

Transit Reconfigurable Exerciser – Intern Exit Abstract

Title of Research:

Transit Reconfigurable Exerciser

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The Research focus:

Development of novel technologies using smart materials to create countermeasures systems that meet volume, weight, and performance requirements for long duration space flight.

Research methods used:

Prototyping, testing, and manufacturing

The results/findings of the research:

Fast paced development of an exercise device proved to be exciting and challenging. Tolerances on machined parts proved to be more critical than expected and resulted in minor leaks. Testing continues on the manufactured prototype to determine if enough torque is generated for use in exercise applications.

The main conclusion and recommendations:

Work should continue to develop the Transit Reconfigurable Exerciser into a device that will serve as a robust prototype and proof of concept. The use of smart materials is a small, low power method of providing resistance in the context of an exercise device.

Abstract:

The Transit Resistive Exerciser (TRES) was developed during a 16 week period in which a clutch device filled with smart material was built and began the testing phase. The clutch serves as a passive method of creating resistance. When paired with a series of springs, the device creates a rowing machine also capable of resistive exercise configurations. The device has loading profiles similar to the exercise devices used on the International Space Station today. The prototype created was designed in a modular fashion to support parallel development on various aspects of the project. Hardware and software are currently in development and make use of commercially available parts. Similar technologies have been used in the automotive industry but have never been explored in the context of countermeasure systems for space flight. If the work done leads to successful testing and further development, this technology has the potential to cut the size and weight of exercise devices by an order of magnitude or more.