

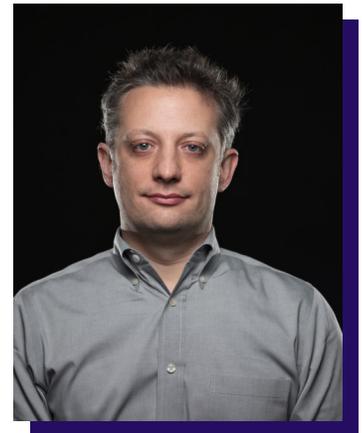
Rehabilitation Engineering

**Spinal cord stimulation to restore sensation
and reduce phantom limb pain after limb amputation**

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Lee Fisher is an Associate Professor in the Departments of Physical Medicine & Rehabilitation and Bioengineering at the University of Pittsburgh and Director of Education for the Rehab Neural Engineering Labs. Dr. Fisher received his PhD in Biomedical Engineering from Case Western Reserve University, where his research focused on the use of electrical stimulation to restore standing after spinal cord injury. He was a post-doctoral scholar at the University of Pittsburgh before joining the faculty in 2013. Dr. Fisher was the 2021 recipient of the North American Neuromodulation Society's Kumar New Investigator Award for his research focused on sensory restoration in people with limb amputation. He is a Senior Member of IEEE and Associate Editor of the IEEE Transactions on Neural Systems and Rehabilitation Engineering and Guest Editor of Frontiers in Pain Research.

ABSTRACT

Despite important advances in the design of prosthetic devices, loss of a limb causes major challenges that often limit participation in activities of daily living. For people with upper-limb amputation, prosthetic adoption rates remain poor and device control is often unintuitive. Those with lower-limb amputation experience impaired balance control, abnormal gait, and an increased rate of falls. Across both groups, upwards of 85% of people also experience debilitating phantom limb pain. All these problems can be attributed, in part, to the loss of sensory feedback from the limb after amputation. In this talk, I will present our research efforts focused on development of devices to stimulate the spinal cord to restore sensory feedback in people with limb amputation. Using devices that are currently implanted in over 50,000 people every year to treat chronic pain, we have demonstrated that spinal cord stimulation can evoke sensations in the missing limb to improve control of prosthetic limbs and reduce phantom limb pain in people with both upper- and lower-limb amputation

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321 MacNider UNC & ECU