Docket #: S16-012

Gecko-adhesive for gentle robotic grasping of irregular objects

Engineers in Prof. Mark Cutkosky's laboratory have developed a gentle gripper device that can conform to, grasp, and lift a wide range of objects using an air bladder enhanced with gecko-inspired shear adhesion. This technology exploits the conformability of air and the gripping ability of gecko adhesives to passively grasp objects without squeezing. This enables gentle handling of a large variety of shapes, sizes and textures including delicate or deformable objects that that could be damaged with traditional gripping force from friction. This technology could be used for a range of robotics applications, such as package handling or prosthetics. The adhesive has been tested to 30,000 grip cycles while retaining most of its adhesion. When fouled with large amounts of dirt, it performs the same as non-adhesive rubber; however, it is easily cleaned by contact with a sticky surface and returns to full levels of performance.

Video demonstration of objects picked and placed by the gripper including soft bagged goods, boxes, irregular objects and flat objects.

Stage of Research
The inventors have built a prototype air-bladder gripper and used it to pick and place objects with a variety of shapes, materials, sizes and weights.

Applications

- **Robotics** - to passively grasp irregular objects, with end user applications such as:
    - package handling and fulfillment
    - manufacturing and industrial robotics

    - prosthetics and medical robotics

Advantages

- **Gentle grasping** - gripper won't crush delicate or deformable objects because it uses shear adhesion instead of friction to squeeze an object
- **Flexible handling** - can grasp a variety of objects including non-flat surfaces with odd shapes or irregular edges

Patents

- Published Application: 20190176342
- Issued: 10,647,004 (USA)

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