4D-PRINTED PNEUMATICALLY ACTUATED FLEXIBLE ROBOTIC JOINTS

Tech ID: 29799 / UC Case 2019-031-0

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,780,100	10/10/2023	2019-031

BRIEF DESCRIPTION

A four-dimensional-printed pneumatically actuated soft joint provides a high actuation range, controlled folding degree, high customizability, and streamlined assembly driven by air pressure. Developed by UC Berkeley researchers, this technology utilizes spherical bellow structures whose peaks and valleys are printed with flexible materials, which are then adhered to both sides of the joint to facilitate folding. The unique joint design, ease of assembly, and wide material palette for this pneumatically actuated material can be applied to a diverse array of robotic actuation mechanisms. For example, a versatile robotic gripper can be constructed to safely manipulate a wide variety of delicate, soft, or hard objects across multiple fields including medical, aerospace, and defense applications.

SUGGESTED USES

»
Manufacturing of versatile robotic grippers capable of handling delicate, soft, or hard objects without damaging them

»
Development of flexible robotic components for minimally invasive surgical instruments in the medical field

»
Integration into automated sorting systems for agricultural or food processing industries to handle fragile produce

»
Deployment in aerospace exploration equipment requiring lightweight, highly customizable deployment mechanisms

»
Utilization in defense applications for specialized robotic systems operating in unpredictable or hazardous environments

ADVANTAGES

»
Delivers a high actuation range with a precisely controlled folding degree for dexterous movement

»
Streamlines the overall manufacturing and assembly process by utilizing efficient air pressure drivers

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INVENTORS

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OTHER INFORMATION

CATEGORIZED AS

» **Engineering**

» Robotics and Automation

RELATED CASES

2019-031-0

»

Offers exceptional customizability through a wide material palette compatible with advanced printing techniques

»

Reduces mechanical complexity and risk of failure by eliminating rigid joints and complex internal linkages

»

Provides safe interaction with sensitive objects due to the inherently compliant nature of soft materials

RELATED MATERIALS

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Deep Learning Techniques For In Vivo Elasticity Imaging
- Sinusoidal Surface Serrations On A Bio-Inspired Propeller

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