31391 Software Frameworks for Autonomous Systems: Mini-project 1*

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September 2020

The first mini-project concerns the concept of "Pick and Place".

> From WIKIPEDIA: Pick and place is the act of picking things up from one location and placing them in another. Picking and placing is one of the major uses of industrial robots.

In the context of this year's first mini-project for 31391, you will be asked to perform Group Work. Each team/group is required to create a script which will allow a robot manipulator to plan and execute trajectories in order to "grasp" objects which are randomly placed in the simulated (within Gazebo) working area.

The scenario of the project is as follows:

The working area of your system is expected to be a tabletop with the Kinova robot equipped with a 3-finger gripper. A number of targets (1-6 cubes named: cube1, cube2, ..., cube6) will be randomly placed on the tabletop. An object called bucket is also placed in the tabletop. Your goal is to pick all objects and place them in the bucket. Note that the even though the objects exist in Gazebo they are not in the perception system of the robot (or in Moveit!) and therefore you will have to "import" them to the Moveit! workspace.

*The content of this document is confidential and should only be shared among the DTU students enrolled in the course: 31391 Software Frameworks for Autonomous Systems

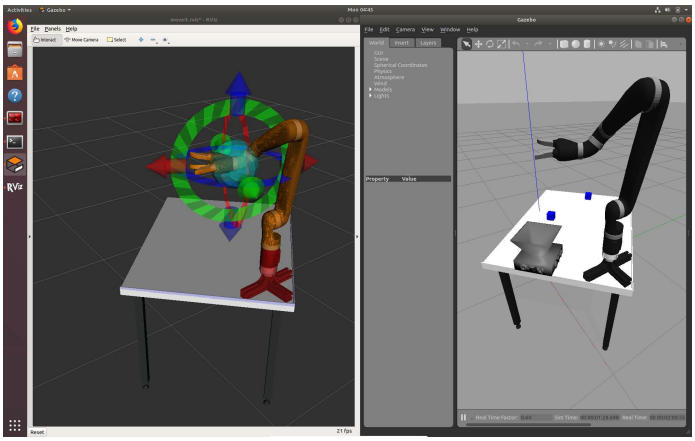

Figure 1: The setup of the mini-project

First, copy the files from lecture 5, 6 on DTU Learn (*https://learn.inside.dtu.dk*) to the appropriate folders (as described). To start the project setup you will have to execute the following commands in 4 separate terminals (or tabs):

- *roslaunch jaco_on_table jaco_on_table_gazebo_controlled.launchload_grasp_fix := true*
- *roslaunch jaco_on_table_moveit jaco_on_table_moveit.launch*
- *roslaunch jaco_on_table_moveit jaco_on_table_rviz.launch*
- *rosrun hello_ros cube_spawn.py*

Requirements of the project & Deadline

The project is to be implemented in the fall semester of 2019 During weeks 40,41,42. The students are expected to utilize the knowledge and competencies they acquired throughout the semester lectures and laboratories in the course "31391 Software Frameworks for Autonomous Systems". This mini-project is

executed group-wise. You will have to use the groups as defined in DTU Learn and on the excel link: *https://dtudk-my.sharepoint.com/:x:/g/personal/lanalpa_win_dtu_dk/ERZdwOnWYJVGpxx00a_e5xEBw_BM3y8nxogUJdG9Ck08Jg?e=Izg7nY*

The students are expected to document their work in a report (one per group) as well as prove the capabilities of their system with supplementary material such as videos and images. The mini-project report shall not be too extensive (5 pages) but should contain all the necessary information on the approach followed and results. The submission, including a link to the material (report + sup. material) to be considered, will be uploaded in DTU Learn in the assignments section

The deadline for the submission of the project (report + sup. material) is set on Wednesday 14^{th} of October 2020 at 23:59.