

3D Sketching for Multi-Pose Products: An Interactive Showcase

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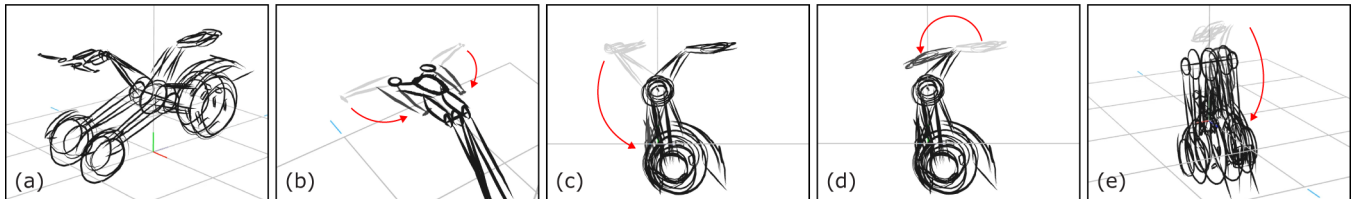


Figure 1: (a) A 3D sketch of a concept foldable bike produced using our system. Sequentially, (b) the bike handle, (c) the front of the bike, and (d) the back of the bike are folded into (e) the portable form.

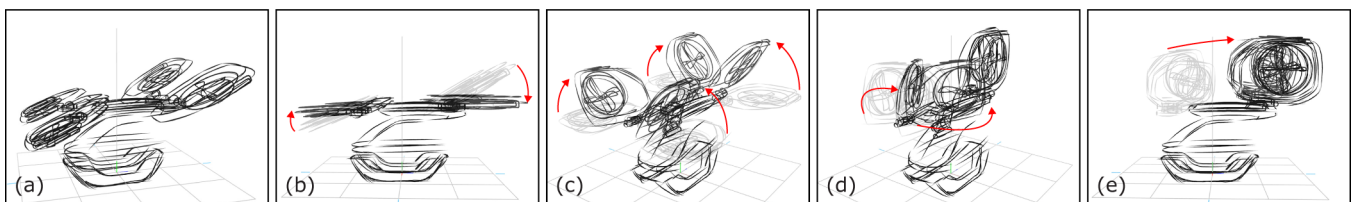


Figure 2: (a) A 3D sketch of a concept flying-car produced using our system. (b-e) The four thrusters perform a series of maneuvers to become fully folded after landing.

ABSTRACT

2D perspective sketching is an essential tool for designers during the early stage of design. However, for products that have moving parts and take different poses during usage, 2D perspective sketching can be painstaking and time-consuming. In this interactive showcase, we present a 3D sketching system for multi-pose products. Our system lets designers easily sketch 3D curves, and part, rig, and pose them. We showcase that, with interactions that closely resemble traditional 2D perspective sketching and the physical manipulation of an articulated object, designers can quickly try many different form and movement ideas in 3D during the early stage of design.

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1 INTRODUCTION

Multi-pose products have moving parts and take different poses during usage. However, sketching complex forms in different poses and perspectives can be painstaking and time-consuming even for experts, during the early idea exploration stage. Moreover, the actual movement can only be seen much later in the design process, with elaborate 3D modeling or physical prototyping, at which point unexpected or unsatisfactory outcomes can literally send designers back to the drawing board.

We showcase a 3D sketching system for multi-pose products [Lee et al. 2020] that lets designers quickly try many different form and movement ideas in 3D earlier on in the design process. Using our system, designers can easily sketch, part, rig, and pose 3D curves (Figure 1, 2). Here, 3D sketching refers to authoring 3D forms through digital pen drawing input, which can be a powerful tool in the hands of trained designers [Bae et al. 2008; Kim et al. 2018; Kim and Bae 2016].

Previous studies suggested systems that help the user animate 2D sketches [Davis et al. 2008; Kazi et al. 2014] or construct a movable 3D model from multiple 2D sketches [Shao et al. 2013], and systems that use 3D sketches to determine optimization parameters of a generative design algorithm [Kazi et al. 2017]. Our system focuses on a kinematic 3D sketching workflow for designers to ideate and iterate on multi-pose products, through interactions that emulate traditional 2D perspective sketching and physical manipulation of an articulated object.

