

## Vanderbilt's Exosuit Reduces Strain For Workers

Vanderbilt University



Back pain is a leading cause of disability and missed work around the world, with physically demanding jobs placing workers at an increased risk of injury. In response, a team of researchers at Vanderbilt University invented a wearable solution that helps workers perform their jobs more safely.

The commercialized device, called the HeroWear Apex 2, is a textile-based exosuit that reduces strain on the back during bending and lifting work.

Lab and field studies confirmed the exosuit reduces low back (erector spinae) muscle activity and fatigue, typically by around 20-40%, demonstrating both immediate relief and enhanced endurance across repetitive lifting tasks.

Developed by a research team led by Karl Zelik, Associate Professor of Mechanical Engineering at Vanderbilt, and commercialized by Vanderbilt spin-off company HeroWear, the Apex 2 draws on biomechanics research and human-centered design to support users while preserving freedom of movement. Unlike traditional exoskeletons, which tend to be bulky and rigid, the Apex 2 is lightweight and comfortable to wear throughout a full work shift.

Vanderbilt's Center for Technology Transfer and Commercialization (CTTC) was instrumental in translating the research into a commercial product. CTTC filed and managed intellectual property related to the exosuit, helped form a startup company around the technology and negotiated key license agreements to bring the device to market.

"CTTC helped ensure the technology was protected, launched a startup, and enabled early collaborations with the U.S. Department of Defense and other major partners," said Alan Bentley, Assistant Vice Chancellor for Technology Transfer.

The startup, HeroWear, was founded in 2019 to commercialize the Apex 2 exosuit. Since then, the company has been growing year over year and has deployed these exosuits to thousands of workers in manufacturing, logistics, and defense organizations across the U.S and globally. HeroWear customers range from global Fortune 50 manufacturing companies, to large global logistics firms, down to five-person retail shops. The technology has been deployed to support workers at organizations such as Rust-Oleum, Boeing, Americold, and the Royal Australian Air Force. Several organizations have been deploying exosuits at scale for years, with data showing significant reductions in long-term injury rates.

The research was supported by the National Science Foundation, the National Institutes of Health, the Department of Defense and the National Institute for Occupational Safety and Health.

HeroWear and the Apex 2 exosuit have received regional and national recognitions. In 2024 alone it received an Inc. Best in Business Award, a Safety Innovation Challenge Award from the National Safety Council, and a NEXT Startup of the Year Award from the Nashville Entrepreneur Center.

The exosuit's success shows how university research and effective technology transfer can lead to real-world innovations that protect workers, improve health outcomes, and reduce economic costs for employers. HeroWear's story is a compelling example of academic innovation addressing widespread occupational health challenges.

This story was originally published in 2026.

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