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Licensing Opportunity

TTO – Technology Transfer Office

closed loop neuromodulation SoC for high density sensing and stimulation

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Keywords

Closed loop neuromodulation, electrode array, System on chip (SoC), energy efficient

Intellectual Property

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Publications

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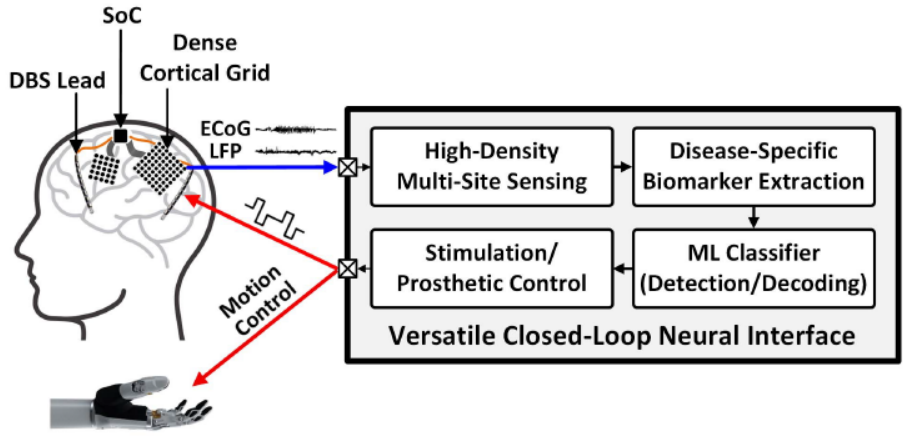

The SoC enables an energy efficient, highly versatile neural interface platform for sensing and stimulation integrating a large number of channels (tested at 256 channels) and enhanced with on-chip machine learning (using multi-symptom biomarker extraction and a multi-class tree-structured neural network (NeuralTree) classifier).

Description

Closed-loop brain stimulation systems driven by system-on-chip (SoC) devices with machine learning capabilities hold great promises to treat neurological disorders and injuries. The current SoC devices with integrated machine learning are limited by the number of channels that can be used to acquire high resolution neural activity from electrode arrays, as well as their energy efficiency to acquire and classify the neural signal.

The proposed technology provides a highly scalable SoC for closed loop neuromodulation (exemplified with a 256 channels analog front-end device) enhanced by an energy efficient machine learning classifier for detecting disease symptoms.

Advantages

The SoC technology allows to select and read highly multiplexed electrode array channels and therefore to target larger neural tissue area with a high-spatial-resolution. The machine learning capacity integrated in the SoC is energy efficient and scalable. It enables accurate detection and classification of disease biomarkers to adapt the stimulation in a closed loop neuromodulation system.

Applications

- Neural disorder therapy e.g. epilepsy, Parkinson's disease, essential tremor.
- Brain machine interfaces (BMI)
- Motor intention decoding for BMI prosthetics
- Spinal cord and peripheral interfaces
- Mental disorders such as depression and OCD