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Universal Metamorphic Robot Hand Design

Reconfigurable five-finger hand morphs size, handedness, and grasp modes for versatile robotic/prosthetic use.

Researchers at Purdue University have designed a universal metamorphic robot hand with a five-finger device. Conventional robotic hands, notably of the metamorphic or prosthetic type, are typically configured for use in a single size or orientation. However, this poses challenges as certain applications require different types of robotic hands, which can increase costs and decrease versatility. Therefore, a robotic hand that can be deployed in various use scenarios with different sizes and orientations is direly needed.

The robotic hand developed by Purdue University researchers provides the industrial, medical, and service sectors with a dexterous and universal prosthesis hand. By controlling rotary and prismatic joints, the palm structure can be scaled and deformed to certain configurations, allowing the fingers to achieve a bi-directional grasping capability. Moreover, this design can function as either a left or right hand of variable size and shape. The robotic hand can be tailored to accommodate diverse needs and tasks, rendering this technology incredibly versatile and widely applicable.

Technology Validation:

The researchers are currently prototyping the design of the versatile and universal metamorphic robot hand.

Advantages:

-Yields better application adaptability and assures sufficiency to cater to various application domains

-Possesses feasible control system both hardware-wise and software-wise

-Provides a dexterous and universal manipulator, meeting the needs of different sizes and shapes without having to retool

-Adjustable palm size and finger orientation

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Category
Digital Health & Medtech/Wearable Health Tech & Biosensors

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-Can function as either a right hand or a left hand (bidirectional grasping capability)

Applications:

-Industrial, medical, and service sectors

-Motion control

-Path planning

-Inverse kinematics

-Smart prosthetic hand implant

-Industrial robotic hand

TRL: 2

Intellectual Property:

Provisional-Patent, 2024-04-15, United States

Utility Patent, 2025-04-15, United States

Keywords: left hand, Mechanical Engineering, metamorphic hand, prosthetic implant, right hand, robot hand

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