

Intelligent Design: Users Power Evolution in 3-D Web Printing

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By Zoë Macintosh
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At EndlessForms.com, you aren't just the consumer, and you're not just a designer, either. You are the guiding force behind the evolution of 3-D printed objects, and a contributor in a [unique kind of crowdsourcing](#) that optimizes product design while shedding light on the most basic concepts in biology.

The site's creators, a group of Cornell University researchers, have bottled the power of evolution in the first tool that allows groups of users to "breed" products, such as lamps or toys, as if they were strains of plants. The program responds to the binary choices of hundreds of users, virtually "mating" new designs over many generations, and ultimately perfecting them through evolution.

"Anybody can [design 3-D shapes](#) without knowing anything about design, really. I think that is the beginning of a new era in the way that products are designed," said researcher Hod Lipson, an assistant professor in Cornell's creative machines lab who helped design the website.

The site works by offering visitors 15 randomly generated simple forms to play with. Upon selecting a pair of objects and pressing "evolve," users find themselves faced with another 15 new designs generated from the pooled "genetic information" of the objects.

Traditionally, opportunities to design anything from perfume bottles to furniture have been limited to those with design knowledge and expertise in sophisticated software. Through this evolutionary process, anyone can design custom products, no expertise needed. For instance, a car company "could use this technology to display different 3-D shapes of a Ferrari, a Prius or other existing cars, and let people choose what types they like and recombine them in new ways," Lipson told InnovationNewsDaily.

As objects evolve over multiple generations (pairings) and absorb the design [decisions of crowds of people](#), only computing power limits the complexity and number of possible forms.

Additionally, the emergence of forms such as a spinal cord form and a butterfly, which some site visitors managed to make in only a few pairings, are keeping scientists riveted because they mirror breakthroughs in real evolution's history. The repeated emergence of symmetry and similar shapes among the forms also mimics evolution, a mimicry that reaffirms the robustness of the program and the potential use of the program for evolving other technological products, such as a robotic brain.

Down the road, the team would also like to evolve entire ecosystems of interacting, said Jeff Clune, another Cornell researcher involved in the project.

"A key to making it work is that it has to have lots of light bulbs to work. It's like evolution. Evolution works on these grand scales with millions of individuals," Lipson said. "One person can be clicking on things for a year and get nothing. Tens of thousands of users interacting will produce the diversity of the gene pool."

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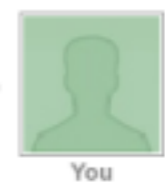
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