

Press Release

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IN THE FOCUS

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Kabellose Erfassung lokaler Feldpotentiale und elektrische Stimulation der Großhirnrinde für medizinische Diagnostik und Neuroprothetik*

by Alexander Svojanovsky, General Manager

What a title for a new project that dovetails with the successful completion of the FaSor project! Currently we are searching for an abbreviation which is easy to remember. For the moment let's focus on the tasks:

Partners working alongside Brain Products include the Bremen Institute of Technology (ZKW, IMSAS, ITEM) and the University of Bonn (Epileptology). A system for use in epilepsy diagnostics and neuroprosthetics will be developed within the next 3 years. Implanted electrode grids send EEG data wirelessly to a receiver (outside the head) where the signals can be analyzed in real-time (spike detection as well as BCI algorithms are planned). Based on the categorized data, feedback is transmitted to the electrodes and electrical stimulation occurs. The whole system is intended to be portable and the power for both the electrodes and the stimuli will be induced externally.

Although the aims are ambitious, all of the partners are confident and highly motivated to succeed in a project that is rich in promise. This project is financed by the BMBF (Federal Ministry of Education and Research) via the DLR (German Aerospace Center). The resulting product will have an enormous impact. More information will be available during the course of the project in our Press Releases and on our official project website.

** wireless acquisition of local fieldpotentials and electrical stimulation of cerebral cortex for medical diagnostics and neuroprosthetics*



Products in Practice

Brain Products goes eXtreme EEG - Recording EEGs in the Nepalese Himalayas

by Pierluigi Castellone, International Sales Manager

Some months ago, Brain Products launched a new project called „eXtreme EEG“. The idea is to support research groups which plan to record EEGs and other neurophysiological data under extreme conditions by providing them with a portable 16-channel research amplifier, an active electrode system, a laptop and web cam for the video EEG recording and, of course, our knowledge and expertise.

The ultimate goal of this project is to find out how far the boundaries of what is possible can be pushed forward and identify potential new areas for EEG research. Among the many proposals we received in a period of just a few weeks, the one submitted by a group of world-famous Hungarian mountaineers, which involved recording EEGs, respiration and blood pulse signals while climbing one of the highest mountains in the Himalayas, appealed to us as an “extremely extreme” and challenging task.

A few discussions with Mr. Koljar Lajos (leader of the expedition) and his team allayed any doubts we might have had and convinced us that we should support the project.

The members of the expedition started their adventure on the 14th of April, departing from Budapest in the direction of Katmandu (Nepal) with two clear objectives in mind: To climb Mount ...

Manaslu - the eight highest mountain in the world - and record neuro-physiological data by means of the eXtreme EEG package!

The Cap Preparation

The preparation of the EEG cap in such extreme conditions was one of the aspects we wanted to be tested extensively during the Himalaya expedition.

The unusual environmental conditions in which the neurophysiological data was recorded could have caused unexpected problems during the cap preparation like, for example, freezing of the gel.

Nevertheless the equipment we supplied to the climbers performed excellently at both low and high altitudes and the team members encountered no problems during the preparation of subjects or while making the recordings.

Reducing the impedance of the 16 active electrodes used for those measurements below 10 K Ohm was extremely easy and the preparation took less than 5 minutes. "That was just amazing!" – said Mr. Lajos.



Pic. 1: EEG cap preparation at 4.800 m: a member of the expedition fills the electrodes in with SuperVisc gel

as physiological activity recorded at an altitude higher than 4,800 m above sea level.

Each dataset consisted of two recordings (1) a measurement taken with the subject at rest (2) a measurement taken while walking and climbing. All the datasets were recorded together with a video using the BrainVision Recorder software. A video clip showing some of the videos captured during the measurements on the Manaslu can be found on our website at www.brainproducts.com/extreme_eeg.php

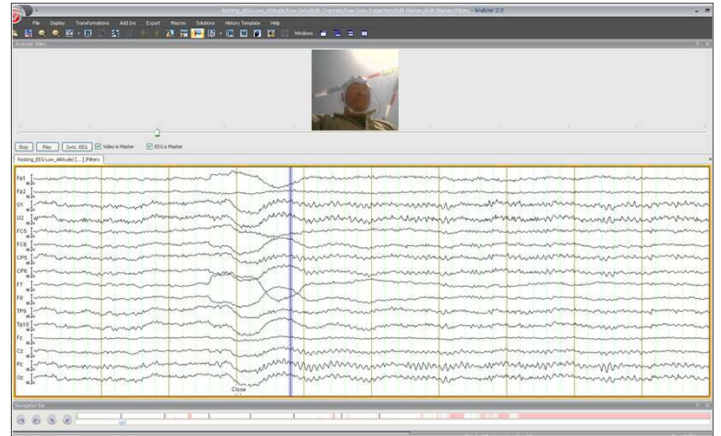
Data Analysis

The results of the analysis performed on the data by using the BrainVision Analyzer 2 software confirmed its good quality. As shown in picture 3, a typical increase in alpha activity in the "closed eyes" condition at both altitudes is clearly visible already from the Raw Data:

Data Recording

The main goal of the recordings was to measure neurophysiological data under both normal and extreme conditions by using 16 EEG electrodes (Fp1, Fp2, O1, O2, FC5, FC6, CP5, CP6, F7, F8, TP9, TP10, Fz, Cz, Pz e Oz), a blood pulse and a respiration sensor.

"Normal conditions" were defined as physiological activity recorded at an altitude lower than 1000 m above sea level and "extreme conditions"



Pic. 2

The FFT analysis performed for channel Oz for the "closed eyes" versus "Open Eyes" condition both at low and high altitude also confirms the good quality of the data.

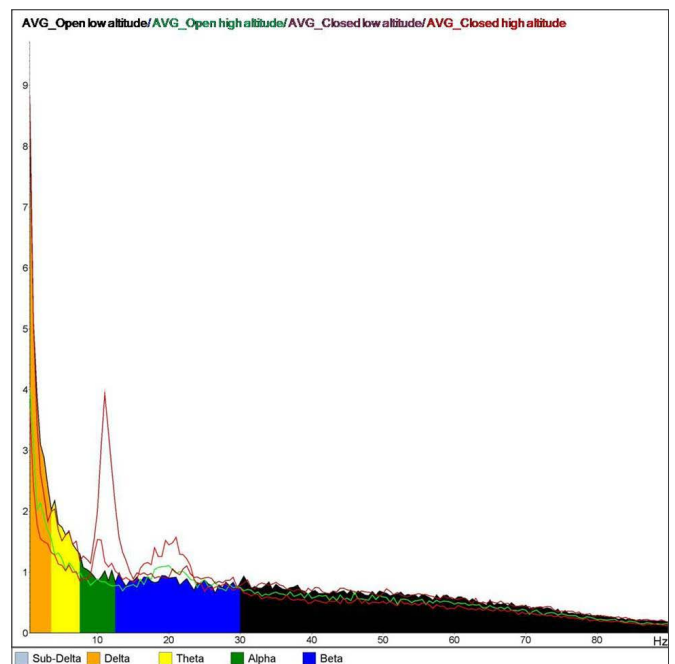
The analysis of the blood pulse signal revealed no significant change in the mean heart rate of the volunteer (a Himalayan high altitude native Sherpa). 53 bpm at high altitude versus 50 bpm at low altitude with the subject at rest confirms that adaptation to very high altitudes is a very smooth process for Himalayan natives.

The good quality of the data recorded from the members of the Himalaya expedition proved how reliable and robust the V-Amp and the actiCAP are. Even when used under the most extreme environmental conditions the equipment performed just as good as in any EEG lab.

To conclude this article, we would like to honor the memory of Dr. Szabò Levente, who was killed in an accident during the descent from Mount Manaslu. On the occasion of this tragedy, we would like to express our deepest condolences to Dr. Szabò's family and friends.

We would also like to thank the members of the Hungarian Himalaya expedition for their commitment; it was a pleasure to work with them!

Additional information about the eXtreme EEG project can be found at www.brainproducts.com/extreme_eeg.php



Pic. 3