Multiple-Goal Task Realization of Robot Arm with Rotating Table

Multiple-goal task such as inspection and spot-welding is essential in manufacturing industries. Previous research works mostly focused on methods for motion planning and collision avoidance; some research works, on the other hand, proposed methods on designing a specialized robot arm for a given task. Selection of these methods is crucial to ensure that a method or combination of methods is applicable to several tasks and can effectively minimize the task completion time.

In this study, we utilize a system consisting of a 6-DOF standard robot arm and a 1-DOF positioning table (Fig. 1), which is applicable to several tasks. The robot arm has to reach goals while the table positions an object. In minimizing the task completion time, we propose a hybrid design composed of hardware-based and programming-based methods (Fig. 2). The hardware-based method involves designing a tool attachment (TA), which is a fixed linkage attached on the robot arm end-effector. In programming-based method, we incorporate base placement (BP) design, goal rearrangement and motion coordination. The proposed method is evaluated under various numbers of goals; its performance against other methods is shown in Fig. 3. A comparison of derived configurations of robot arm and table is shown in Fig. 4.

Keywords: Multiple-goal task, manipulator, design method.

Reference

1) Lounell B. Gueta, Ryosuke Chiba, Tamio Arai, Tsuyoshi Ueyama and Jun Ota, "Hybrid design for multiple-goal task realization in robot arm with rotating table", IEEE Intl. Conf. on Robotics and Automation (ICRA '09), to appear in May 2009.

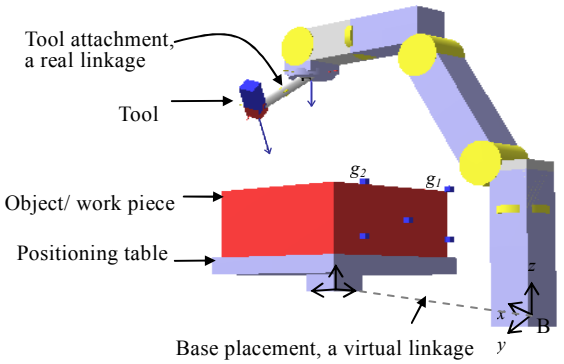

Fig. 1 A system consisting of a robot arm and a positioning table.

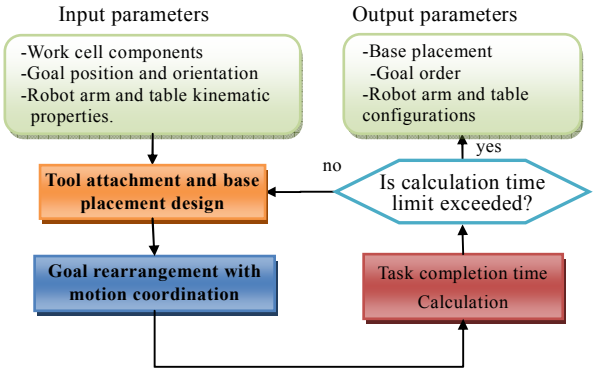

Fig. 2 Proposed method.

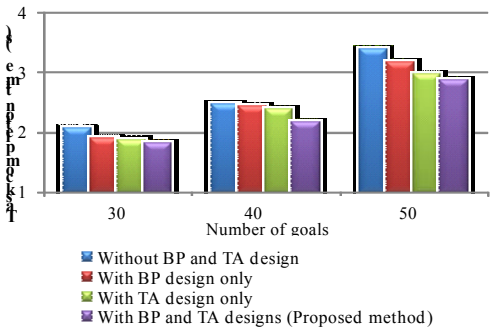

Fig. 3 Performance of compared methods.

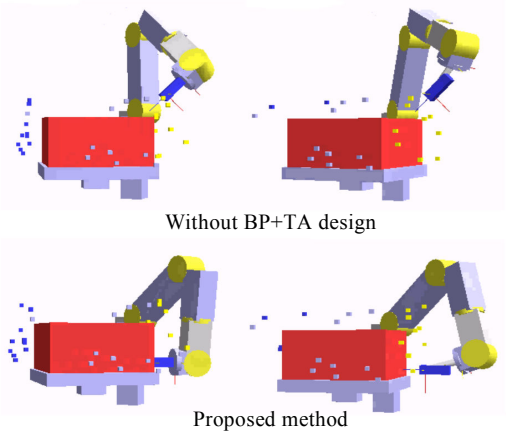

Fig. 4 Derived configurations of robot arm and table with 30 goals.