Open source hardware and software for biomedical measurements

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Abstract

Measurement of biomedical signals (ECG, EMG, EEG etc.) is a complex task. Presentation of its purpose, of the nature of biomedical signals and details about technology of measurement, acquisition and processing is a challenge in education. As the procedures of measuring biomedical signals request preparation of measurement system, and control of measurement conditions, significant support for these activities can be provided by open source software packages for measurement, acquisition and processing of biomedical signals. Measurements can be performed and measurement results can be recorded in database by these packages. Measurements process can be simulated afterwards, relying upon the previous measurement records. This enables more flexibility in diagnostics, research or in teaching the nature of biomedical signals and processing and analysis of measurement results. The mentioned open source software packages often can be used with the instrumentation designed according to open source hardware projects oriented towards biomedical measurements. This enables developing biomedical instrumentation platforms appropriate for more collaboration between engineers, teachers and researchers worldwide in various fields of engineering, medicine, psychology etc. The convenience of this approach can be demonstrated by using various open source hardware and software projects. The author is demonstrating this on one example: an example of the system for measurement and processing, intended for EEG measurements from electrodes positioned on international 10-20 system locations. It is designed as one channel system, with the ability of extending to multichannel system, having in mind its use for current researches in areas of cognitive neurosciences and neurophysiology.

Keywords: measurement; biomedical engineering; open source; hardware; software.

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