Open source data acquisition system for visual electrophysiology

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Purpose:
1. To develop a PC-based data acquisition system for ERG, PERG, EOG and VEP measurements.
2. Construction of a video stimulator from standard PC components.

Methods:
Data acquisition: a software program running under different versions of the Windows operating system (95 - XP) was developed using the C language (Microsoft Visual C). Analog signals were digitized with a 12-bit A/D converter card (PCI-6023E, National Instruments, USA). External devices like programmable amplifier, Ganzfeld stimulator, video stimulator and photometer were controlled through RS232 lines. Due to the limitations of the trigger circuit of the A/D converter card a simple four channel trigger circuit was developed. Images of the electrophysiological signals can be transferred to other applications using the clipboard. Measurement data can also be exported to comma or tab delimited text or enhanced metafiles. Since the program works like other Windows applications (Word, PowerPoint, Photoshop, etc.) with the copy and paste commands. Measurement data can also be transferred to other applications using the clipboard. Measurement data can also be exported to other Windows applications, most of the functions can be controlled with simple menus and dialogs.

Results:
The program supports ERG, PERG, EOG and VEP measurements with pattern reversal, pattern onset-offset, and luminance stimulation. Recording of albino VEPs is also possible. All of the measurements were developed according the ISCEV ERG, VEP and PERG standards. Images of the recorded signals can be transferred to other Windows applications (Word, PowerPoint, Photoshop, etc.) with the copy and paste commands. Measurement data can also be exported to comma or tab delimited text files or enhanced metafiles. Since the program works like other Windows applications, most of the functions can be controlled with simple menus and dialogs.

Conclusions:
A data acquisition system consisting of standard hardware and software components could be developed for ERG, EOG, PERG and VEP measurements at a fraction of the price of a commercial one. Thanks to the modular design, additional hardware, e.g., A/D converter card, amplifier, stimulator, etc. can be supported by writing only one or two functions. Since the source code is available, the programs can be improved without difficulties.

Availability:
In case of interest the source codes of the programs will be available free of charge under the GNU GPL license: http://www.gnu.org/licenses/licenses.html#GPL.

Co-developers are welcome! Requirements for the data acquisition program: knowledge of the C language (Visual C, Microsoft) & Windows programming, requirements for the video stimulator: knowledge of the C language (Microsoft C for DOS 7.0) & DOS programming.

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