Contribution ID: **97** Type: **Poster**

Classification of Finger Movements Using OPM-Based MEG for Brain-Machine Interfaces

Thursday 7 August 2025 17:10 (5 minutes)

Recently, Meta Platforms, Inc. reported that brain-machine interfaces (BMIs) based on magnetoencephalography (MEG) can achieve higher accuracy than those based on electroencephalography (EEG)[1]. Optically pumped magnetometers (OPMs), which have been actively developed for miniaturization and shield-free measurements, offer a promising noninvasive sensing solution for BMIs. In this study, we investigated whether hand movement tasks could be classified using MEG signals measured with OPM modules, with the goal of advancing BMI applications. A participant performed flexion and extension of either the thumb or the little finger inside a magnetic shield while MEG signals were recorded from sensors placed on the scalp. Simultaneously, myomagnetic signals were recorded from sensors on the forearm to determine movement onset. Independent component analysis was applied to extract brain-related components, followed by frequency analysis and principal component analysis (PCA), from which the first two principal components were used. Figure 1 shows the results of linear classification using a support vector machine (SVM), achieving a classification accuracy of approximately 67% for the two motor tasks. Future work will focus on improving classification performance by optimizing sensor position, increasing the number of sensors, and refining signal processing methods to enable classification of a broader range of tasks.

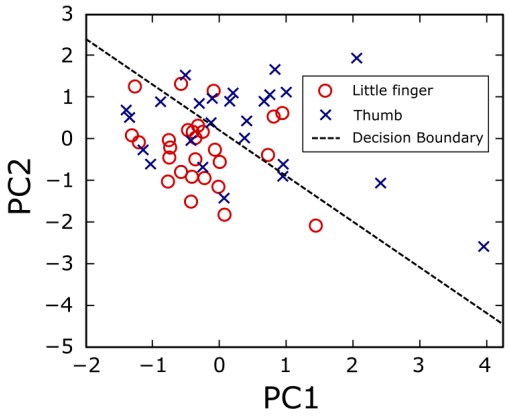

Figure 1: Classification of finger Movements by SVM.

Reference

[1] Brain-to-Text Decoding: A Non-invasive Approach via Typing,
https://ai.meta.com/research/publications/brain-to-text-decoding-a-non-invasive-approach-via-typing/

Author: ITO, Yosuke (Kyoto University)

Co-authors: Mr YAMASHITA, Kantoh (Kyoto University); UEMATSU, Kuga (Kyoto University)

Presenter: ITO, Yosuke (Kyoto University)

Session Classification: Poster Session and Buffet