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Recording Channels for Biopotential Signals

Bidirectional Brain-Computer Interface research is limited by the need for device architectures thar can facilitate scientific inquiry into human brain function. This technology offers a digital register to record channels in combination with techniques to enable a multiplexing Bidirectional Brain-Computer interface.

What is the Problem?

Bidirectional Brain-Computer Interfaces generally refer to electronic systems that may allow computers to simultaneously record, process, and stimulate neural activity. These systems may facilitate scientific inquiry into human brain function and are ushering in a new era of neuro prosthetics. These advances have the potential to enable new treatments for a number of neurological disorders including Parkinson's Disease, epilepsy, and depression. Simultaneously, Bidirectional Brain-Computer Interface research continues to drive progress in the field of human-computer interaction. However, there is a need for device architectures that enable this technology, as current multiple feedback capacitors have a large footprint.

What is the Solution?

The solution is a digital feedback architecture that makes it possible to multiplex many channels by using a digital register instead of multiple feedback capacitors. Multiplexing the entire front end across many electrodes can reduce the area footprint by a factor >>10. This is a method of recording channels and biopotential signal acquisition and recording. The recording channels implement a combination of techniques, including multiplexing of multiple electrode inputs, delta encoding of biopotential signals, and common mode suppression.

What is the Competitive Advantage?

Existing solutions lack the device architecture to enable Bidirectional Brain-Computer interface, such as multiple feedback capacitors, which have a large footprint, leading to suboptimal designs. This technology will eliminate the use of multiple feedback capacitors by using a digital register to multiplex many channels. This digital feedback architecture can significantly reduce the area footprint.

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