

The Future of Wearable Neurotechnology: A Study on Neurostimulation Suits

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Abstract: *This report provides a comprehensive literature review and comparative analysis of wearable neurotechnology, with a specific focus on neurostimulation suits. The study examines the historical trajectory of the field, analyzes the core principles and clinical applications of current devices, and critically evaluates the primary challenges to their widespread adoption. By synthesizing data from academic research, clinical trials, and industry reports, the report projects the future of the field, highlighting the transformative role of artificial intelligence, advanced materials, and closed loop systems. Key findings indicate that wearable neurostimulation is evolving from simple, open loop devices to intelligent, multi modal systems capable of delivering personalized, real time therapy. Leading examples, such as the Exopulse Mollie Suit for spasticity and the CUE Device for Parkinson's disease, demonstrate clinical efficacy, albeit with highly individualized outcomes. The analysis reveals that the most significant barriers to adoption are not solely technical, but rather economic, regulatory, and ethical. High device costs, a fragmented reimbursement landscape, and the absence of harmonized regulatory frameworks pose substantial hurdles. Furthermore, the increasing use of these technologies for human enhancement, beyond their therapeutic applications, raises profound questions concerning data privacy, equitable access, and cognitive liberty. The future of this market is poised for significant growth, driven by a convergence of AI, the Internet of Things (IoT), and continued miniaturization. For this potential to be fully realized, a concerted effort is required to address current research gaps, streamline regulatory pathways, and establish robust ethical governance*

Keywords: Closed Loop Systems, Adaptive Deep Brain Stimulation (aDBS), Neural Decoding, Multivariate Classifiers, Generative AI, Internet of Things (IoT)

