

PRINTABLE REPULSIVE-FORCE ELECTROSTATIC ACTUATOR METHODS AND DEVICE

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PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,951,134	03/16/2021	2016-169

BRIEF DESCRIPTION

Flexible electrostatic actuators are well designed for a range of commercial applications, from small micro-mechanical robotics to large vector displays or sound wall systems. Electrostatic actuation provides efficient, low-power, fast-response driving and control of movable nano-, micro-, and macro-structures. While commercially available electrostatic actuators have the requisite high levels of mechanical energy / force for some applications, their energy requirements are typically orders of magnitude higher than what is needed in large-area, low-power applications. Moreover, conventional approaches to these types of electrostatic actuators have limited design geometries and are prone to reliability issues like electrical shorts. To address these problems, researchers at the University of California, Berkeley, have experimented with planar electrostatic actuators using novel printing and electrode patterning and engineering techniques. The team has demonstrated a repulsive-force electrostatic actuator device (100 mm x 60 mm achieved) with extremely high field strength and high voltage operation and without insulator coatings or air breakdown.

SUGGESTED USES

- » Large area arrays e.g. signage, sound generation/control
- » Small area arrays e.g. biological tissue growth, micro-robot sensor packages

ADVANTAGES

- » High field strength (200 kV/mm) and high voltage (5000 V) operation, without insulator coatings or shorting (air breakdown)
- » Greater forces (4000x) and greater displacements (2x - 75x) and equivalent pressures to MEMS-fabricated actuators
- » Reduced shorting potential as compared with devices published/on market
- » Multi-layer capability for design/geometry flexibility
- » Minimizes likelihood of stiction / pull-in failure
- » Leverages industry standard, low-cost, roll-to-roll or screen printing processes

RELATED MATERIALS

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ [Locomotion Device and Methods and Related Software](#)
- ▶ [Compact Series Elastic Actuator Integration](#)

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OTHER INFORMATION

KEYWORDS

electrostatic actuators, electrostatic actuation, repulsive, actuator, flexible actuator, MEMS, custom shape, micro-mirror, tunable capacitor, micromirror, adaptive optics, vector displays, sound walls

CATEGORIZED AS

- » **Materials & Chemicals**
- » Other
- » **Semiconductors**
- » Design and Fabrication
- » **Sensors & Instrumentation**
- » Other

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