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Learning from the Venus Flytrap: A Biomimetic Responsive Interface DOUGLAS P. HOLMES, ALFRED J. CROSBY, University of Massachusetts — The ability to have controllable and fast property changes to a material surface over large length scales is desirable for a variety of functions including chemical sensors, antimicrobial devices, "smart" adhesives, and drug delivery coatings. Recently, many strategies, including shape memory and environment selectivity, have been developed for synthesizing responsive surfaces, but the response times are often too slow or non-sensitive. Here, we present a new strategy for responsive surfaces or interfaces that builds upon the response mechanism of the Venus flytrap, which exhibits one of the most rapid movements in the plant kingdom. This rapid, controllable movement is largely attributed to the geometry of the leaflets, which can undergo a snap-through elastic instability upon development of a critical pressure. Learning from nature, we have made a responsive interface with controlled, elastic instabilities capable of large geometric changes across very short timescales. We present the fabrication of a responsive surface of microlenses with a controlled, predictable geometry that undergoes a rapid snap-through transition when triggered by various stimuli.

Douglas Holmes
University of Massachusetts

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