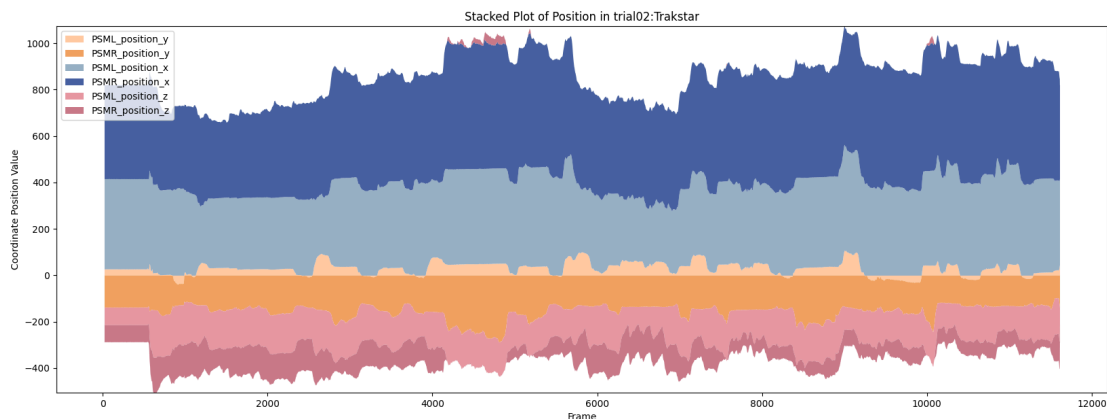
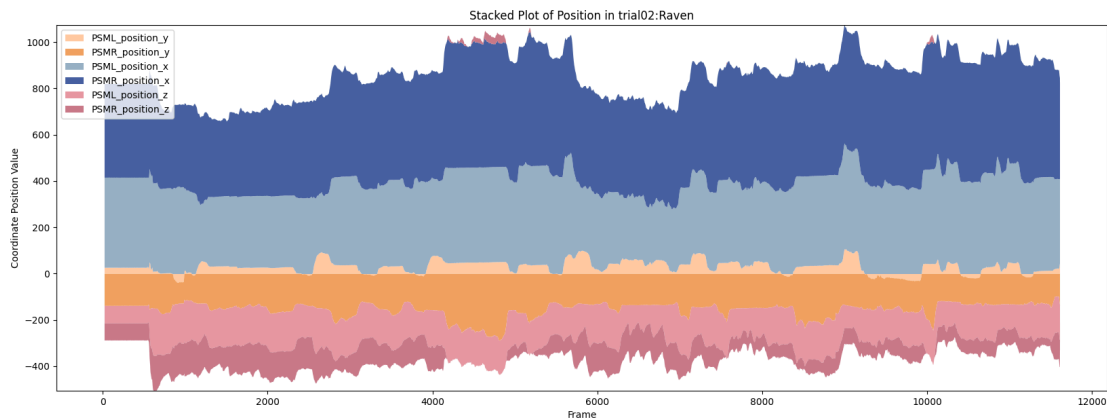


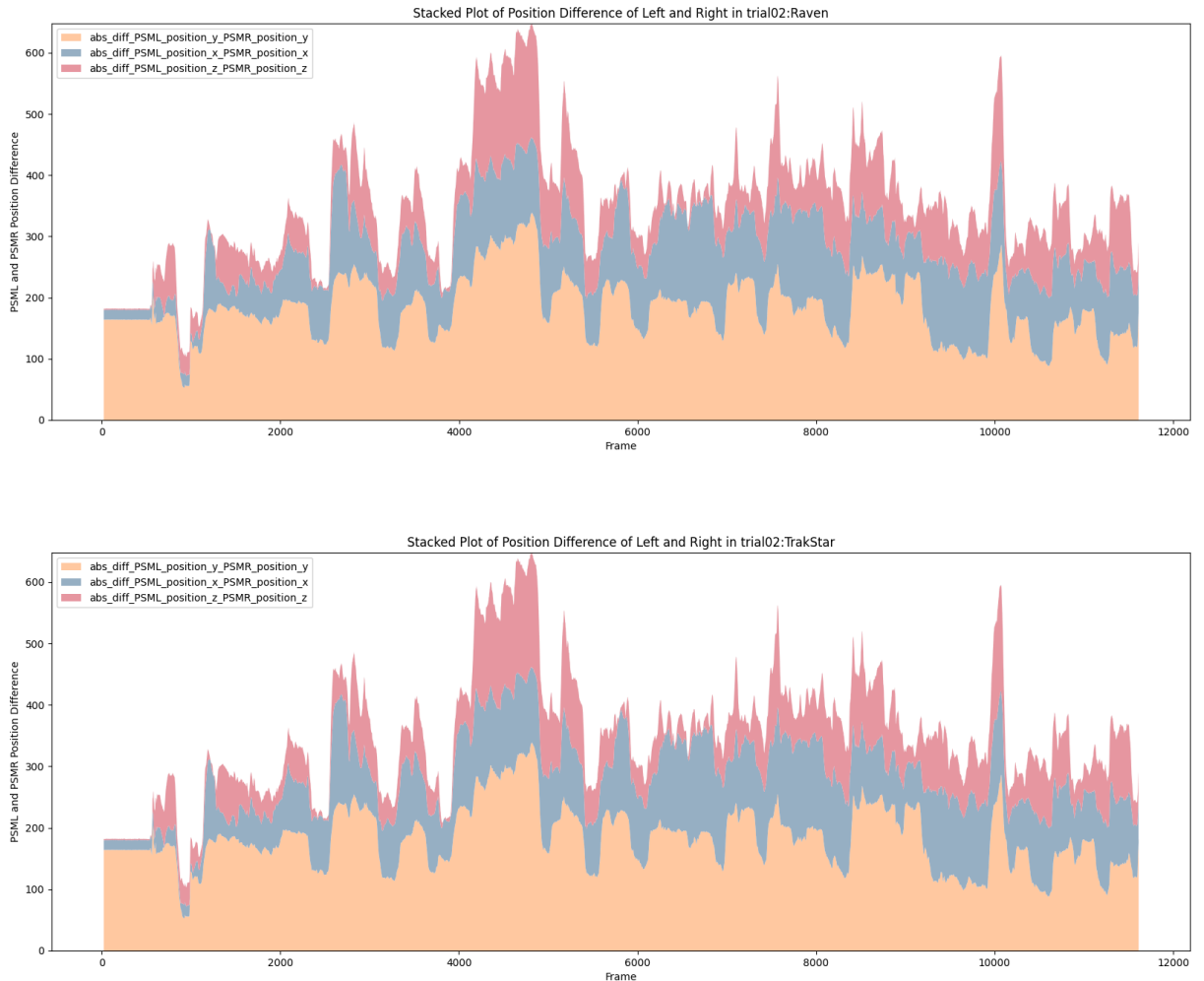
# Trial Task Report - Huarui Liu

## 1. Stacked Plots:



- The colors orange, blue, and pink represent the Y, X, and Z positional coordinates, respectively, with darker shades indicating data for PSML and lighter shades for PSMR.
- Each axis for PSML and PSMR tends to display similar shaded areas, which might suggest that there is a correlation in their movements. I think this can mean that synchronized operational behavior or mirrored movements happens between PSML and PSMR.
- To see whether my idea about this phenomenon is correct or not, I further modified the original stacked plot to highlight the distances between PSML and PSMR across the X, Y, and Z position. The resulting figure shows that there are specific frames where the differences across all three dimensions become really small at the same time, with the discrepancies in the X and Z nearly in the same position. This pattern could suggest that there are moments when both components come into very close and then separate again.
- Besides position values, the dataset also contains velocity and gripper\_angle data. But because these variables do not show significant variations or contribute meaningful insights in the stacked plots, I choose to not include them in the figure.

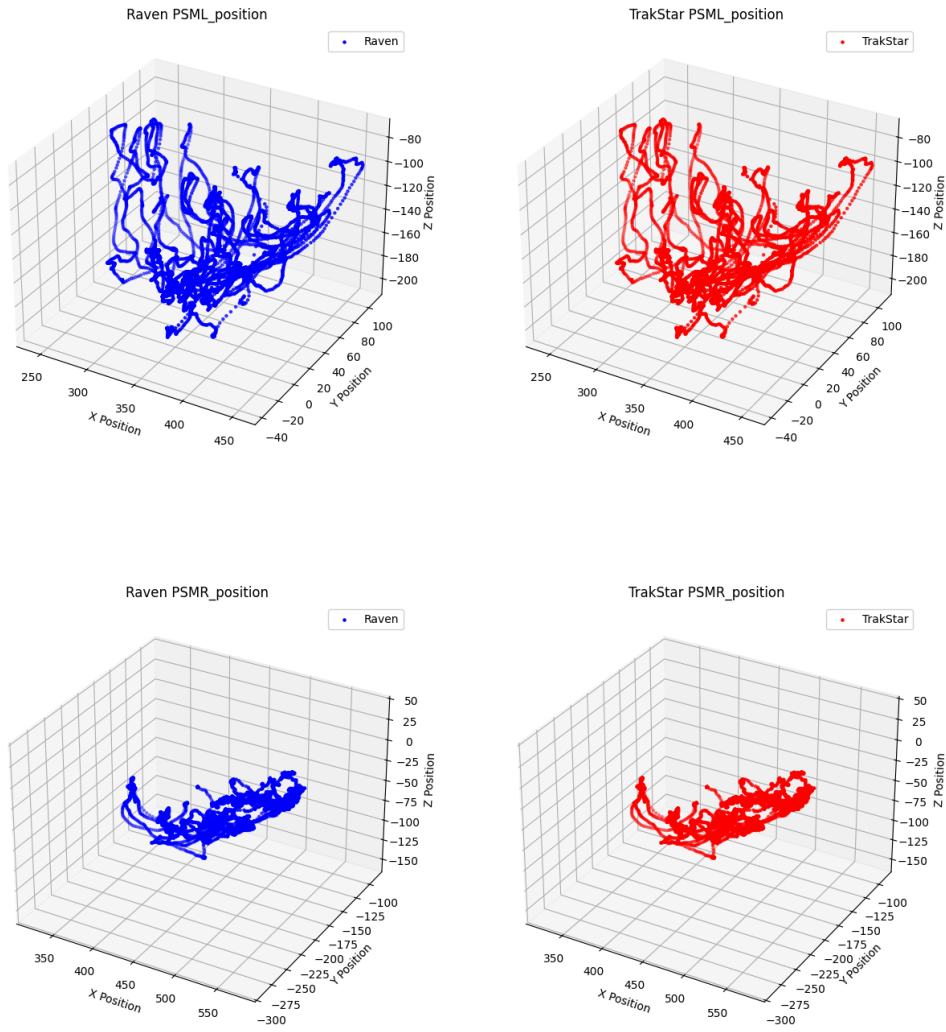
## FINAL STACKED PLOTS



## 2. Side-by-Side Comparison

- a. I observed that the coordinate position for PSML and PSMR in both the Raven and TrakStar systems align closely in each frame, so I would expect that side-by-side plots would show highly similar patterns, and that overlapping them would likely result in nearly indistinguishable paths. Given that if we draw X, Y, Z separately, it could result in many plots, so I choose to draw it in a 3D plot. This method efficiently captures the trajectory of each system in a single visual space, side-by-side comparison between Raven and TrakStar is clear.
- b. We can observe that for both PSML and PSMR, the trajectories in the 3D plots appear very similar, indicating that the kinematics of the Raven and TrakStar Motion Tracking Systems are overall aligned across the dataset. If we want to gain more precise insights, I think we can further zoom into specific ranges to observe more subtle patterns.

## FINAL SIDE-BY-SIDE COMPARISON



### 3. Bonus Task:

For this task, I attempted to synchronize data of the PSML\_position\_z\_trakstar with corresponding video by plotting the data for each frame, combining these plots with the video frames and outputting them as a combined video file. But I have not figured out how to accurately synchronize the dataset frames with the video frames because of the mismatch in their respective frame indices, so I will not include this in the repository for now. After resolving the problem I will add the video to the repo.



