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NOVEL APPROACH TO COUNTERMEASURES USING SOFT ROBOTICS

Abstract

Long-duration space travel has extremely negative effects on the human body, and whilst countermeasures have been developed to reduce these effects on ISS crews, further mechanisms are required to enable deeper exploration of the solar system.

This paper introduces a wearable mechanism that creates omnidirectional resistance to the muscles, using a new type of artificial muscle, and a novel control mechanism. Produced by AstroWear, this soft robotics exoskeleton system is (initially targeted to be) a countermeasure for muscle and bone density wastage during extended stays in microgravity, and to aid rehabilitation on return to Earth.

In this paper we present initial results of testing of the strength, and bidirectional workings of the actuator/artificial muscle mechanism, and discuss the novel control software.

In addition to its aim of countering the effects of microgravity on the musculoskeletal system, this exoskeleton concept can also be used to explore the potential benefits of haptic feedback for astronauts for both ground-based training, and space-based operations.