Cleveland Clinic Innovations

Addressable Electrode Interface for Biomedical Recordings

Jorge A. Gonzalez-Martinez, John T. Gale, Imad Najm

PRODUCT

Automated electrode identification system for biomedical procedures and patient monitoring using microelectronic circuits that inform the recording system of each electrode's identity.

INDICATIONS

Intracranial electrode arrays, ECoG, EEG, EMG, ECG

VALUE PROPOSITION

- Tracks labels automatically for hundreds of electrode channels.
- Provides real-time electrode connectivity status.
- Reduces surgical preparation and monitoring setup time.
- Eliminates incorrect electrode connections.

DEVELOPMENT STAGE

Proof of concept established.

INTELLECTUAL PROPERTY

- US: 9813078B2

CONTACT INFORMATION

Partha Paul, PhD, MBA
Director, Business Development & Licensing
Paulp2@ccf.org
216-672-1664

IDF: 2015-108

UNMET NEED

The neurodiagnostic market is primarily driven by the growing prevalence of various neurological disorders. Advances in electrode engineering and microelectronics have made it possible to simultaneously record from hundreds of electrodes, such as EMG, EEG, cortical and depth micro arrays, intracranial ECoG or intracranial SEEG, either alone or in combination. Currently there is no automated system to identify SEEG microelectrode channels when registering to a data collection system. This is done manually by technicians, and it causes various neuro-mapping errors that can impair patients and increases monitoring and surgical preparation time. Global EEG and EMG devices market in 2024 is expected to grow to USD 740.48 million with a CAGR over 8%. Additionally, brain computer interface market is projected to reach USD 506 million by 2029.

SOLUTION

An automated method to ensure electrode connections map correctly to data acquisition used for surgical planning. The solution proposes a system that embeds microcircuits storing unique IDs in electrodes. The acquisition system detects IDs automatically, tracking connectivity and mapping without risk of human error. Nurses and technicians save time, enhance accuracy, and improve patient outcomes. The micro-circuit on the electrode will transmit the pulse while the acquisition system will decode and automatically label the channels. In addition, the acquisition system will be able to change the labels that are stored on the micro-circuitry using a computer interface.

- Setup time reduced by 30% and reduced risk of infection.
- Real-time status dashboards enable teams to coordinate smoothly.
- Decreased rates of misplacement in ICU/emergency setting.
- Increased number of procedures and additional electrodes possible for finer resolution of data.