



LIGHTWEIGHT EXOSKELETON FOR LOAD CARRYING AND MOBILITY | WarSTAR and TSPID

An exoskeleton can be considered a human performance augmentation system, worn by a person, which contains a power supply to provide activation-energy for leg and arm movement. Exoskeletons are essentially wearable robots.

Historically, efforts have focused on exoskeletons that are fully powered, with actuators in every joint. More recent efforts are directed as well at low-powered, lightweight devices that include a mix of passive and active activation for leg movements. An applied research project is being conducted at the US Army Natick Soldier Research, Development and Engineering Center (NSRDEC) to develop a lower extremity, low-powered, lightweight device that will increase Soldiers' load-carrying capacity, while reducing the physiological cost and the biomechanical stresses that Soldiers experience when carrying heavy loads.

The goals of this current effort at NSRDEC:

1. Develop a simple orthotic-like, lower extremity device that increases a Soldier's load-carrying capacity to 150 lbs and allows a Soldier to maintain a walking speed of 3 mph or higher.
2. Achieve a design for the device that is efficient in terms of the oxygen consumed by the individual Soldier during load carrying activities and is compatible with use by the Soldier in military field operations.
3. Develop a lightweight power system that enables a Soldier to complete a 5-mile march carrying a maximal load without the necessity to recharge or switch out power supplies.

This program is in its early phases, with research now underway to devise and bench-test concepts for the device. Future efforts may include prototype fabrication and laboratory testing of prototypes to study their physiological and biomechanical benefits to Soldiers carrying heavy loads. Military field evaluations of the most-promising prototypes may also be conducted.

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