LOCALIZATION IMAGING PROCESS FOR IMPROVING NEUROSURGICAL CLINICAL WORKFLOWS

Brunner, Peter, Tan, Gansheng

Weilbaecher, Craig

T-021644

Published date: 1/16/2026

Value Proposition: *Fully automatic and robust process for localization of rigid or semi-rigid Intracerebral electrodes in neurosurgical patients.*

Technology Description

Researchers at Washington University in St. Louis have developed a fully automated, rapid imaging process to localize rigid or semi-rigid intracerebral electrodes (e.g., DBS, SEEG, and ECoG leads) in neurosurgical patients using post-operative CT images. Accurate localization of intracranial electrodes is a foundational step in the clinical workflow for epilepsy monitoring and surgical planning, as it directly informs the identification of seizure onset zones and functionally eloquent cortex. Inaccurate or subjective localization can lead to suboptimal targeting, misinterpretation of electrophysiological data, or increased procedural risk.

This invention can enable linking neural signals to precise anatomical structures and support reproducible, anatomically grounded analyses of intracranial local field potentials. The entire process is designed to be compatible with downstream anatomical mapping (e.g., onto MRI/DTI-derived cortical models) and is implemented in MATLAB, allowing for easy integration into both clinical and research workflows.

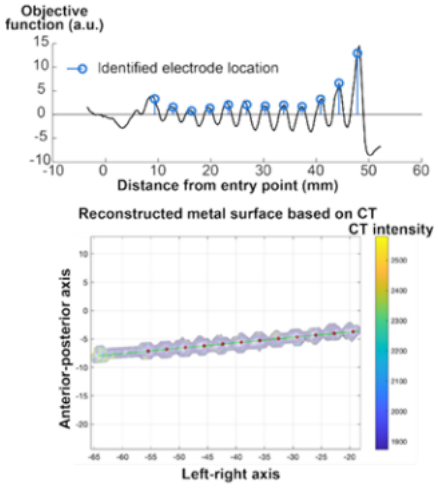

Figure 1. Validation of the identified electrode locations along an electrode array (DIXI MICRODEEP® SEEG Electrodes)

Stage of Research

This technology is implemented as a MATLAB codebase and has been tested on DIXI electrodes. It has

been tested on DIXI electrodes, including MICRODEEP® micro-macro configurations, with support for inactive macro contacts, and is ready for integration and further validation in clinical settings.

Applications

- Imaging to localize rigid or semi-rigid intracerebral electrodes

Key Advantages

- Eliminates the need for human labeling or manual input of distal contact coordinates
- Overcomes CT noise and metal-induced scattering
- Constrains candidate voxels to a stereotactic path, unlike methods that search for connected voxels, increasing specificity
- Uses a known geometry to detect electrodes even when contacts are not individually visible

Patents
Patent application filed

Related Web Links – Peter Brunner Profile