BioBolt

TECHNOLOGY NUMBER: 4265

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Category
Medical Devices
Engineering & Physical Sciences
Semiconductor, MEMS, and Electronics

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OVERVIEW

Minimally invasive device for monitoring intracranial neural activity wirelessly

- Provides long-term monitoring with less tissue reaction and infection risk
- Applications include brain behavior studies, neural disorder diagnostics, and brain-computer interfaces

BACKGROUND

Neural activity interface systems are essential for accessing and monitoring brain activities, either at the level of single neurons (action potentials or spikes) or ensembles of neurons. This capability facilitates a better understanding and prediction of neuronal behavior. Traditional implanted neural probes, used to monitor single-neuron activities, pose significant challenges for long-term use due to foreign body reactions from surrounding tissue, which leads to signal degradation. Alternative methods, such as electroencephalography (EEG) and electrocochleography (ECoG), exhibit less tissue reaction, allowing for relatively long-term monitoring, but they lack the spatial resolution required to monitor activity at the single-neuron level. Consequently, the need exists for an improved neural interface system that can provide high-resolution monitoring over an extended period without causing significant tissue damage or signal degradation.

INNOVATION

Researchers at the University of Michigan have developed a minimally invasive neural interface device capable of long-term intracranial neural activity monitoring. This innovative device avoids penetration of the dura mater, reducing the risk of tissue reaction and infection. Wireless communication is employed for efficient transmission of neural activities, and the device design supports full implantation within the cranium, eliminating the need for craniotomy procedures typically required for electrode implantation. This approach not only enhances the safety and simplicity of implantation procedures but also enables long-term telemetry schemes. Potential applications include studying brain behavior, diagnosing neural disorders, and developing brain-computer interfaces. The device's minimally invasive nature combined with its wireless capabilities represents a significant advancement over current neural monitoring technologies.

ADDITIONAL INFORMATION

REFERENCES:

S. -I. Chang, K. AlAshmouny, M. McCormick, Y. -C. Chen and E. Yoon, "BioBolt: A minimally-invasive neural interface for wireless epidural recording by intra-skin communication," 2011 Symposium on VLSI Circuits - Digest of Technical Papers, Kyoto, Japan, 2011, pp. 146-147

INTELLECTUAL PROPERTY:

US9854987 "Distributed, minimally-invasive neural interface for wireless epidural recording"