Docket #: S21-079

A Stretchable Tactile Sleeve for Reaching into Cluttered Spaces

Robots will need sensory skins to safely interact with humans and navigate more complex environments than factory work cells. This invention is a new stretchable pneumatic sensor skin that can feel its surroundings and reach for objects in constrained environments. With no electronics at the sensing sites, the skin is durable and waterproof, thus it is washable and potentially sterilizable in healthcare settings. This design is scalable and uses low-cost materials. The current prototype is a sleeve that can be pulled over a 2 degree-of-freedom robot wrist with minimal change in signal as it stretches over joints. The sleeve is covered on all sides with small pneumatic membranes that produce pressure signals on contact.

Video of invention

Stage of Development

- Prototype in form of stretchable sleeve
- Future work includes creating a sensory glove that also covers the digits of a robot finger

Applications

- **Robotics**- industrial and potentially medical

Advantages

- **Stretchable, tactile skin can cover large area**
- **High sensitivity** - force sensing range captures down to 0.01 N and has a roll-off of frequency of 102 Hz

- **No conductive elements or rigid components**
- **Robust to impacts and withstands many cycles of stretch**
- Waterproof
- Low-cost fabrication
- Easy implementation

Publications

- Gruebele, Alexander M., Michael A. Lin, Dane Brouwer, Shenli Yuan, Andrew C. Zerbe, and Mark R. Cutkosky. "A Stretchable Tactile Sleeve for Reaching Into Cluttered Spaces." *IEEE Robotics and Automation Letters* 6, no. 3 (2021): 5308-5315.

Patents

- Published Application: 20220316974
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Innovators

- Alexander Gruebele
- Michael Lin
- Mark Cutkosky
- Dane Brouwer

Licensing Contact

Matthew Ryan

Licensing Manager

Email