A Library of Dynamic Regrasping Motions

Dr. Avishai Sintov
University of Illinois at Urbana-Champaign

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Abstract

In todays manufacturing plants, robots are the foundational element of high volume automation and are used extensively in various operations. Manufacturing plants have to juggle two critical and often conflicting requirements: the greater demand and the higher quality. This requires manufacturing high quality products while meeting a very high production rate. The robots interact with the objects by using an arm and an end-effector that is a key interface between the robot and the component or product that needs to be handled. The robot arms are built for multi-purpose tasks. While many end-effectors look similar to one another; they are designed, built, and optimized for a specific task and specific part geometry. This makes them very inflexible in handling variations in component shape or the task. Thus, a typical end-effector consumes a considerable amount of engineering time and adds extra cost to the final product. In this talk I will address this problem with two distinguish approaches. I will briefly talk about a novel search algorithm for common grasping of a set of objects (a collaborated project with General Motors). The algorithm searches for a simple end-effector design able to feasibly grasp all of the objects. The second approach is known as Dynamic Regrasping to alternate grasp configurations of the object with respect to the task to be done. I would talk about two types of dynamic regrasping manipulations using a robotic arm and a simple non-dexterous gripper. Thus, the same arm can grasp multiple parts and perform multiple operations on the same part, and by that decrease the number of robotic arms in the plant.

Bio

Avishai Sintov received his B.Sc., M.Sc. and Ph.D. degrees in Mechanical Engineering from Ben-Gurion University of the Negev, Beer Sheva, in 2008, 2012 and 2016, respectively. Currently, he is a Post-doctoral research fellow in the Coordinated Science Laboratory at the University of Illinois at Urbana-Champaign. His interests include motion planning, grasping and regrasping synthesis, dynamic manipulations, machine learning and robot design.

Faculty Host: Kostas Bekris