

Prototypes of software portal and stimulation device for electrophysiological research



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This abstract focuses on recent conceptual improvements of two software and hardware prototypes that can be easily integrated into various electrophysiological laboratory systems: the EEG/ERP Portal (EEGbase) and a stimulation device for cognitive research. The EEG/ERP Portal is a web based application for long-term storage, management, processing and sharing of electrophysiological data. It was designed and developed using robust open source technologies and semantic web resources to ensure future extensibility of the application and sustainability of stored data/metadata. The Portal suffered from low flexibility with respect to the scope of the electrophysiological domain and covered a small number of laboratory needs in terms of the variety of stored metadata and customization of the user interface. As a solution, we left the idea of using high level concepts of the Semantic Web and individually applied selected best practices of this approach. This also includes the use of a non-relational database for storing and retrieving metadata. The stimulation device for cognitive research is an ARM based Cortex microcontroller including firmware and optional control software for creating various experiments in which the subject is stimulated by visual and/or auditory stimuli. It works in three modes: 1- sequential stimulation mode in which stimuli are presented sequentially respecting their probability, 2- simultaneous stimulation mode in which stimuli are presented simultaneously with corresponding frequencies, 3- stimulation mode with waiting for pressing a response. Stimulation outputs can be e.g. simple LEDs, LED panels, patterns presented on small LCD displays, simple tones of various frequencies and lengths, or sounds stored in wav files. The stimulator designed for research laboratories is mobile, enables synchronization with recording devices and can be connected to conventional equipment.

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