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Optimising robotic exoskeletons to help people walk

Being able to walk with the aid of a robotic exoskeleton was once the preserve of sci-fi films. Recently, though, these wearable robots have started appearing in medical settings, helping to restore the mobility of people who have difficulty walking, whether through illness, injury or disability.

However, walking is a complex task, and exoskeletons, which use motorised joints to replicate human motion, do not always deliver a substantial reduction in effort. A project at the University of Edinburgh, funded by the Turing and Honda, is aiming to improve their efficiency. The researchers have developed an exoskeleton controller that uses a computer model of the human musculoskeletal system to **estimate the wearer's energy levels in real time**, allowing the controller to adjust the exoskeleton's response and reduce the wearer's exertion.

The team is now expanding this work to accommodate a second person interacting with the exoskeleton wearer. This scenario is relevant to care homes, for instance, where the wearer might be assisted by a human carer as they walk or stand up. Or in a factory, someone might wear an exoskeleton to help with a heavy-lifting task that also involves another worker. The researchers' new exoskeleton controller will adapt not just to the wearer, but also to the other person's assistance.

All of this research will help to make exoskeletons more useful in real-world settings. Eventually, perhaps we will be using exoskeletons in the way that people now use electric bikes, counting on them to give us a motorised boost when the going gets tough.

“Exoskeletons hold great promise in restoring people’s mobility. Our work is helping to take this research from the lab into the real world.”



Sethu Vijayakumar

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