NASA SBIR/STTR Technologies

Controlled Resistance & Aerobic Exercise Countermeasure

PI: Stelu Deaconu, PhD, / Streamline Automation, LLC – Huntsville, AL

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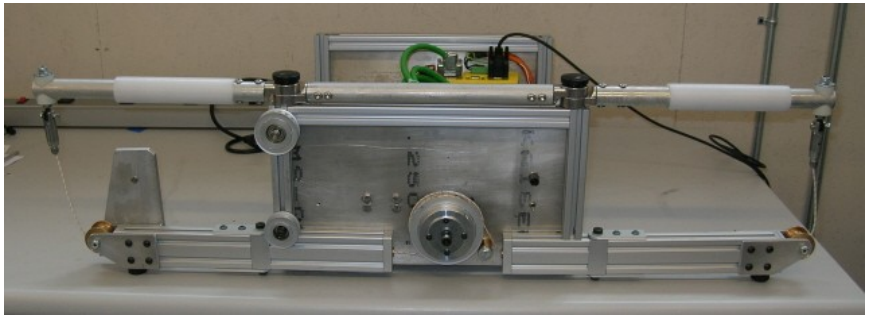
Identification and Significance of Innovation

- Spaceflight adaptations include muscle atrophy, decreased bone mineral density and reduced aerobic capacity
- Effective resistance exercise countermeasure hardware supports safe and successful space exploration
- Real-time control is applied to an electric servo-motor to provide resistance exercise in a lightweight, compact, and reconfigurable design
- Compact cycle ergometer provides aerobic exercise and generates power that will be stored



Phase 1 Prototype Exercise Unit
Demonstrated at Wyle Laboratories in July 2009 – Controlled Resistance Exercise is Feasible

Technical Objectives

- Whole body axial loading & individual joint resistive loading that accurately simulates free weights
- Load adjustable to 2.5 kg maintains strength & bone
- Easily configured and stowed
- Cycle ergometer for aerobic exercise / power production
- Design to accommodate entire anthropometric range
- Instrumented to document exercise sessions

Work Plan

- Prototype detail design and engineering analysis
- User interface development
- Prototype fabrication
- Control implementation
- Test plan development
- Demonstrate performance with human testing

NASA Applications

- Provides resistance & aerobic exercise
- Portable design applicable in virtually any aspect of spaceflight (extended use on ISS, short-term lunar sortie missions, and future Mars exploration)

Non-NASA Applications

- Controlled resistance exercise for athletic training
- Neuromuscular rehabilitation (stroke, spinal cord injury)
- In-home personal training and physical therapy with tele-presence of recorded exercise session parameters

Firm Contacts

- Dr . Stelu S. Deaconu – Principal Investigator
  (256) 713-1220, Stelu.Deaconu@StreamlineAutomation.biz
- Dr. David C. Paulus, PE – Mechanical Engineer
  (479) 452-5940, David.Paulus@StreamlineAutomation.biz