OBJECT DETECTION AND GRASP PLANNING FOR AUTONOMOUS INTERVENTION

MIR MARINE & MARITIME INTELLIGENT ROBOTICS

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CONTEXT AND MOTIVATION

Fig1: GIRONA 500 I-AUV.

Reduces human intervention, increases efficiency and safety.

Revolutionizes underwater operations with precise intervention.

Integrating deep learning for object detection with state-of-the-art grasp planning algorithms.

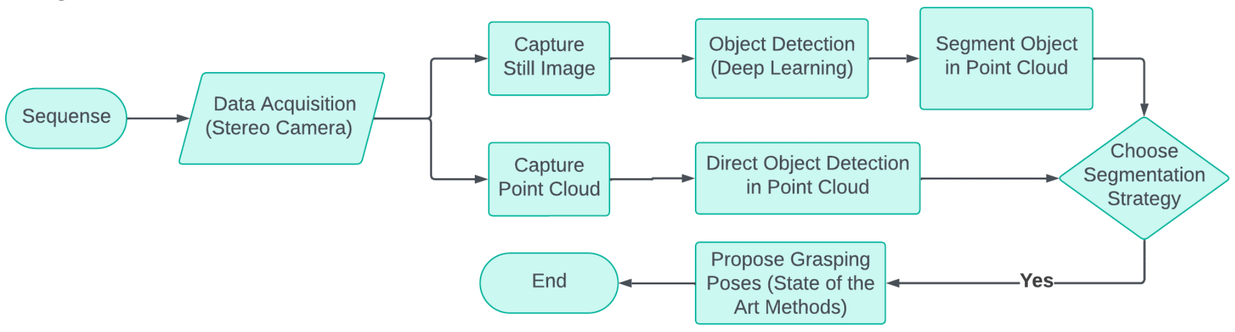


Fig 2: Objective Flow Diagram.

STATE OF THE ART SOLUTION

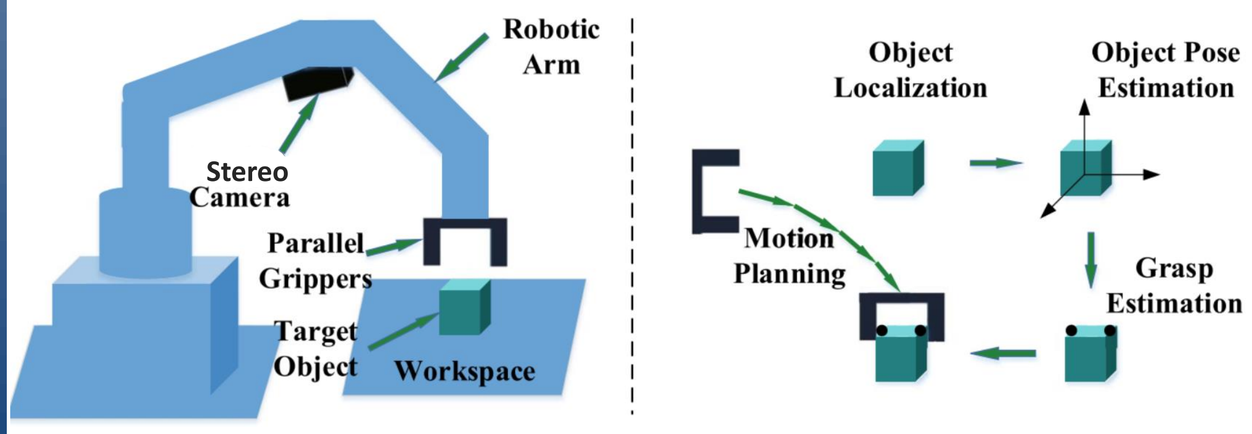
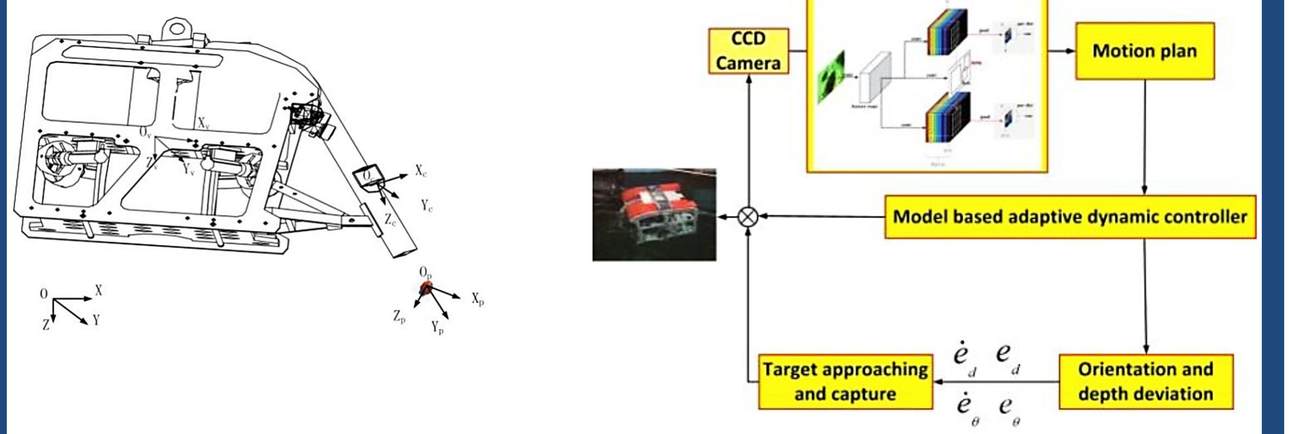


Fig 2: A general grasp detection system involves target object localization, object pose estimation, and grasp estimation.



(a) Coordinates of robotic organism target capture

(b) Target recognition and capture architecture

Fig 3: Current state of art underwater autonomous and dexterous operation robot, environment perception, underwater vehicle-manipulator system modeling and coordinated control, target uninjured grasp [1].

REFERENCES

1. Huang, Hai, et al. "A review on underwater autonomous environmental perception and target grasp, the challenge of robotic organism capture." Ocean Engineering 195 (2020): 106644.
2. Calli, Berk, et al. "Benchmarking in manipulation research: Using the Yale-CMU-Berkeley object and model set." *IEEE Robotics & Automation Magazine* 22.3 (2015): 36-52.
3. Ni, Peiyuan, et al. "Pointnet++ grasping: Learning an end-to-end spatial grasp generation algorithm from sparse point clouds." 2020 IEEE International Conference on Robotics and Automation (ICRA). IEEE, 2020.

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PROPOSED SOLUTION

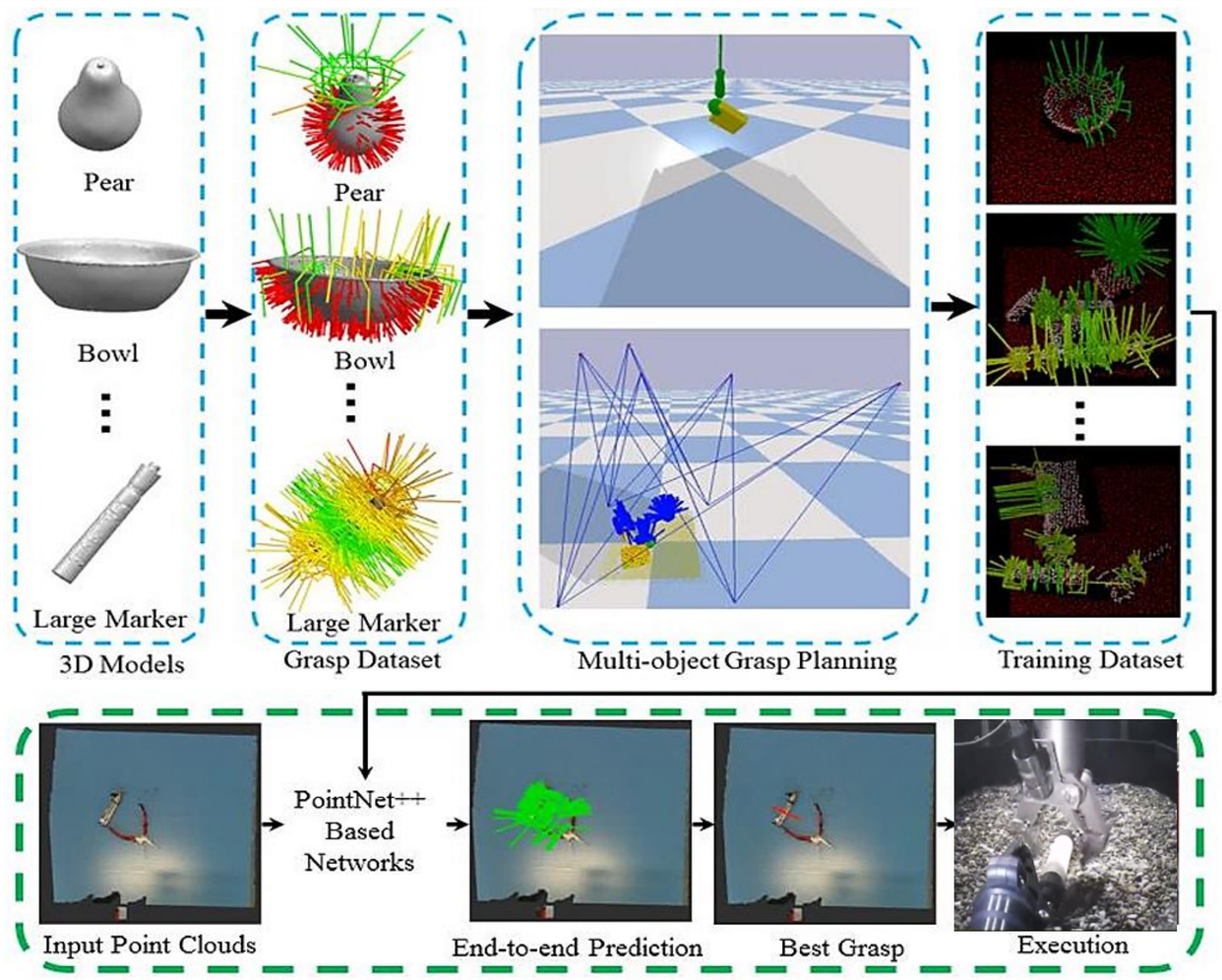

Fig 4: Proposed Pipeline for Training. I will used synthetic training dataset from YCB [2] object set. Given raw still image data from a stereo camera , using PointNet++ based Network can directly predict the poses, categories and scores (qualities) of all the grasps in a fast way [3].

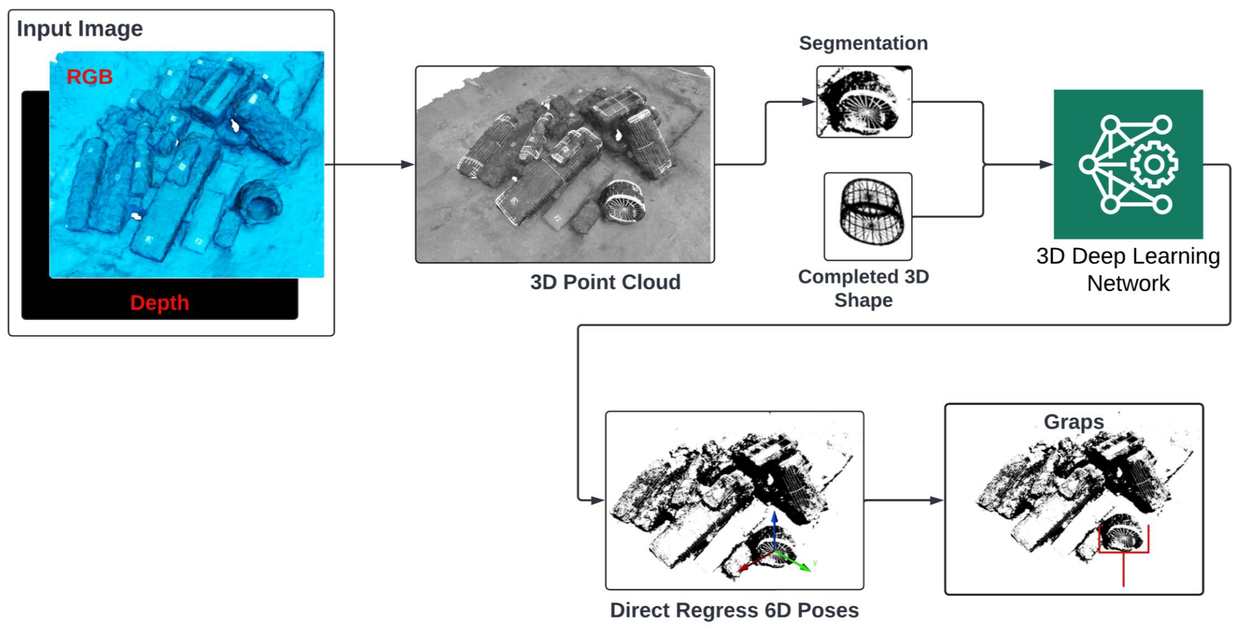

Fig 5: Functional flow-chart of 3D template-based 6D object pose estimation and grasp methods based on the complete shape.

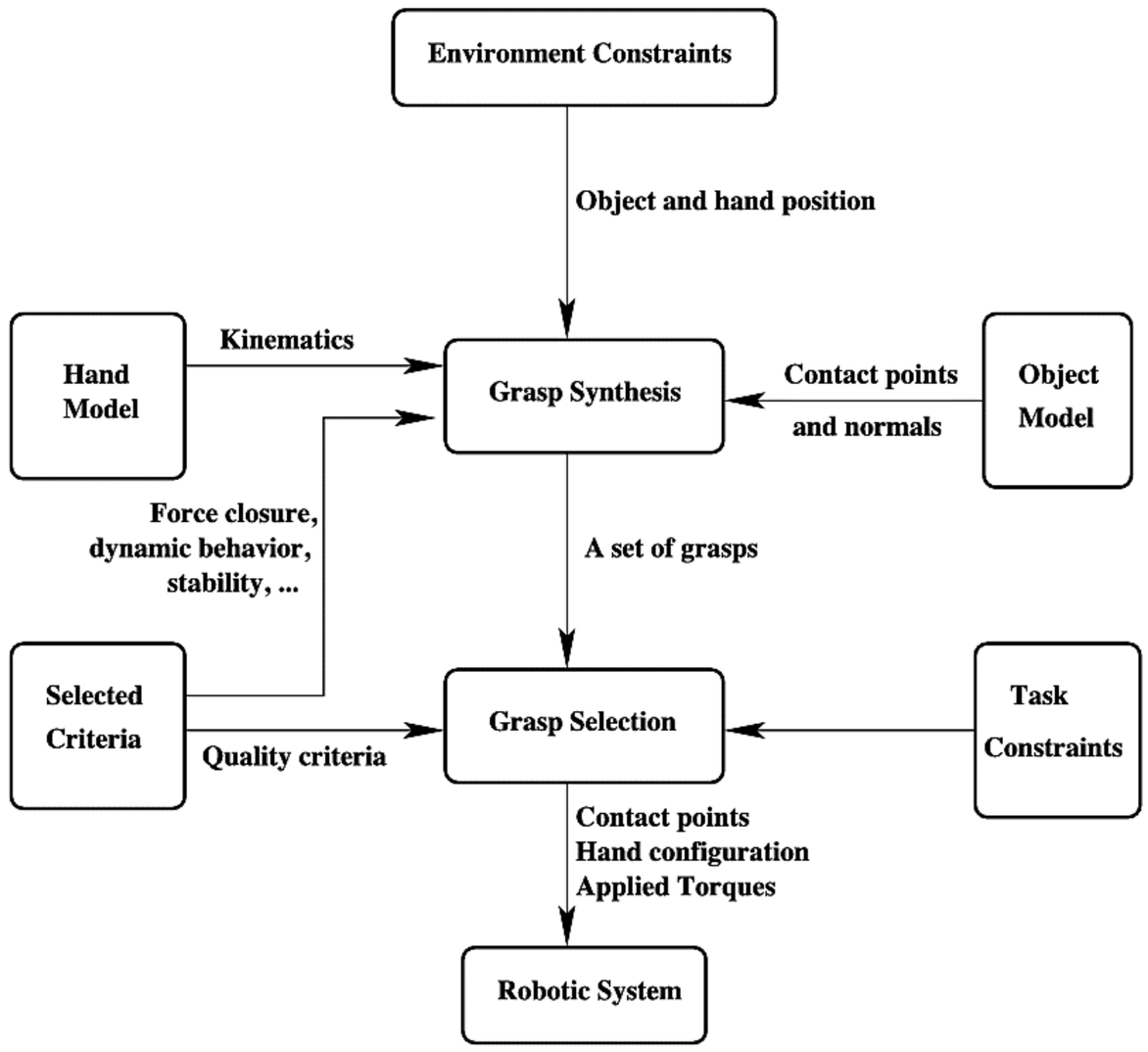

Fig 6: Strategy of grasp synthesis using analytical approaches.