



EDGE EXTRACTION USING IMAGE AND THREE-AXIS TACTILE DATA

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Abstract - This paper describes a hand-arm system equipped with optical three-axis tactile sensors and a binocular vision sensor. The vision compensates for the limitations of tactile information and tactile sensing, and vice versa. The tactile sensor can obtain geometrical data as real scale, while image data requires calibration to obtain length as a metric unit. Even if stereovision is used, we cannot obtain sufficient precision. In the evaluation test, the robotic hand equipped with tactile sensors traces an object including convex and concave portions to evaluate edge trace precision. Error of distance obtained by the binocular vision is around ± 10 mm when distance between the camera and object is around 600 mm. When the hand-arm robot touches the convex portion of the object, size data obtained by the vision is modified within ± 0.5 mm accuracy. Since the robotic finger is too thick to touch the bottom of the concave, size data of the concave portion obtained by tactile sensing includes relatively large error of around 4 mm. However, the robot finger can follow the contour with ± 0.5 mm accuracy except for the bottom portion. Therefore, vision sensing is not sufficient for precise edge exploration and modification based on tactile sensing is required.

Index terms: Tactile Exploration, Edge Extraction, Image Data, Hand-arm Robot, Calibration.