(SD2022-122) Unsupervised channel compression method for low power neural prostheses

Tech ID: 32893 / UC Case 2021-Z08-1

BACKGROUND

Brain machine interfaces (BMIs) have the potential to help individuals with functional impairments, such as loss of motor control, due to neurological disease or spinal cord injury. BMIs map brain signals acquired in relevant brain regions to patient intent to enable functional restoration. In previous studies, BMIs have enabled patients to control robotic arm movements, and type by translating brain signals directly into text. Intracortical BMIs record and sample brain signals from relevant regions of the brain at rates high enough to process both local field potentials (LFP) and action potentials (spikes).

The development of high performance brain machine interfaces (BMIs) requires scaling recording channel count to enable simultaneous recording from large populations of neurons. Unfortunately, proposed implantable neural interfaces have power requirements that scale linearly with channel count.

TECHNOLOGY DESCRIPTION

Researchers from UC San Diego have invented a method for reducing the number of neural channels transmitted by a neural prosthesis while retaining functionally relevant performance of the prosthesis. This reduction in channel count is unsupervised in nature, which is an important feature of the system. This means that this compression in transmitted channels can be achieved without feedback from downstream application specific modules of the prosthesis. This would allow a full implanted component of the the prosthesis to automatically compress the output channels without application specific feedback.

APPLICATIONS

Future neural prostheses systems.

ADVANTAGES

The power-efficiency gains of this invention may enable the development of clinically viable, fully implantable neural interfaces with increased application-specific performance, such as more accurate and robust functional motor restoration.

The invention facilitate a more power-efficient system design for fully implanted neural prostheses without compromising system performance. It also allows for a reduction in bandwidth requirements for data telemetry. Both power and bandwidth are critical aspects of implanted neural prostheses as heating effects

CONTACT
Skip Cynar
scynar@ucsd.edu
tel: 858-822-2672.

OTHER INFORMATION

KEYWORDS
Neural interface, brain machine interface, neural prosthesis

CATEGORIZED AS
- Medical
  - Devices
  - Rehabilitation
- Engineering
  - Other

RELATED CASES
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must be limited to ensure biocompatibility and tissue properties limit data telemetry options.

STATE OF DEVELOPMENT

INTELLECTUAL PROPERTY INFO

UC San Diego is seeking companies interesting in pursuing commercialization of this patent-pending technology.

PCT patent application pending: https://patents.google.com/patent/WO2023069968A1/en?oq=US2022%2f078328

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(54) Title: MULTI CHANNEL DATA AGGREGATION BASED DATA COMPRESSION

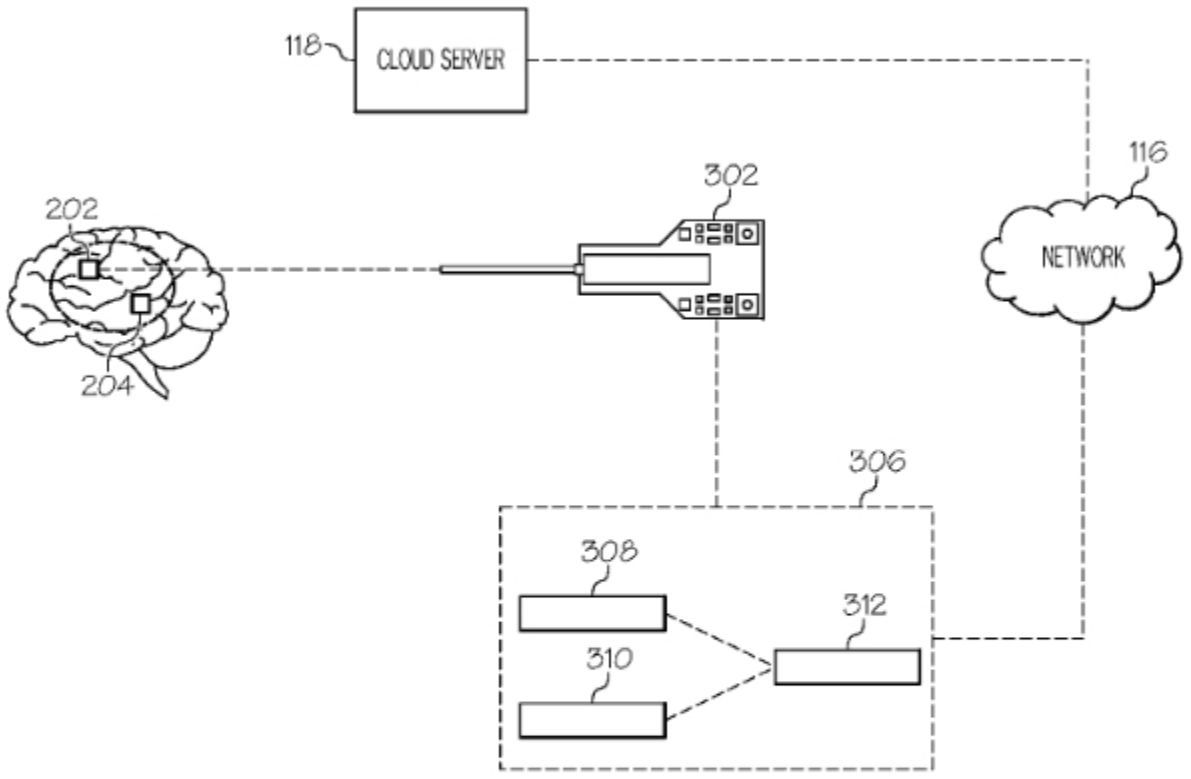

FIG. 3

(57) Abstract: In some embodiments, there is provided a system, which comprises at least one computer that is communicatively coupled with at least one sensor. The at least one sensor is embedded in a brain and configured to detect a plurality of activity data associated with neurons of the brain, implement a compression algorithm on the plurality of activity data by comparing a first entropy value associated with a first set of data points of the plurality of activity data with a second entropy value associated with a second set of data points of the plurality of activity data, and combining the first set of data points responsive to determining that the first entropy value is lower than the second entropy value, and transmit the combination of the first set of data points to the at least one computer.

RELATED MATERIALS

- Description: pub: Alothman A, Gilja V. Unsupervised Channel Compression Methods in Motor Prostheses Design. Annu Int Conf IEEE Eng Med Biol Soc. 2021 Nov;2021:6581-6585. See: https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=9630343 - 11/01/2021

University of California, San Diego
Office of Innovation and Commercialization
9500 Gilman Drive, MC 0910, ,
La Jolla,CA 92093-0910

Tel: 858.534.5815
innovation@ucsd.edu
https://innovation.ucsd.edu
Fax: 858.534.7345