Binary Underline

Designing for relatively hard materials that do not deform too much is commonly handled by software that calculates and optimizes structures using mathematical models that are well understood and easily applied. But there is an expanding class of design challenges for things that incorporate soft materials -- biological materials, engineered tissues, membranes, and even shape-shifting fluids that respond to electromagnetic fields. Predicting how these soft and fluidic materials respond to forces is more challenging than predicting the behavior of hard materials. Real world applications can include design of artificial hearts and heart valves or robot materials that mimic flesh and soft tissue.

To meet this challenge, a team of Tufts researchers led by Tim Atherton, professor of physics, created Morpho, an open-source programmable environment that enables researchers and engineers to solve shape optimization problems for soft materials. The software recently described in Nature Computational Science is meant to be easy to use, free to use, and applicable to a broad range of scenarios. Among the team developing the software were James Adler, professor of mathematics, and Chaitanya Joshi, postdoctoral scholar in physics.