



המכללה האקדמית להנדסה
אורט בראודה

Software Engineering Seminar

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Optimized Synthesis of Snapping Fixtures

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Abstract:

The paper deals with the design and optimized synthesis of a special type of fixtures, which we call snapping fixtures. Given a polyhedral work piece P , which we need to hold, a snapping fixture is a semi-rigid polyhedron G , such that when P and G are well separated, we can push P toward G , slightly bending G on the way, and obtain a configuration, where G is back in its original shape and P and G are inseparable as rigid bodies.

We present an algorithm for the automatic synthesis of such fixtures, which also optimizes certain properties of it to make it more useful in practice.

Our algorithm produces the fixture model to be 3D printed. We describe two applications with different optimization criteria: Fixtures to hold add-ons for drones, where we aim to make the fixture as lightweight as possible, and small-scale fixtures to hold precious stones in jewelry, where we aim to maximize the exposure of the stones, namely minimize the obscuring of the work piece by the fixture.

The primary focus of the work is the algorithmic issues in the automatic optimized synthesis of the snapping fixtures, but we also report on various fixtures that we have physically produced and discuss issues related to the 3D printing of the fixtures, such as materials, layer thickness, and fill density.