Washington University in St. Louis
Office of Technology Management

SOFTWARE USED TO DETECT NEURAL OSCILLATIONS IN THE TIME-FREQUENCY SPACE

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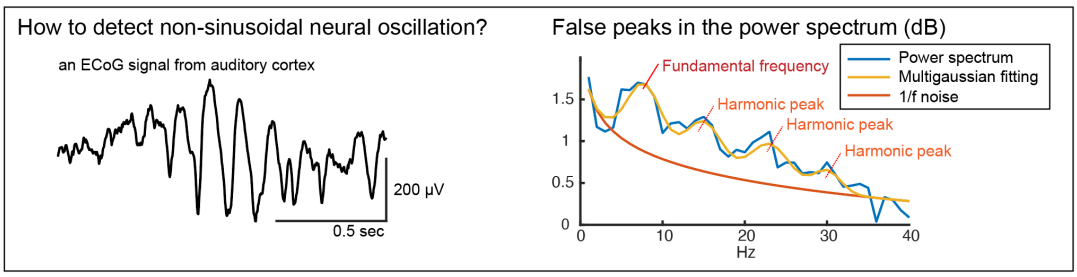
T-020025

Technology Description

Researchers at Washington University in St. Louis have developed a software method that demonstrates high precision and specificity in detecting neural oscillations in time and frequency domains. Current methods to look at identifying peaks over 1/f noise within the power spectrum only operate within the frequency domain, and thus can neither accurately determine the oscillation's onset/offset time, nor properly distinguish between the fundamental frequency of a non-sinusoidal oscillation and its harmonics.

This method is designed to solve the critical problem of detecting neural oscillations with high specificity by removing 1/f noise in the time-frequency space and determining the initial onset and offset of oscillations, ultimately improving how dynamic brain functions are understood.

Motivation



Stage of Research

Evaluated method by verifying its performance on simulated sinusoidal and non-sinusoidal oscillatory burst convolved with 1/f noise.

Publications

Cho H, Adamek M, Willie JT, Brunner P. Novel Cyclic Homogeneous Oscillation Detection Method for High Accuracy and Specific Characterization of Neural Dynamics. bioRxiv [Preprint]. 2024 Mar.

Applications

- Brainwave based monitoring for depth of anesthesia
- Brain-computer interfaces
- Monitoring of mental fatigue level

Key Advantages

- Demonstrates high precision and specificity in detecting neural oscillations in time and frequency domains

- Yields the onset, offset, center frequency, frequency range, number of cycles and degree of asymmetry for each detected oscillation

Patents

Patent application filed

Related Web Links – Peter Brunner profile**;** Brunner lab