Gazebo Launch

- Launch gazebo using
  - ```*roslaunch rrp_gazebo gazebo.launch*```

```
[ INFO] [1683167916.431874300]: Finished loading Gazebo ROS API Plugin.
[ INFO] [1683167916.434503400]: waitForService: Service [/gazebo_gui/set_physics_properties] has not been advertised, waiting...
[ INFO] [1683167917.453832400]: waitForService: Service [/gazebo/set_physics_properties] is now available.
[ INFO] [1683167917.511951900, 0.044000000]: Physics dynamic reconfigure ready.
[INFO] [1683167917.653074, 0.176000]: Calling service /gazebo/spawn_urdf_model
[INFO] [1683167918.106512, 0.330000]: Spawn status: SpawnModel: Successfully spawned entity
[ INFO] [1683167918.292484200, 0.330000000]: Loading gazebo_ros_control plugin
[ INFO] [1683167918.293040800, 0.330000000]: Starting gazebo_ros_control plugin in namespace: /rrp
[ INFO] [1683167918.294863600, 0.330000000]: gazebo_ros_control plugin is waiting for model URDF in parameter [/robot_description] on the
 ROS param server.
[ INFO] [1683167918.499442500, 0.330000000]: Loaded gazebo_ros_control.
[urdf_spawner-4] process has finished cleanly
log file: /root/.ros/log/c3ca8b74-ea24-11ed-adba-aed15a0c2bf3/urdf_spawner-4*.log
```

Server Output

```
root@docker-desktop:/rbe500_ws# source devel/setup.bash
root@docker-desktop:/rbe500_ws# rosrun rrp_control scara_joint_ee_vel_server.py
[INFO] [1683168755.250553, 0.000000]: Scara Position controller is ready to receive the desired joint position
[q1_vel q2_vel q3_vel] [-2.5  5.  -0.1]
```

Client Output

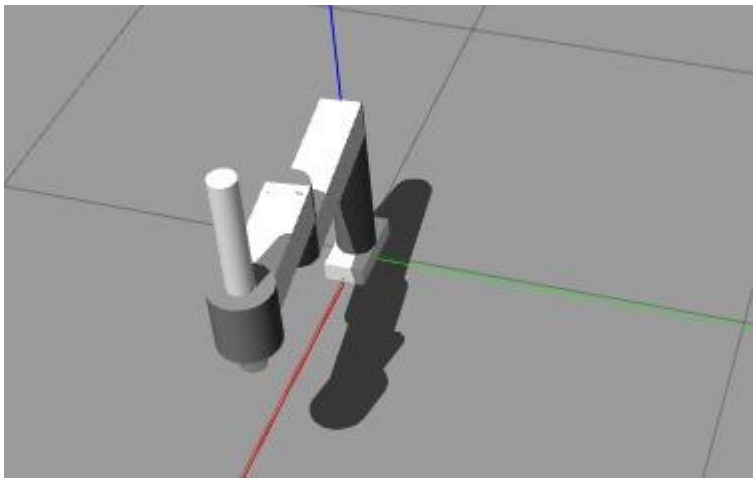
```
root@docker-desktop:/rbe500_ws# source devel/setup.bash
root@docker-desktop:/rbe500_ws# rosrun rrp_control scara_joint_ee_vel_client.py 0.5 0.5 0.1
  [INFO] [1683168778.845997, 738.962000]: Desired end effector velocity set successfully to x_dot : 0.5 y_dot : 0.5, z_dot : 0.1
```

Question 2

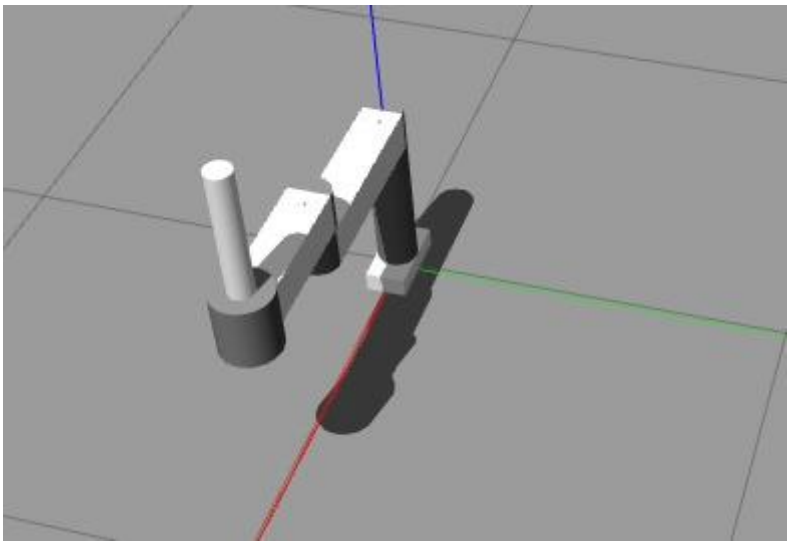
- Launch Gazebo as mentioned in previous question
- The init position is to be set to [0.2,0.0,0.0] and the final position is set to [0,0,0]
- Launch effort controller server
    - ```*roslaunch rrp_control rrp_effort_control.launch*```
- Run the position controller
    - ```*rosrun rrp_control rrp_pos_controller.py*```

Following are the outputs:

This is the initial position:



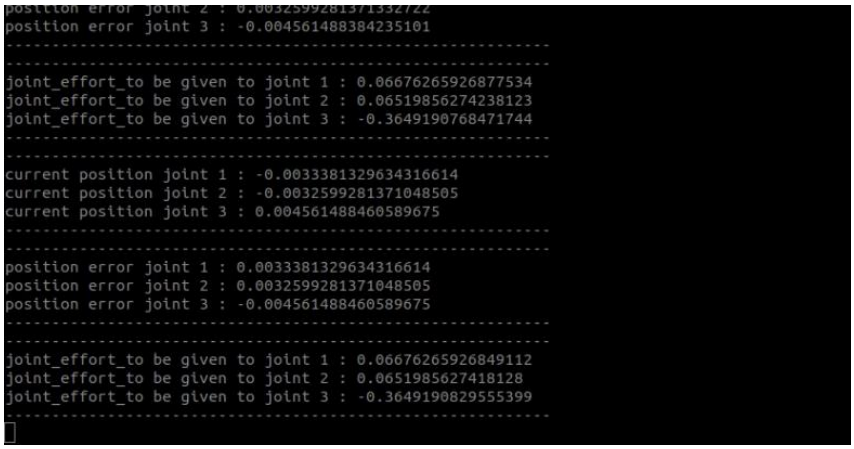
This is the final position:



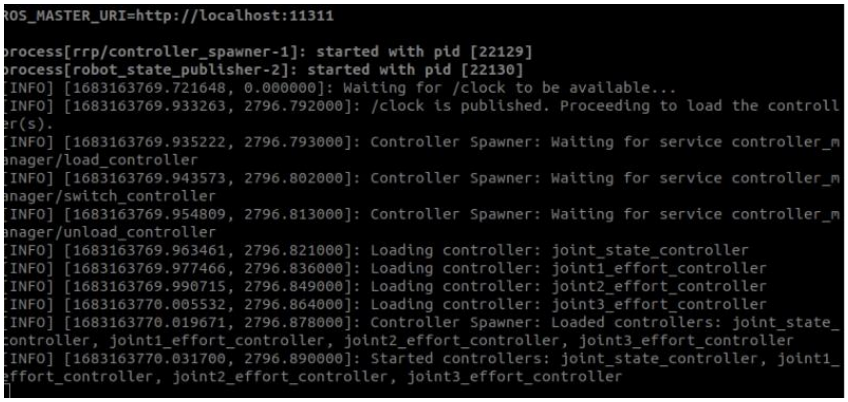
First call service call to set it to init pos:

```
q2_dot: 0.0
q3_dot: 0.0"
success: True
message: "Desired joint velocities set successfully to joint1 :  0.2, Desired Joint Position\
  \ 2 : 0.0, Desired Joint Position 3 : 0.0 "
```

Position controller error output:



Controller Server



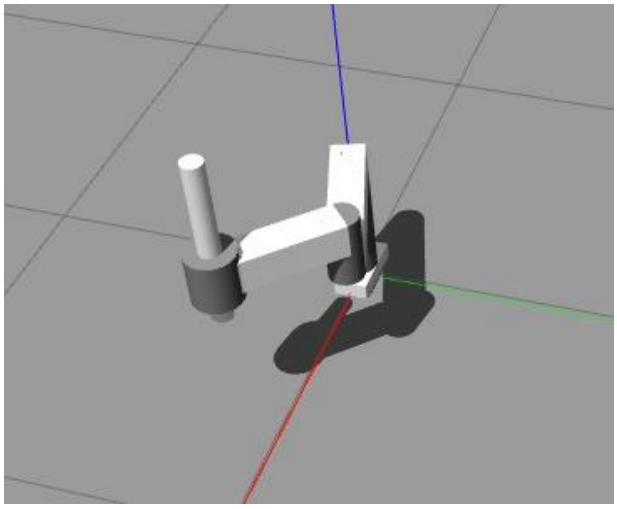
For velocity controller:

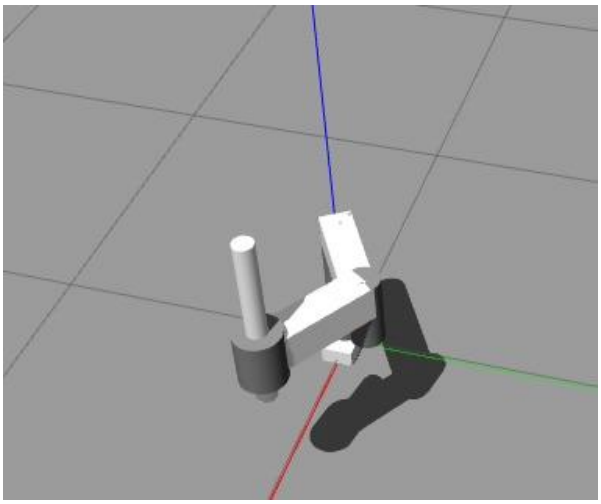
The steps are similar

- Launch Gazebo as mentioned in previous question
- Launch effort controller server
    - ```*roslaunch rrp_control rrp_effort_control.launch*```
- Run the velocity controller
    - ```*rosrun rrp_control rrp_vel_controller.py*```
- Call the client to set init vel (desired = 0 vel):
    - ``` *rosservice call  /set_joint_vel "q1_dot: 0.2 q2_dot: 0.0  q3_dot: 0.0'''*

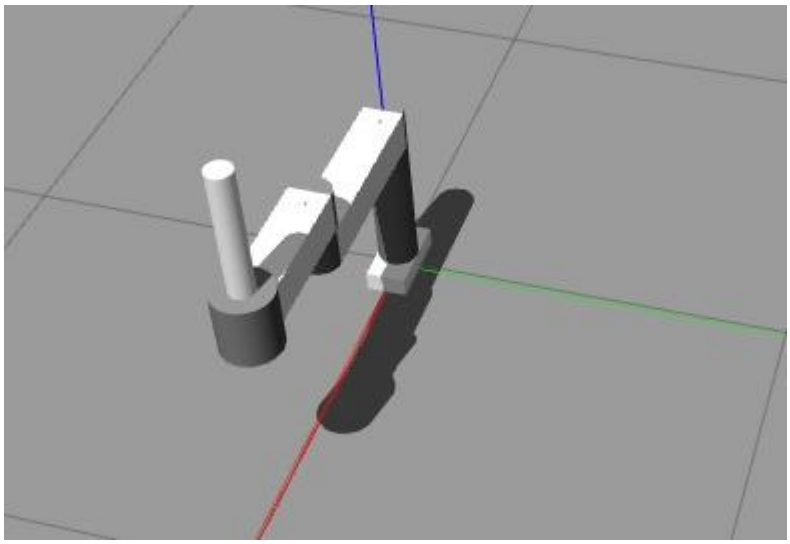
Following are the outputs:

This is the initial vel = 0.2:





velocity result in gazebo:



Service call

```
q2_dot: 0.0
q3_dot: 0.0"
success: True
message: "Desired joint velocities set successfully to joint1 :  0.2, Desired Joint Position\
  \ 2 : 0.0, Desired Joint Position 3 : 0.0 "
```

Velocity controller server output

```
velocity joint 2 : 2.0873580641733724e-12
velocity joint 3 : -4.437796988926829e-05



joint_effort given to joint 1 : 0.18076923076618095
joint_effort given to joint 2 : -1.0436790320866862e-11
joint_effort given to joint 3 : 0.00022188984944634146



velocity joint 1 : 0.161538461539111
velocity joint 2 : 2.1052881660210687e-12
velocity joint 3 : -4.437796980107443e-05



joint_effort given to joint 1 : 0.18076923076617835
joint_effort given to joint 2 : -1.0526440830105344e-11
joint_effort given to joint 3 : 0.00022188984900537215
```

Run all controller servers

```
ROS_MASTER_URI=http://localhost:11311

process[rrp/controller_spawner-1]: started with pid [22129]
process[robot_state_publisher-2]: started with pid [22130]
[INFO] [1683163769.721648, 0.000000]: Waiting for /clock to be available...
[INFO] [1683163769.933263, 2796.792000]: /clock is published. Proceeding to load the controll
er(s).
[INFO] [1683163769.935222, 2796.793000]: Controller Spawner: Waiting for service controller_m
anager/load_controller
[INFO] [1683163769.943573, 2796.802000]: Controller Spawner: Waiting for service controller_m
anager/switch_controller
[INFO] [1683163769.954809, 2796.813000]: Controller Spawner: Waiting for service controller_m
anager/unload_controller
[INFO] [1683163769.963461, 2796.821000]: Loading controller: joint_state_controller
[INFO] [1683163769.977466, 2796.836000]: Loading controller: joint1_effort_controller
[INFO] [1683163769.990715, 2796.849000]: Loading controller: joint2_effort_controller
[INFO] [1683163770.005532, 2796.864000]: Loading controller: joint3_effort_controller
[INFO] [1683163770.019671, 2796.878000]: Controller Spawner: Loaded controllers: joint_state_
controller, joint1_effort_controller, joint2_effort_controller, joint3_effort_controller
[INFO] [1683163770.031700, 2796.890000]: Started controllers: joint_state_controller, joint1_
effort_controller, joint2_effort_controller, joint3_effort_controller
```