

ABSTRACT

Neuroscience practitioners face challenges due to limited medical equipment for analyzing Electroencephalography (EEG) recordings, which can hinder the effectiveness of patient diagnosis and treatment. While open-source software is available, technical barriers, usability issues, and language obstacles often hinder its adoption. This study aims to develop a user-friendly desktop application for EEG recording mapping and analysis. The development process follows the Design Thinking (DT) methodology, comprising five stages: empathy, define, ideate, prototype, and test. The QtEEG-MAP application was developed using the latest version of the Qt framework, enabling the creation of an intuitive user interface for cross-platform desktop applications. The application supports processing raw EEG data in .csv, .txt, .edf, .bdf, and .mat formats and features preprocessing with band-pass filtering, transformation using Fast Fourier Transform (FFT), feature extraction using Fast Independent Component Analysis (FastICA) and Principal Component Analysis (PCA), scrollable data mapping on 16 electrode channels in time and frequency domains, spectrum mapping and topoplots, frequency sub-band separation, spike detection and sorting, and clustering with K-Means algorithm. Usability testing using the System Usability Scale (SUS) indicates good usability, with scores of 80.17 for novice users and 70.67 for experienced users. Functional testing through User Acceptance Testing (UAT) demonstrates good performance for experienced users with a score of 77.5% and excellent performance for novice users with a score of 82.7%.

Keyword : Desktop Applications, Signal Processing, EEG, Design Thinking, SUS, UAT