

Deformable Self-balancing Adhesion Grippers

This technology offers a gripper for irregular surfaces where these mechanisms can be combinations of 1D or 2D self-balancing and self-similar structures.

What is the Problem?

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Many devices such as vacuum grippers, Gecko adhesive grippers and electrostatic adhesion grippers need contact with a flat area. However, this makes attaching to irregular surfaces difficult. Curved surfaces can be viewed as locally flat in a small enough area. Having a surface that would conform in small patches or areas to an object would aid in grasping an irregularly shaped object. Such a device would allow a wide variety of adhesion-based methods to work more efficiently by having the gripper conform to the object.

What is the Solution?

The solution is a novel gripper for irregular surfaces. The solution places adhesion surfaces at the end of a two-dimensional surface connected to self-balancing mechanisms. These mechanisms can be combinations of 1D or 2D self-balancing and self-similar structures. By placing adhesion surfaces at the end of a fractal structure of balancing units, the system can have high adhesion to complex surfaces. Many adhesion devices benefit from having highly aligned contact areas with an object. These adhesion surfaces can be suction cups, gecko adhesion material, or electrostatics. The main element of the structure is a 2D initial surface that can take loadings from the contact with the object to change its configuration and self-balance the forces across one or more dimensions to maximize contact area normal to the surface. These structures need not be perfectly fractal or as they may have parameters that vary across interaction of the scale of the mechanism, such as the orientation, aspect ratio or scaled spacing between components.

What is the Competitive Advantage?

Current gripper solutions suffer from the inability to maintain attachment with irregular surfaces. This system will enable attachment to irregular surfaces.

Patent Information:

[US20230211509A1](#)

Technology ID

BDP 8716

Category

Hardware/Robotics
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Technologies

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