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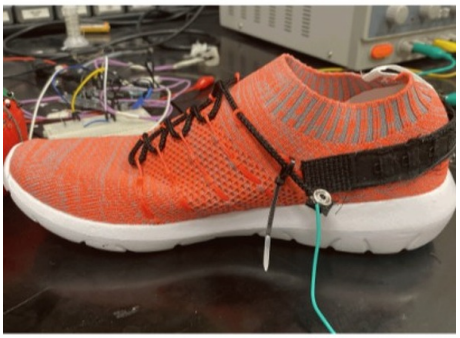
Accessible clothing technologies, systems, and methods using integrated soft robotics

A collection of tools to self-tighten clothing for individuals with physical impairments



IP Status: Provisional Patent Application Filed

Applications

- Self-tightening bra
- Self-tying shoes
- Self-tightening belt
- Clothing for individuals with physical impairments

Key Benefits & Differentiators

- **Hands-free tightening:** Garments are designed to tighten from residual body heat

Technology Overview

Individuals with physical impairments can struggle significantly with simple everyday tasks associated with dressing and undressing. Traditional garment structures that are ubiquitously used for fitting/tightening/fastening clothing – e.g., zippers, snaps, buttons, laces, or belts – require varying degrees of physical strength, dexterity, precision, and manual control that may exceed the abilities of individuals with age-related (or other) impairments. We propose to develop these garment-based technologies to overcome accessibility challenges in everyday clothing, through a suite of adaptive solutions that can support and assist with the daily challenge of tightening / loosening or fastening/unfastening a garment.

Researchers at the University of Minnesota have developed a suite of garment-based adaptive solutions for tightening, fitting, and fastening everyday clothing. Soft robotic actuators composed of temperature-sensitive shape memory alloys are integrated directly into garments to enable hands-free tightening -- these structures can be paired with traditional fastening elements such as buckles, hook-and-eyes, or clips, to create fully-automated, self-fastening

Technology ID

2024-263

Category

All Technologies
Engineering & Physical Sciences/Design Specifications
Engineering & Physical Sciences/Materials
Life Sciences/Human Health
Life Sciences/Medical Devices

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garments/clothing. These actuators function as augmented accessibility features, self-tightening bras or belts, and even hands-free tying of shoes.

Phase of Development

TRL: 3-4
Prototypes have been developed of multiple traditional garments including sneakers, bras, and belts

Desired Partnerships

This technology is now available for:

- License
- Sponsored research
- Co-development

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Researchers

- **Brad Holschuh, PhD** Professor, Department of Design, Housing, and Apparel
- **Lucy Dunne, PhD** Professor, Department of Design, Housing, and Apparel
- **Heidi Woelfle** Lab Manager, Wearable Technology Lab

References

1. Xin-Ting Liu, Heidi Woelfle, and Brad Holschuh(2024) , https://dl.acm.org/doi/10.1145/3675094.3681948, In Companion of the 2024 on ACM International Joint Conference on Pervasive and Ubiquitous Computing, 342-346