



Aalto University
School of Electrical
Engineering

ELEC-E8126

ROBOTIC MANIPULATION

Report: Exercise -3

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1 Mathematical equations for poses:

To get the pose, we need to get the transform from the published transforms. we use the lookUpTransform to get the transform and as mentioned in the question, we separate the poses into grasp,pre-grasp and place poses. To get the poses , we used the following equations.

$$T_{pre-grasp} = T_{pick} * T_z(0.1) * R_x(\pi)$$

$$T_{grasp} = T_{pick} * R_x(\pi)$$

$$T_{place} = T_{place} * R_x(\pi)$$

2 Answers to questions:

2.1 In which coordinate frame the MoveIt assumes the poses are specified and what should I do if my pose is specified with respect to another frame?

The MoveIt library assumes all the poses with respect to base_link frame . If we have to specify with respect to another frame, then we have to use setPoseReferenceFrame() to explicitly set the reference frame for the MoveIt library operations.

2.2 What are the differences between Cartesian path computation and planning?

1. The major difference is that planning computes the path in terms of joint space, i.e. Giving in terms of Joint angles, whereas in terms of Cartesian path computation, the path is computed in terms of Cartesian coordinate frame, i.e as (x,y,z) positions.
2. In Cartesian path, the path computed is linear. i.e in most of the cases the path generated will be a straight line. But in case of planning, it can generate a non linear path as well.
3. For planning, we need to set the target pose for all the joint values, i.e. explicitly mention the target joint angles. Whereas in planning, we need to mention the target as a Cartesian goal point.
4. Interpolation of points seems to be easy in Cartesian path computation. Whereas it is quite difficult in planning.

2.3 Is there any chance that the object will be moved by robot before grasping? Why yes/no?

No , The object cannot be moved by Robot before grasping, provided the planned trajectories are executed properly. If there is a mismatch in the Arm trajectory or Hand trajectory before grasping, then the object may be moved. It depends on the trajectory and its accuracy of execution.

2.4 Can robot collide with itself during execution of computed pick-and-place path?

I think so yes, because it depends on the path how the planner is planning. If the path computed is very close to robot's body, then there might be a partial collision by the robot itself.

There is an flag for collision through which we can neglect the effects of collision in simulations