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Wearable robotics could save the day (and your back)

Sign up now to test a device and provide feedback

Robert Schloen demonstrates the BackX passive hip exoskeleton during the N3B safety fair.

How can a lightweight back-assisted exosuit help material handlers decrease back strain from repetitive lifting tasks? What are the benefits of a passive robotic shoulder support in reducing fatigue and injury for environmental cleanup workers? How can mechanical devices reduce joint and muscle injuries in a manufacturing environment?

These are some of the questions a group of Laboratory engineers are asking in their ongoing quest to identify and evaluate specially designed wearable advanced technologies to assist workers and help keep them safe.

"Our charter is to evaluate wearable robotic devices that provide assistance by distributing load through other parts of the body," said **Robert Schloen**, R&D engineer and project manager in the Automation, Robotics and Controls group. "We are seeking groups and tasks at the Lab to determine if the devices are beneficial, and whether the benefits outweigh any hindrances they may introduce."

Devices aid cleanup workforce, countless others

In a program funded by DOE's Office of Environmental Management, Los Alamos works alongside Sandia National Laboratories, the program lead, and four other organizations to explore whether wearable robotics and exoskeleton systems can help protect workers from musculoskeletal injuries resulting from ergonomic issues, acute overexertion or even chronic overuse.

In addition to the teams directly involved, the program also works with several other sites, such as the Waste Isolation Pilot Plant and the Hanford Site to identify areas where workers may benefit from wearable devices and help increase efficiency and reduce fatigue in everyday, ergonomically challenging tasks.

"These devices have the potential to be used by people working in a variety of industries, from construction and logistics to military and manufacturing," said Schloen. "Tank farm technicians carrying heavy loads in the field and assisting with glove-box and hot-cell operations are a few of the challenges we're exploring that could benefit workers. However, the technology is designed to reduce the chance of injury, not to increase maximum load or productivity."

Keeping workers safe

While wearable robotic devices are currently commercially available and are being considered for various industrial applications, most are passive without powered electronics, such as Bluetooth or Wi-Fi, said **Javier Ruiz**, R&D engineer. One such device, the Ottobock Shoulder, is a passive device that uses elastic bands to support the forearms in a raised position, taking some load off the shoulders and diverting that weight onto the hips.

"We have procured several of these for evaluation," said Ruiz. "This type of wearable robotic technology, being in direct contact with the body, needs to comply with a variety of requirements to make sure the system is efficient, safe and usable by individuals on a daily basis."

To ensure employee safety, the program has been in lockstep with the Lab's Occupational Safety and Health Deployed Services (OSH-DS) ergonomists and industrial hygiene and safety professionals in their assessment of the technologies. Any data and feedback collected at the Lab or by any of the teams is shared to help inform investigations by other teams currently involved in research and development.

"We are working to identify groups to test devices and provide feedback on their experiences and would encourage interested groups to reach out to us. We also want to maintain disciplined operations in identifying tasks and the specific devices that work well to assist with those tasks."