

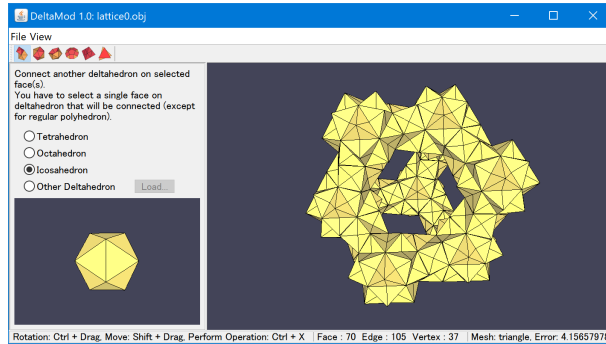
# An Interactive Design System for Deltahedron-based Modular Origami

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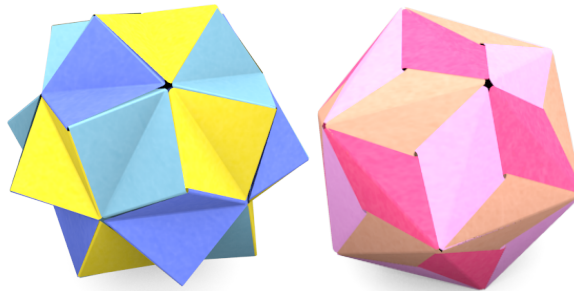
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## Abstract

In this paper, we present an interactive design system for modular origami whose underlying geometry is deltahedron. Deltahedron is a polyhedron whose faces are congruent equilateral triangles. Users can design a desired deltahedron by operations such as (gyro)elongating and jointing. Figure 1 shows an interface of our proposed system.



**Figure 1:** Our proposed system.



**Figure 2:** Icosahedra with different pyramid heights. 3-coloring.

Modular origami representation of a deltahedron is obtained by replacing an entire model with a set of simple unit models. We can generate various types of modular origami representation by changing a height parameter of the pyramid. Figure 2 shows the examples of the pyramids with isosceles right triangle and the zero height pyramids. Adding gaps between the units

makes “hand-assembled” looking. These results is rendered using Blender. Note that this representation is not physically accurate.

We also implemented the coloring problem solver for this modular system. The colorings of icosahedra in Figure 2 are automatically calculated. This coloring problem equals to the coloring of the dual graph of the underlying polyhedral graph and its colorability is proofed in the case of planar. Experimentally, it works for genus  $g > 0$  polyhedron (i.e., have holes).