Kinematic Calibration of Phantom X Pincher Robot Arm

Problem

Development of a cost-friendly and effective kinematic calibration setup for Phantom X Pincher arm, utilized in the Introduction to Robotics course lab at Habib University.

Significance

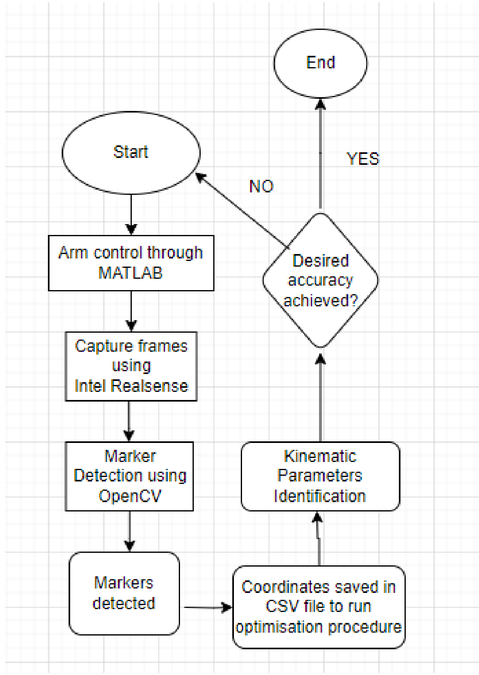
- Pick and place is a fundamental process in industrial automation that involves using robotic arms or manipulators to pick objects from one location and place them in another
- In the context of industrial manipulators, precise pick and place operations lead to fewer errors and faster cycle times, resulting in increased production rates and reduced downtime
- Precise placement ensures that components are positioned accurately, leading to higher quality finished products with consistent dimensions and alignments
- Accurate pick and place reduces the likelihood of dropped or misplaced objects, which can lead to costly defects and waste
- Kinematic calibration is a way of achieving accuracy in pick and place operations
- It is a process that fine-tunes the robot's kinematic parameters to ensure accurate mapping between its joint angles and end-effector positions
- Calibration compensates for any deviations between the robot's theoretical model and its actual behavior, resulting in improved accuracy

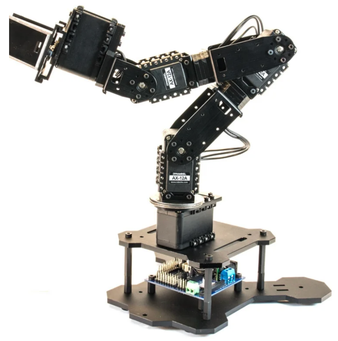
Findings/Results

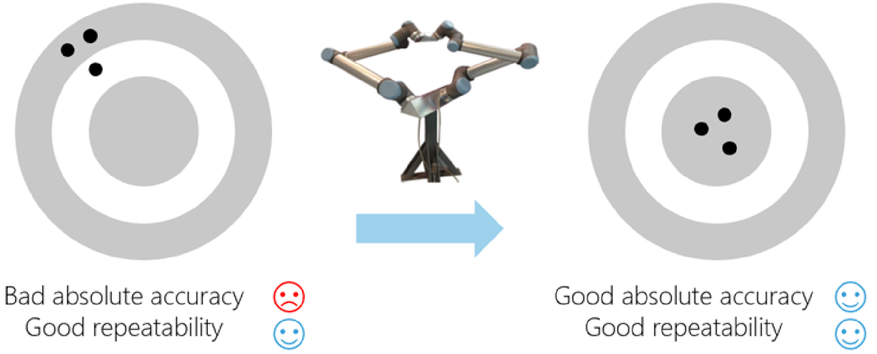
pending

Future work

- We plan on to integrate pose orientation accuracy in our experiment as a long-term goal through incorporating the use of IMU sensors







References

[1] Hamid Majidi Balanji, Ali Emre Turgut, and Lutfi Tunc, “A novel vision-based calibration framework for industrial robotic manipulators,” vol. 73, pp. 102248–102248, Feb. 2022, doi: https://doi.org/10.1016/j.rcim.2021.102248.