

Table of Contents

1. Introduction.....	5
1.1 Objective and Scope.....	5
1.2 Problem Statement.....	6
1.3 Report Outline.....	6
2. Literature Review.....	7
2.1 Cognition and Embodied Cognition.....	7
2.2 iCub and iCub Simulator.....	7
2.3 YARP (Yet Another Robotic Platform).....	9
2.4 Computer Vision and OpenCV.....	9
2.5 Grasping and Vision-Based Grasp.....	10
2.5.1 Feasible Grasp Regions.....	11
2.5.2 Force Closure Grasp.....	12
2.5.3 Algorithm for Force Closure Grasp.....	13
3. Proposed Architecture.....	14
3.1 Objective.....	14
3.2 Proposed solution.....	14
3.2.1 Schematic Diagram.....	14
3.3 Modules and Details.....	16
3.3.1 Vision Processing.....	17
3.3.1.1 Thresholding.....	17
3.3.1.2 Edge Detection.....	19
3.3.1.3 Contour Extraction.....	22
3.3.2 Grasp Planner.....	24
3.3.2.1 Force Closure Grasp Algorithm.....	24
3.3.2.2 Finger Position Computation.....	25
3.3.2.3 Inverse Kinematics.....	26
4. Implementation and Results.....	27
4.1 Platform.....	27
4.2 Implementation Algorithm.....	27
4.3 Results and Issues.....	29
5. Conclusion and Further Work.....	30

Extending Open-Source iCub Simulator for Grasping Behavior

References

Appendix

Appendix A

Appendix B

Appendix C