

Grasping and Positioning Tasks for Selective Compliant Articulated Robotic Arm using Object Detection and Localization: Preliminary Results

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Abstract

Vision guided robots have more ability, functionality and adaptivity in industrial assembly lines than normal robots. This research attempts to increase the impact of computer vision on robotic positioning and grasping applications. Therefore, we addressed object detection and localization to perform robotic grasping and positioning using Selective Compliant Assembly Robot Arm (SCARA). The target position of SCARA robot is determined based on information obtained from object detection and position measurement process. This process is implemented on a circular object to simplify the task. For accurate position measurement, the distortion of camera lens is removed using camera calibration technique. In object detection, several methods are compared to detect circular holes in an input image. The most successful methods with 100% Precision, Recall and F-measure are used to detect the circular object. The position of this object is measured in world coordinate unit for pick-and-place operation. Then, the experiment is designed to move SCARA robot to the measured position of the detected circular object. The result showed that the robot is successfully moved to the measured position of the detected object with average positioning error (0.314, 0.155) mm.

Keywords-object detection; object localization; edge detection; robotic arm; robot positioning, robot grasping