

GSoC-2020 JdeRobot-Universidad Rey Juan Carlos

Robotic arm manipulation challenge

Introduction

The main idea for our project proposal #3 to GSoC-2020, as you can read in [1], is to expand our JdeRobot Robotics Academy to include autonomous robotic manipulation using robotic arms and cobots, developing a collection of new exercises including standard robotic arms and AGVs in realistic industrial work environments.

Then, the purpose of this challenge is to test your skills and previous knowledge about ROS, Gazebo, URDF and the MoveIt! package. You will need to accomplish at least one of the tests of this challenge as part of your GSoC-2020 application for project #3.

Requirements

- Ubuntu 16.04 + ROS Kinetic installed.
- A Gazebo simulation of the ABB IRB120 6-axis industrial arm with a Robotiq 85 2-finger gripper, that can be found in our *Industrial Robotics* resources repo [2].

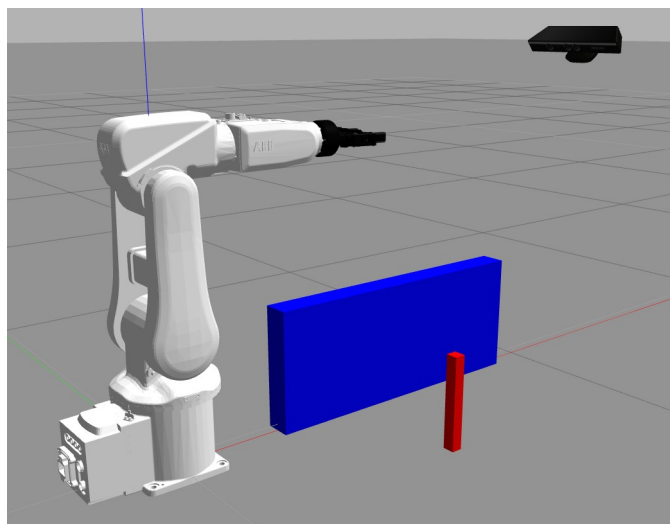


Fig. 1. ABB IRB120 arm in Gazebo, with a Robotiq gripper and a Kinect depth camera

Challenge description

This challenge consists in three independent tests of incremental complexity. You must submit at least one solution to one of the three tests if you want your application to our project #3 in GSoC-2020 to be evaluated:

1. **TEST 1: FIXING SPAWNING ERRORS.** Please launch the basic Gazebo simulation (`roslaunch irb120_robotiq85_gazebo irb120_robotiq85_gazebo.launch`). That will spawn the IRB120 arm plus the gripper, including their ROS controllers. You will see that some errors and warnings emerge during the spawning process. Your task to solve this test consist in fixing the right urdf, yaml and/or launch files to amend all old or faulty items causing errors and warnings.

2. **TEST 2: GRASPING DEMO IN RVIZ.** This time you will launch the basic simulation that includes Rviz and the MoveGroup interface, by running `roslaunch irb120_robotiq85_gazebo irb120_robotiq85_gazebo_moveit_rviz.launch`. Your task is to create a basic grasping demo using the MoveIt! MoveGroup Python interface. Your solution must include a complete pick and place operation of two small pieces of different size, in Rviz.
3. **TEST 3: PERCEPTION IN GAZEBO.** For our third and more complex test your task is to update the gazebo world shown in Fig. 1 to create a complete grasping workstation, including a pedestal for the IRB120 arm, a table with several small cubes over it and the Kinect depth camera. Start with `roslaunch irb120_robotiq85_gazebo irb120_robotiq85_kinect_gazebo_world.launch`. After updating the Gazebo environment, you must create your own MoveIt configuration package, including perception and collision checking, and perform a pick and place operation including collision avoidance in the Gazebo simulator.

How do I send my solutions?

- First, fork our repository [2] and work on your own copy for each TEST.
- To submit your solution to each TEST, please upload to your YouTube account a video showing the results. After that, send us an email [3] containing the links to your repo and to the video uploaded.

Links

[1] <https://jderobot.github.io/activities/gsoc/2020#project-3-robotics-academy-robotic-arm-manipulation-with-moveit>

[2] <https://github.com/JdeRobot/IndustrialRobotics>

[3] mailto: [diego.martin.martin AT urjc.es](mailto:diego.martin.martin@urjc.es)