Compliant Adhesion: Local Suction Generation on Compliant Membranes

This technology offers softer and smaller possible pressure sources into vacuums near suction points. The suction attachment will address the concerns of tubes collapsing under vacuum.

Technology ID

BDP 8715

Category

Hardware/Robotics
Selection of Available Technologies

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What is the Problem?

What is the problem?

Attaching suction to irregular surfaces is difficult. Small suction devices can conform to local patches but getting suction to them is difficult since suction tubing collapses more easily. This means having a rigid section separate from the suction surface that reduces the ability of the gripper to conform to surfaces. Soft robots allow for easily conforming to surfaces, but soft vacuum lines can collapse.

What is the Solution?

The solution is to convert softer and smaller possible pressure sources into vacuums near the point where suction is needed. Two or more venturi pump expansion chambers are placed in an elastomeric structure and supplied with high velocity fluid, such as air. The expansion chamber of the venturi pump is connected directly to the exterior of an object to be grasped or can be piped to a separate part of the elastomeric structure that acts as a suction cup. This uses distributed Venturi Pumps to convert positive flow into suction near consumption allowing use of higher flows and smaller features than pumping vacuum. It is easier to pump high speed positive pressure through small tubes than vacuum since a vacuum causes the smaller tubes to collapse, remediating the needs for high stiffness tubes. The Venturi pumps are integrated into a deformable structure allowing them to conform to the surface.

What is the Competitive Advantage?

Current suction solutions are difficult to attach to irregular surfaces, and soft robots can cause the vacuum lines to collapse. This system will enable suction attachment to irregular surfaces without the concerns of tubes collapsing under vacuum.

Patent Information: