Lab 4: Planning in Task-Space Regions

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December 2023

1 Theory Questions

Q6: Set $\Delta x = [0, 0, 0, -0.5, 0, 0]$, and use the Jacobian pseudoinverse method to find the change in q. Use this to update the position. Does the final pose of the can look accurate? Report your observations and justifications.

Sol: The final position is not accurate, it is offset by some amount in the x axis as well.

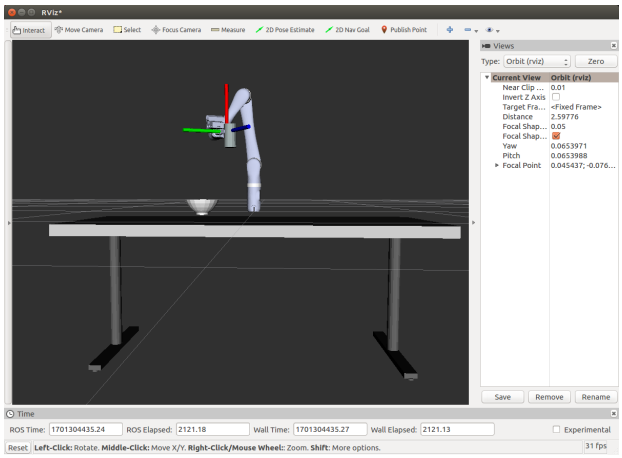

Figure 1: Front view

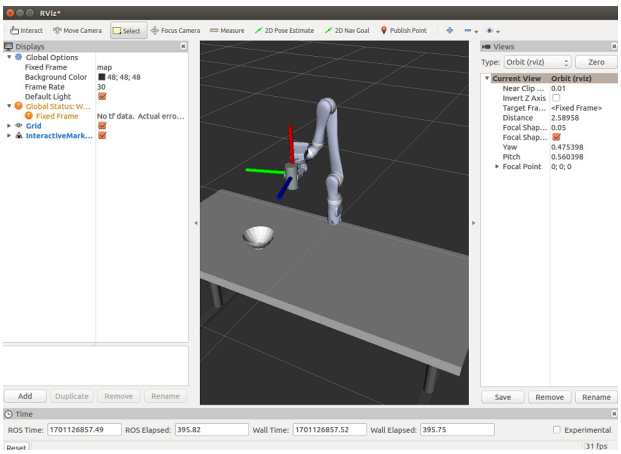

Figure 2: Isometric view

The source of the issue is the size of Δx. Due to the large size of Δx, there might be issues with reachability from the current position. This is because the joint limits are not considered in this calculation, and jumping directly with a large change in q may not be possible. Instead, the arm moves to approximate the goal as much as possible, which leads to an offset.

Given that we have a large Δx, we also do not use a small step size (we use a step size = 1). This makes the change in q much larger, and movements jerkier and inaccurate.

Another reason is that the Jacobian is only valid locally, as in it is valid only at a given q and values close to that. Since Δx is large, the Jacobian is no longer valid.