EXPLORING ALGORITHMS FOR GRASPING UNKNOWN OBJECTS USING 2 FINGER GRIPPER

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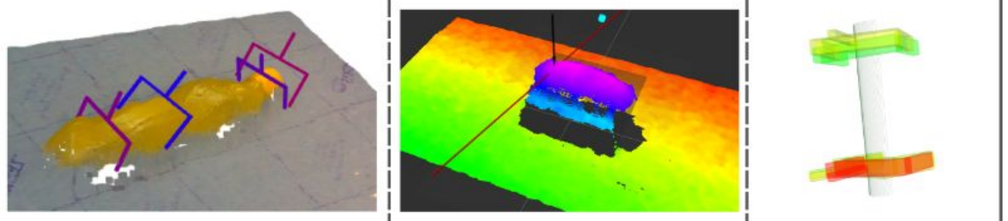
ABSTRACT

Focus on exploring learning and analytical-based algorithms for grasping unknown objects using a two finger gripper. The aim is to discover robust and efficient techniques for grasping and manipulating objects with minimal prior knowledge or object-specific information. And, to enhance the grasping capabilities of UR5 which can handle a variety of unknown objects autonomously.

FUTURE SCOPE

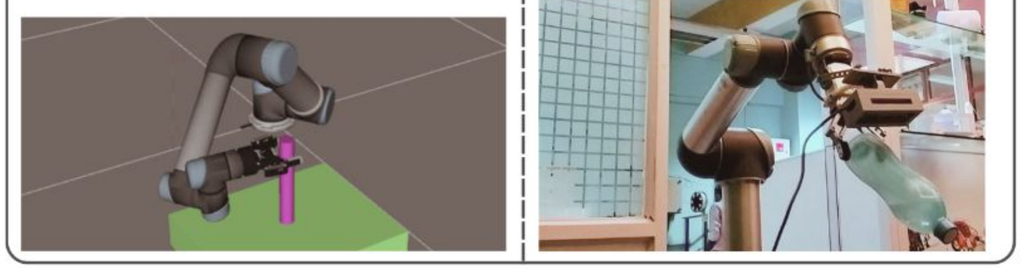
- Explore computationally efficient and accurate learning-based and analytical algorithms beyond our current implementations.
- Conduct extensive experiments in cluttered scene and factory settings to evaluate the performance of these algorithms.
- Develop a flexible pipeline or framework that integrates the most effective algorithms based on our quality metrics and can accommodate future algorithms and techniques, ensuring continuous improvement of the solution.

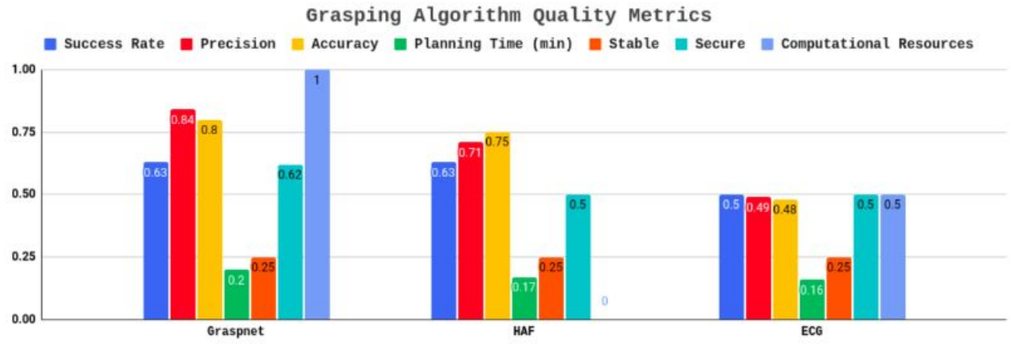
GRASP POSE ESTIMATION FOR TWO FINGER ROBOTIC ARM



GRASPNET | HAF | ECG

GRASP PLANNING AND EXECUTION WITH MOVEIT





TECHNOLOGY STACK

GAZEBO | ROS | pcl | MoveIt | RViz | UNIVERSAL ROBOTS

HEIGHT ASSISTIVE FEATURE

ANALYTICAL BASED APPROACH

ARCHITECTURE:
Analytical approach to incorporate depth cues and geometric characteristics of the object from the image.

APPLICATION:
Used for industrial applications to pick objects on conveyer belt via top down approach

GRASPNET

LEARNING BASED APPROACH

ARCHITECTURE:
Deep neural network (CNN)

APPLICATION:
Used for assistive applications to pick unknown objects with complex orientations

ELLLIPTICAL CENTROID GRASP

ANALYTICAL BASED APPROACH

ARCHITECTURE:
It estimated the pose and orientation by considering the centroid and angle of minor axis.

APPLICATION:
Used for industrial pick and place applications with simpler objects for better reliablity.