

THE PROBLEM ADDRESSED

Cognitive Impairments are difficult to be precisely diagnosed. Current treatments cannot heal or revert the cognitive decline. Identifying them as early as possible is crucial to preserve the patients' quality of life.

Electroencephalogram (EEG) is a non-invasive and cost-effective neuroimaging technique, which can help diagnose and even predict cognitive impairments. However, existing software are designed for users with advanced programming skills and unsuitable for routine clinical practice. This project automates EEG signals' analysis and provide a practical all-in-one toolbox fitted for clinical settings.

ARMEDIA is a multidisciplinary team from SAMOVAR lab, focusing on **biomedical data processing and analysis**. The team leading the EEGCap project have been specializing on EEG data for more than 10 years.

TECHNOLOGY

- The developed software automates resting-state EEG analysis based on feature extraction with various EEG markers, feature selection and data fusion (With configurable electrode locations, frequency bands and topological scales).

- The software has been validated for differentiation between patients with **Subjective Impairments** (SCI), **Alzheimer Disease** (AD) and **Mild Cognitive Impairments** (MCI).

COMPETITIVE ADVANTAGES

- Tool's features selected in collaboration with clinicians from **La Pitié Salpêtrière** and **Charles-Foix hospitals**
- Friendly user-interfaces. UX oriented design easily transforms raw EEG into useful data for neuro-medical diagnostics.
- EEG is a lot cheaper and more accessible than fMRI: it would permit large population monitoring

APPLICATIONS

- Detection of cognitive impairments and neurological diseases
- Quantify the impact of cognitive rehabilitation (for example neurofeedback therapies)
- Training and gaming control using wearable EEG-based Brain Computer Interfaces (BCI)

DEVELOPMENT STATUS

- TRL3: system validated offline on clinical data
- The team can provide expertise on automating EEG signals' analysis for technical applications (clinical or other) and for tools accessible to novice users

INTELLECTUAL PROPERTY

Patent Application (EP3925520) filed the 16/06/2020

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PUBLICATIONS

- Abazid et al. *Weighted Brain Network Analysis on Different Stages of Clinical Cognitive Decline*. *Bioengineering*, 9(2), 2022
- Abazid et al. *A comparative study of functional connectivity measures for brain network analysis in the context of AD detection with EEG*. *Entropy*, 23(11), 2021

LOOKING FOR

- Expanding to new use cases
- Co-development partners