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A Novel Variable Stiffness Robotic Gripper

Variable stiffness robotic gripper adjusts cavity fill to balance strength and flexibility, lowering cost and complexity.

Researchers at Purdue University have developed a robotic gripper that adapts its stiffness in response to material property. Robotic grippers function like arms for robots and are key in enhancing automation and understanding human-robot interaction. However, many robotic grippers have not struck a cost-effective balance between strength and flexibility. While traditional rigid grippers lack flexibility, recent soft grippers struggle with load bearing. Purdue researchers developed a gripper mechanism that changes the filling ratio of the cavity between the two parallel beams, allowing flexible grasping. This technology can rapidly alter its stiffness independent of the fingers, reducing cost and device complexity while improving grasping ability of the robotic arm.

Technology Validation: To validate the theoretical gripper model, Purdue researchers measured deformation of the finger i.e., stiffness error of less than 7% through a finite element analysis model and a series of object-grasping tasks in 3D-printed prototypes.

Advantages

-Adaptable Stiffness

-Cost-effective

-User-friendly

Applications

-Automation

-Manufacturing

-Design Education

TRL: 4

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Education & EdTech/Interactive Student Engagement Technologies

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