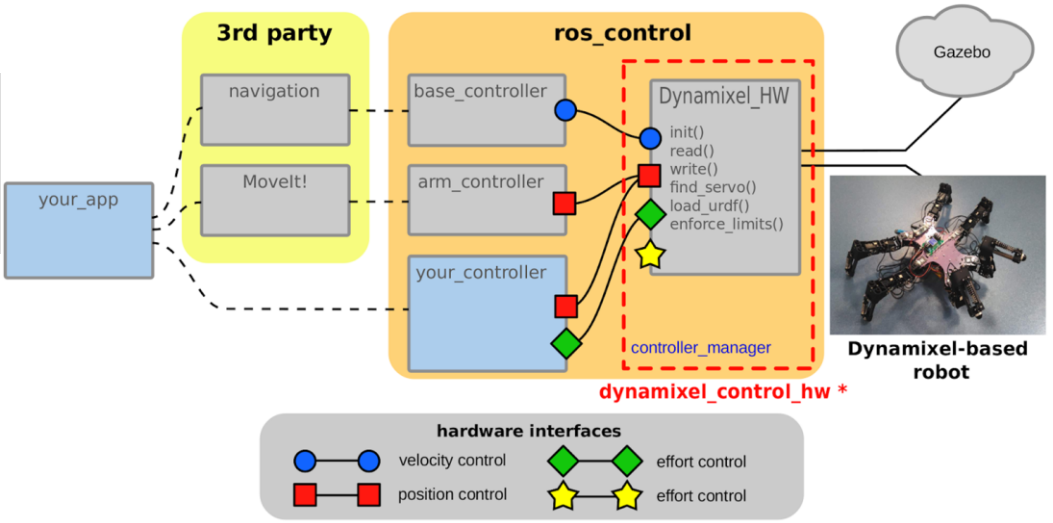
Working on a robot with ROS control, Similar to working in Gazebo, takes in a layout like in the figure.



MoveIt

Working on Real Robot

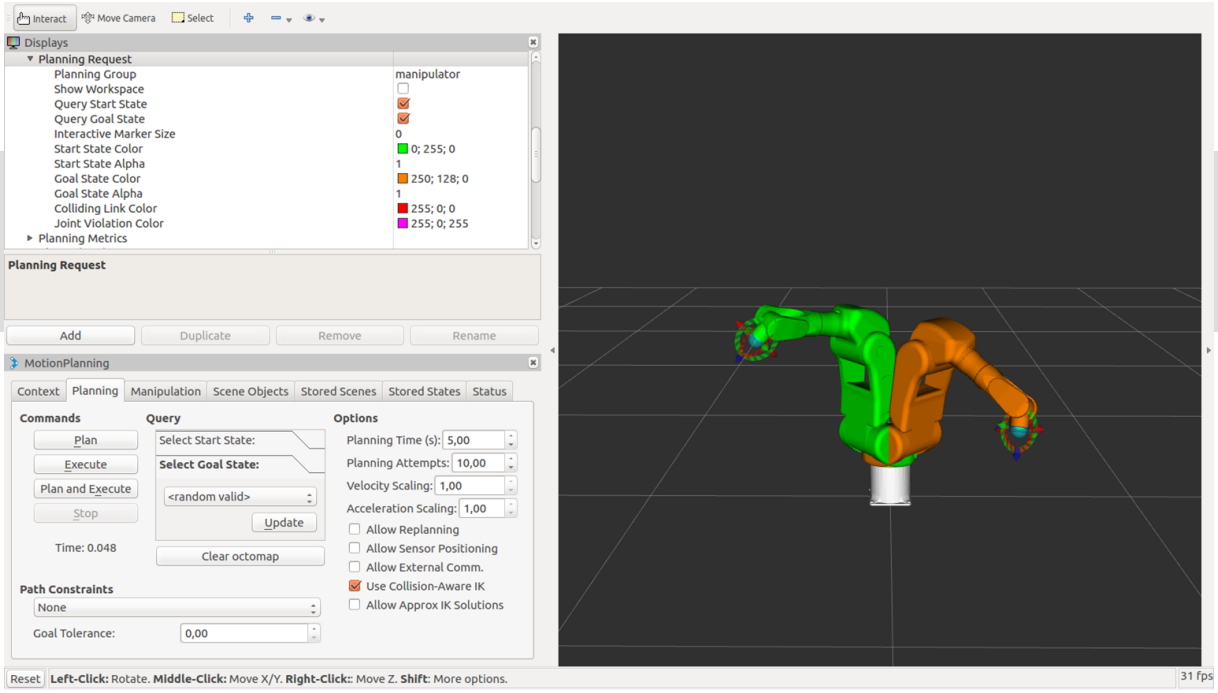
If a special robot is to be worked on, a special Robot Hardware must be defined. For example for Dynamixel ROS Control:
(http://www.resibots.eu/dynamixel_control_hw/);



MoveIt

Sample Application

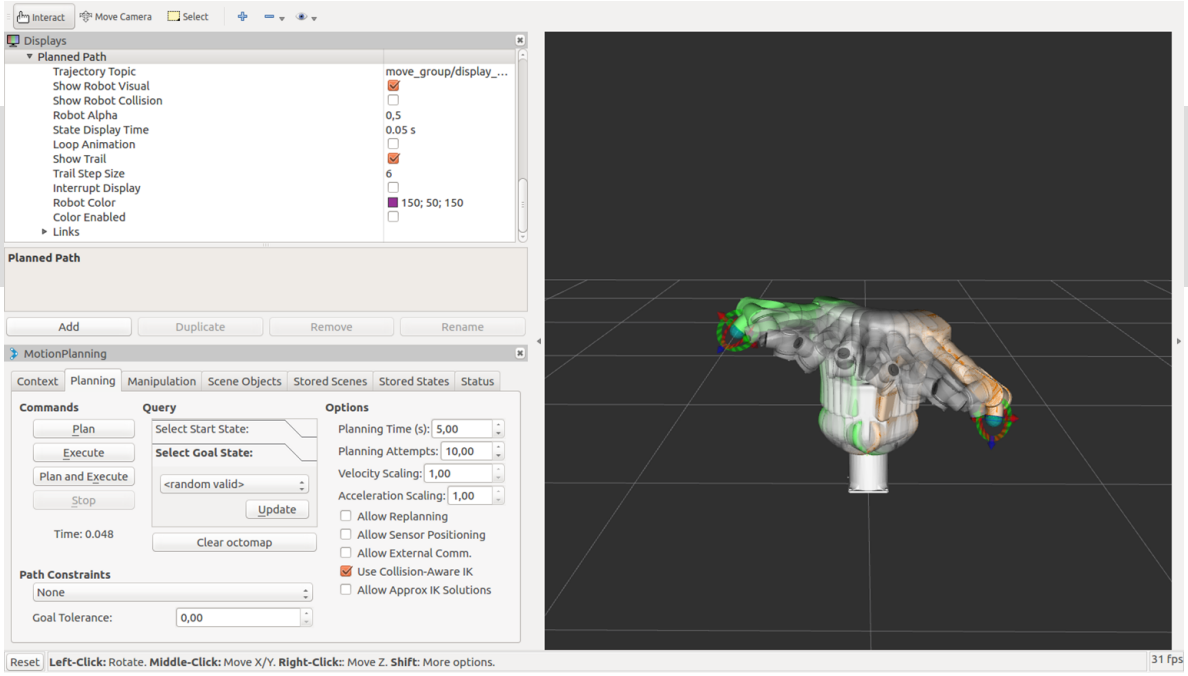
For example, Lets create a motion plan for a robot with a starting stance (green) and target stance (orange) as shown below.



MoveIt

Sample Application

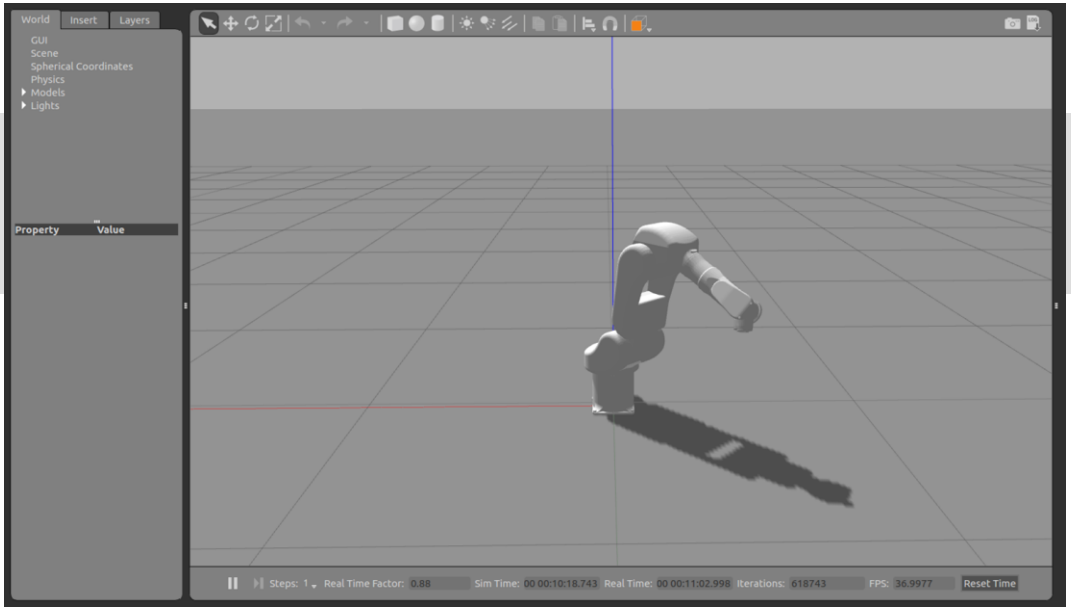
The robot stops (white) at certain moments of the orbit formed when the motion plan is created will appear on Rviz as follows. Here, “Show Trail” option is selected and “Trail Step Size” value is determined as “6”.



MoveIt

Sample Application

When we execute the "Execute" command on Rviz, it will be seen that the model on Gazebo goes from the starting position to the target position.



MoveIt

Sample Application

Since no "hardware_interface :: RobotHW" is created for the robot used in this study, it will be seen that when we manually provide the robot commands (such as joint positions) to the robot hardware, the robot follows the trajectory plan.

Normally, the robot commands that will allow the robot to follow this orbit are provided by the robot controller to "hardware_interface :: RobotHW" through "Joint Command Interfaces" and after these commands are processed on the hardware side, the robot movement occurs.

MoveIt

Sample Application

Sample Application

Sample Application