Fully Automated Localization Of EEG Electrodes

Tech ID: 27512 / UC Case 2012-529-0

SUMMARY

UCLA researchers have developed an algorithm for precisely locating EEG electrodes with respect to the patient's brain.

BACKGROUND

Electroencephalography (EEG) measures brain activity by recording electrical activity via electrodes placed on the scalp, and it is used both clinically and in research. EEG measurements made from the scalp originate from sources deep in the brain, but it is difficult to determine the location of these sources with respect to the electrodes placed on the scalp. Currently, the EEG electrodes are precisely placed according to landmark features on the head like the nose or the ear, but the position of brain features with respect to these chronological features can vary considerably between patients. Knowing where electrical activity in the brain originates will help clinical applications (treating epilepsy), as well as research to understand brain behavior more precisely.

INNOVATION

UCLA researchers have developed an algorithm and implemented it in computer software to precisely locate EEG electrodes from medical images, specifically MRI images. The image analysis software automatically identifies the electrodes' shapes and orients them with respect to the MRI brain images for precise localization. The software algorithms can be adapted to use with other imaging tools, such as computed tomography (CT) or camera-based imaging.

APPLICATIONS

The clinical applications include localization of the onset sites of epileptic seizures, along with many additional uses. The research applications include localization of functional systems in the brain that respond to stimuli and that control behavior.

This invention has many general applications beyond the focus in EEG. It can be used for identifying the location of objects of approximately-known shape from three-dimensional imagery. Example applications might include identification of underwater objects from ultrasonography and detection of body parts from computer-controlled detectors.

ADVANTAGES

- This invention will allow measurement of exact electrode locations in the space of just a few minutes. With computer optimization, this can likely be done in a few seconds.
- The location of the electrodes is identified automatically.

STATE OF DEVELOPMENT

This invention has been fully proven using data collected at UCLA. The algorithms, though not yet optimized, run efficiently in less than one minute. The inventors have plans to further optimize the algorithms and improve robustness. They will also try to integrate the algorithms with available EEG source localization package.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,311,598	06/04/2019	2012-529

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OTHER INFORMATION

KEYWORDS

Electroencephalography (EEG), electrodes, automated localization, MRI

CATEGORIZED AS

- **Medical**
  - Devices
  - Disease: Central Nervous System
  - Imaging

RELATED CASES

2012-529-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- A Method For Measuring Cardiac Timing From A Ballistocardiogram

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