Skysong Innovations
Advancing the Arizona State University Knowledge Enterprise

1475 N. Scottsdale Road, Suite 200
Scottsdale, AZ 85287-3538
Phone: 480 884 1996 Fax: 480 884 1984

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Inventors

Junseok Chae
Alfredo Quinones-Hinojosa
Tito Vivas-Buitrago
Shiyi Liu

Contact

Jovan Heusser
jovan.heusser@skysonginnovations.com

Improved Electrocorticography Array Designs

Electrocorticography (ECoG) arrays are clinically useful in monitoring and recording electrical activity from the cerebral cortex either during surgery or prior to surgery for localizing surgical sites, such as epileptic foci. In terms of recording neural activity, ECoG has much greater spatial specificity than other techniques because it eliminates scalp and skin interference. However, ECoG arrays don't allow for simultaneous recording and stimulation, making functional mapping difficult. Additionally, the design of existing ECoG arrays is suboptimal; the use of rigid materials makes it difficult to cover the contours of the cortex and wires required to transmit neural signals make placement arduous and can be an impediment to the neurosurgeon.

Researchers at Arizona State University in conjunction with collaborators at the Mayo Clinic have developed novel ECoG array designs that enable simultaneous signal acquisition and stimulation as well as wireless data transmission. The arrays are able to stimulate multiple sites concurrently and/or independently. Because data is transmitted wirelessly, the need for wires is eliminated, making placement of the array much easier. Further, the flexible nature of the array allows it to better cover the contours of the cortex and effectively collect neural signals over a large area.

These superior ECoG array designs overcome the limitations of existing arrays and significantly increase their functionality and utility in many neural applications, as well as reduction of intraoperative times that ultimately translate in better outcomes and decreased costs.

Potential Applications

- Brain surgery
  - Tumor/epileptic foci resection
- Brain mapping/research
- Sports medicine (traumatic brain injuries)
- Brain computer interfaces
- Diagnose, assess and monitor certain neuro-otologic disorders

Benefits and Advantages

- Flexible – provides better coverage of the contour surface of the cortex
- Enables simultaneous recording and stimulation
- Allows recording of cortical and subcortical electrical activity while simultaneously performing a surgical procedure
- Wireless signal transmission – eliminates the need for wires
- Greater number of active electrodes to allow concurrent or independent stimulation of multiple sites

For more information about this opportunity, please see

Kwaku - Undergraduate Research Abstract - 2019

For more information about the inventor(s) and their research, please see

Dr. Chae's departmental webpage

Dr. Quinones-Hinojosa's Mayo Clinic Profile