Skysong Innovations
Advancing the Arizona State University Knowledge Enterprise

1475 N. Scottsdale Road, Suite 200
Scottsdale, AZ 85287-3538
Phone: 480 884 1996 Fax: 480 884 1984

Case ID:M18-091P
Published: 11/2/2018

Inventors

Panagiotis Polygerinos

Pham Nguyen

Contact

Shen Yan
shen.yan@skysonginnovations.com

Soft Poly-Limbs: a New Paradigm of Mobile Manipulation for Daily Living Tasks

Background

Prosthetic limbs are devices widely in use to remedy the impairment of functionality that results from the loss of a patient's limb. Additionally, exoskeletons are "wearable robots" that provide a shell around the body and act as a bodily extension, increasing safety and functionality. These machines are frequently utilized in demanding manual labor as a means of mitigating the pressure felt by the workers tasked with such jobs.

While these devices have improved greatly over the years, they still lack much of the capabilities and seamless interfacing with the rest of the body that one's actual limb would provide. The devices currently in use are difficult for the user to adapt to and have extremely limited degrees of operational freedom compared to the original limb. Therefore, it is critical to develop a means to enable biological prosthetics and exoskeletons to more seamlessly interface with their users in order to provide an experience that more resembles performance of the human body.

Invention Description

Researchers at Arizona State University have developed a soft robotic poly-limb (SPL) that is configured as an extra, separate appendage intended to assist users with everyday tasks, unlike current prosthetics, which are configured to replace limbs. Because of this change in configuration, SPLs do not need to follow users' skeletal structure; this enables greater freedom of movement and a simpler process for attachment and removal of the device.

The SPL itself is designed as a series of segments connected by soft actuators, where an actuator is the component responsible for movement and control of a system. This design enables the maneuverability and wider range of degrees of freedom relative to traditional prosthetics. The device's segments are also tapered, which ensures a reduction in the overall weight of the SPL and brings its center of mass closer to the user's body, making the design more user-friendly.

Potential Applications

- Prosthetics
- Labor force

- Exoskeletons
- Soft robotics

Benefits and Advantages

- Maneuverable: Does not need to follow user’s skeletal structure, enabling greater degrees of freedom in operation
- User-friendly: More lightweight, easier to adapt than current biological prosthetics
- Versatile: Usable in various applications including manual labor, elderly person care, prosthetics to replace lost limbs

To see this invention's full publication, click here.