Docket #: S21-430

A wearable approach for optimizing exoskeletons

Researchers at Stanford University present a wearable method for personalizing wearable exoskeletons that may substantially improve mobility in patients. Historically, patients have selected wearable exoskeletons via trial-and-error, and current methods for customizing exoskeletons are costly and time-consuming relative to the presented invention. The approach uses a machine learning model and wearable sensors to evaluate the energy costs of exoskeleton assistance conditions involving whole-body coordination. The inventors demonstrate that for a prototype of ankle exoskeleton assistance, the data-driven optimized approach reduced energy consumption in walking across different speeds and inclines in a statistical comparison with existing methods. The presented method used to uncover the relationship between kinematics and energy costs may additionally extend to other assistive devices.

Stage of Development
Prototype of an ankle exoskeleton

Applications

- Personalized exoskeleton devices for individuals with mobility challenges

Advantages

- Exoskeletons improve mobility and enable patients to save energy during physical activity
- Current approaches to customize exoskeletons are currently more time-intensive and expensive compared to the presented method

Publications

- Slade, P., Kochenderfer, M.J., Delp, S.L. et al. Personalizing exoskeleton assistance while walking in the real world. *Nature* 610, 277–282 (2022).
- Kubota, Taylor, "Stanford exoskeleton walks out into the real world" in *Stanford News* 2022
- Paul, Andrew, "These robotic exoskeleton boots will make you feel 30 pounds lighter" in *Popular Science* 2022

Innovators

- Patrick Slade
- Steven Collins

Licensing Contact

David Mallin

Licensing Manager, Physical Sciences

Email