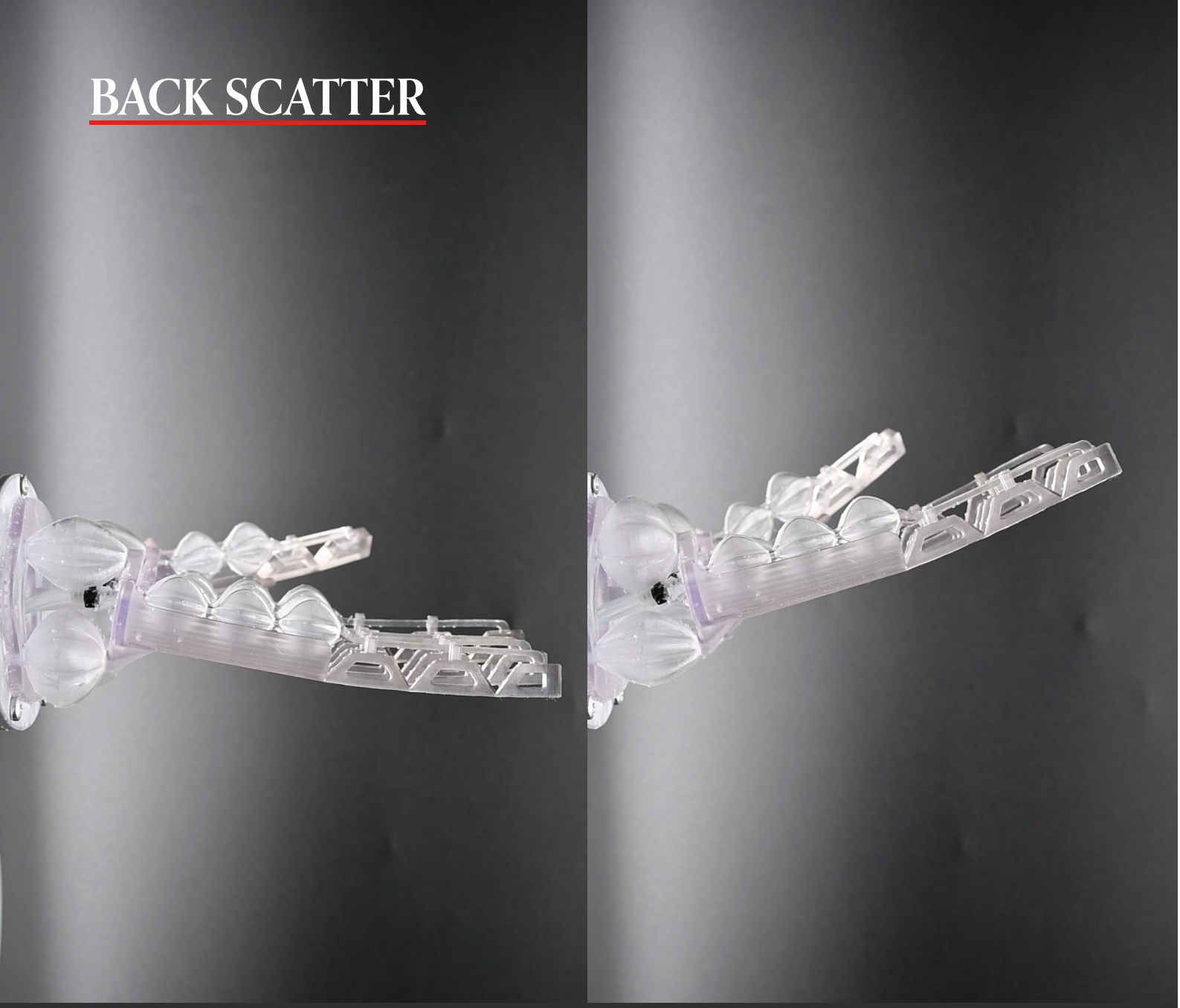

Artificial hands make lifelike movements

Barbara Mazzolai, of the Italian Institute of Technology in Genoa, studies how plants and animals form so that she can develop bioinspired robotic devices. Mazzolai, her PhD student Corrado De Pascali, and colleagues constructed the 3D-printed, human-sized robotic hands seen here, each with 18 individual artificial muscles that extend and contract like those of a person. Those movements are enabled by a pneumatic mechanism first developed in the 1950s. When the air inside of a stretchable cylindrical membrane pressurizes, the membrane expands radially, and its length parallel to the fingers contracts. Traditionally, researchers have attached stretch-resistant fibers to the membrane to translate its volume changes to specific axial movements.

Mazzolai and her colleagues constructed their membrane differently: It is made of one of various commercially available plastics with regularly occurring folds that perform the same job as the stiff fibers. Without the fibers, the monolithic design can be used to build more flexible and customizable artificial muscles at a larger range of spatial scales. Depending on which particular plastic is used, the new artificial muscles can lift weights that are orders of magnitude heavier than the muscles themselves. An 8 g sample in a lab test, for example, lifted an 8 kg weight. (C. De Pascali et al., *Sci. Robot.* **7**, eabn4155, 2022; images courtesy of the Italian Institute of Technology.) —AL

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