Steps for UR5e Simulation

md2591

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1. Install ROS 2 Humble on Ubuntu 22.04
2. Install the driver using the below command:

Terminal

```
$ sudo apt-get install ros-humble-ur
```

3. Launch the simulator and visualize the robot in RViz:

Terminal

```
$ ros2 launch ur_robot_driver ur_control.launch.py \
ur_type:=ur5e robot_ip:=yyy.yyy.yyy.yyy use_fake_hardware:=true \
launch_rviz:=true
```

4. Test if everything is working well:

Terminal

```
$ ros2 run ur_robot_driver example_move.py
```

5. Kill all the tasks from above before moving further. Launch driver without rviz as a precursor to move_it for inverse kinematics: (notice set launch_rviz to false)

Terminal

```
$ ros2 launch ur_robot_driver ur_control.launch.py \
ur_type:=ur5e robot_ip:=yyy.yyy.yyy.yyy use_fake_hardware:=true \
launch_rviz:=false
```

6. Launch move_it:

Terminal

```
$ ros2 launch ur_moveit_config ur_moveit.launch.py \
     ur_type:=ur5e \
     launch_rviz:=true
```

7. Run your script. The example script (pick_place_ik.py) takes a target Cartesian position (x,y,z) for the UR5e end-effector, calls MoveIt's /compute_ik service to compute a valid inverse-kinematics joint configuration, and checks whether the IK solution is successful. If IK succeeds, it sends the resulting joint positions to the active joint trajectory controller using the FollowJointTrajectory action, causing the robot to move smoothly to that pose.

Terminal

```
$ ros2 run ur5e_pick_place pick_place_ik
```

The default target position is x = 0.5, y = 0.0, z = 0.4 and orientation x = 0.0, y = 0.0, z = 0.0, w = 1.0. You can change the position by specifying command-line arguments:

Terminal

```
$ ros2 run ur5e_pick_place pick_place_ik --x 0.45 --y 0.0 --z 0.3
```