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# FOLDING PAPER: VISUAL ART MEETS ALGORITHMS

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**ABSTRACT**: I like to blur the lines between art and mathematics, by freely moving from designing sculpture to proving theorems and back again. Paper folding is a great setting for this approach, as it mixes a rich geometric structure with a beautiful art form. Mathematically, we are continually developing algorithms to fold paper into any shape you desire; with Tomohiro Tachi, our new Origamizer algorithm enables efficient watertight folding of any polyhedral surface, such as the classic Stanford bunny or Utah teapot. Sculpturally, we have been exploring curved creases, which remain poorly understood mathematically, but have potential applications in robotics, deployable structures, manufacturing, and self-assembly. By integrating science and art, we constantly find new inspirations, problems, and ideas: proving that sculptures do or don't exist, or illustrating mathematical beauty through physical beauty. Collaboration, particularly with my father Martin Demaine, has been a powerful way for us to bridge these fields. Lately we are exploring how folding changes with other materials, such as hot glass, opening a new approach to glass blowing, and finding new ways for paper and glass to interact.

**Keywords:** Origami, computational geometry, sculpture.

Figure 1: “Folding Error I” (2014), elephant hide paper, 6" × 9" × 9" high. Sheets of paper are printed with QR code (designed to handle 30% error rate) for "FOLDING ERROR", then folded along circular creases (making the QR code unreadable except by destroying the sculpture) and assembled.

Figure 2: “Panda Tree” (2016), Mi-Teintes watercolor paper and hand-blown glass, 6" × 7" × 12" high. Paper printed with pandas then folded and inserted into glass vessel.