Hydraulically Actuated Textiles
Tech ID: 29967 / UC Case 2018-759-0

BRIEF DESCRIPTION
A soft, planar, actuator based on hydraulically actuated textiles.

BACKGROUND
An interest in soft actuator robotic technologies has become increasingly popular in recent years. While various alternative actuation options exist and several fluidic actuators have been proposed, none are able to handle high levels of strain and are often too rigid making them less desirable for many applications. The development of low-profile, soft, high-force, high-strain, and efficient actuation is therefore critical for the advancement of soft and wearable robotics.

DESCRIPTION
Researchers at the University of California, Santa Barbara, have developed a soft, planar, actuator based on hydraulically actuated textiles. These muscle-like devices can be fabricated easily using a large variety of possible materials. The ability to create fabrics that contract make them applicable to numerous fields. For example, they are well suited for wearable haptic feedback for motion guidance via skin stretch, for haptic virtual reality, or for use in miniature surgical devices. They can also be scaled in length, workspace, force, or in surface area to create larger actuators for an array of potential applications, such as therapeutic devices, robotic exoskeletons, autonomous marine robots, or other field robotics applications. They can produce large variable forces or displacements at fast rates (fractions of a second), are readily integrated into large surface area structures, such as compression apparel. The use of hydraulic fluid ensures that the devices can be safely worn on the body, even when high forces or pressures are used. Due to their high performance, compact size, conformability, and simplicity, hydraulically actuated textiles could greatly impact areas ranging from wearable robotics, to wearable computing, healthcare, technical apparel for sports, and many others.

ADVANTAGES
▶ Compact size
▶ Simple & low cost fabrication
▶ Sage for use on the body
▶ Can effect strains approaching 100%
▶ Outperform existing fluidic actuators

APPLICATIONS
▶ Compression wraps and garments for wellness, sports therapy, and medicine fields
▶ Wearable robotics
▶ Apparel (wearable cuffs, bands, leggings, shirts, suits, etc.)

PATENT STATUS

<table>
<thead>
<tr>
<th>Country</th>
<th>Type</th>
<th>Number</th>
<th>Dated</th>
<th>Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States Of America</td>
<td>Published Application</td>
<td>22/0030985</td>
<td>02/03/2022</td>
<td>2018-759</td>
</tr>
</tbody>
</table>

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS
▶ Highly Stretchable & Flexible Electronic Sensors
▶ Soft Burrowing Robot for Simple & Non-Invasive Subterranean Locomotion
Miniature, Lightweight, High-Force, Capstan Winch For Mobile Robots
Integrated Soft Optoelectronics for Wearable Health Monitoring
Microspine-Rubber Composite for High Friction on Smooth, Rough, and Wet Surfaces
Mechanism for the Autonomous Control of a Vine Robot
Self-Anchoring Burrowing Device for Sensor Placement with Low Reaction Force