(SD2024-124) Predicting neural activity at depth from surface using multimodal experiments and machine learning models

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ABSTRACT
Researchers from UC San Diego’s Neuroelectronic Lab (https://neuroelectronics.ucsd.edu/) demonstrate that they can predict neural activity at deeper layers of the brain by only recording potentials from brain surface. This was achieved by performing multimodal experiments with an ultra-high density transparent graphene electrode technology and developing neural network methods to learn nonlinear dynamic between different modalities. They used cross modality inference to predict the activity at deep layers from surface. Prediction of neural activity at depth have the potential to open up new possibilities for developing minimally invasive neural prosthetics or targeted treatments for various neurological disorders.

TECHNOLOGY DESCRIPTION
When combined together (namely Non-invasive recordings of neural activity at depth through cross modality inference) this newly disclosed technology may have the potential to extend the lifetime of neural implants and improve the longevity of brain-computer interface (BCI) technologies, which could pave the way for medical translation.

Non-invasive recordings of neural activity at depth have the potential to open up new possibilities for developing minimally invasive neural prosthetics or targeted treatments for various neurological disorders.

APPLICATIONS
brain computer interfaces, medical diagnostics, imaging

ADVANTAGES
(1) transparent graphene electrodes,
(2) multimodal experiments, and
(3) computational methods to analyze neural data to demonstrate the prediction of cellular activity at depth.
calcium activity at depth from surface potentials.

STATE OF DEVELOPMENT

**a**

**b**

**c**

**d**

**e**

INTELLECTUAL PROPERTY INFO

UC San Diego is securing patent rights on this invention and such rights are licensable for further commercial development.

RELATED MATERIALS

▶ Transparent Brain Implant Can Read Deep Neural Activity From the Surface (News Release. January 11, 2024)