Lifting The Burden: How A Virginia Tech Invention Is Changing The Workplace

Virginia Tech

In 2016, the Bureau of Labor Statistics reported that nearly 300 out of every 10,000 workers experienced job-related injuries due to lifting materials. Back injuries were the most common, accounting for about 20% of these cases. To address this, Alan Asbek, a faculty member in the Department of Mechanical Engineering at Virginia Tech, developed a groundbreaking wearable device designed to reduce strain on the back during lifting.

Asbek, an expert in wearable robotics and movement biomechanics, led the development of the back exoskeleton in 2017. The design features lightweight beams that run from the waist to the shoulders and down the backs of the thighs, all secured by a backpack-style harness. The exoskeleton is fully mechanical—there are no batteries or motors involved. Instead, it uses the tension created when the beams bend to assist with lifting, minimizing wear and tear on both the user and the device.

This exoskeleton helps ease tasks that involve repetitive bending and lifting—loading trucks, shelving inventory, delivering packages, harvesting crops, or moving patients. In addition to reducing fatigue and making physical labor more sustainable, research from the Asbek lab has shown the device lowers lumbar spinal compression, potentially decreasing the risk of injury for workers.

The invention caught the eye of a large corporation, prompting Virginia Tech Intellectual Properties (VTIP) to work with the university's sponsored programs office to license the technology. The deal brought in much-needed funding for continued development, but it came with highly restrictive terms—especially around intellectual property (IP). Despite VTIP's caution, the lab proceeded, hoping the partnership would help advance the technology.

With the grant support, the Asbek lab developed new iterations of the device under the title "Designs for Exoskeletons to Assist with Lifting and Methods of Monitoring Worker Posture During Lifting." However, when the corporation eventually shifted its focus away from the project, the IP—both the originally licensed and newly developed—remained inactive and tied up due to the agreement's conditions.

In 2020, two former members of the Asbek lab founded a startup called Maroon Assistive and approached VTIP to license the exoskeleton technology. VTIP collaborated with them to track down the necessary parties at the original corporation (many of whom had moved on) and formally terminate the previous licenses. This allowed VTIP to issue a new exclusive commercialization license to the startup. ""This was the first license I negotiated on behalf of VTIP, and it remains one of the more gratifying, said Rozzy Finn, VTIP Licensing Officer. "We put in a lot of effort to get the deal

done, and I'm so glad we did. It's been a pleasure working with the Element Exo team, and I look forward to seeing them continue to make a real-world impact."

Following market research, Maroon Assistive rebranded as Element Exo and has since successfully brought the exoskeleton to market, turning a once-stalled innovation into a tool making a real-world impact.

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