BCI2000 g.MOBIlab Support

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1 Introduction

g.MOBIlab is an amplifier/digitizer combination from g.tec medical engineering GmbH / Guger Technologies OEG (`http://www.gtec.at`). This document describes support for this device in BCI2000, which consists of a BCI2000-compatible Source Module (`gMOBIlab.exe`).

2 g.MOBIlab Hardware

The MOBIlab device supports 8 analog input channels digitized at 16 bit resolution and sampled at a fixed 256 Hz sampling rate. In its standard configuration, channels 1-2 have a sensitivity of $\pm 100\mu V$, channels 3-4 have a sensitivity of $\pm 500\mu V$, channels 5-6 have a sensitivity of $\pm 5mV$, and channels 7-8 have a sensitivity of $\pm 5V$. The input range of the A/D converter is approximately equal to this sensitivity and thus, for example, one LSB for channel 1 or 2 is roughly $\frac{200\mu V}{65535} = 0.003\mu V$. However, the actual input range of the A/D converter is slightly larger than the sensitivity of each channel

(so that the A/D converter can detect when the amp saturates), and thus, exact LSB values have to be determined for each channel using a calibration signal.

This device only has one A/D converter and thus samples are digitized at slightly different times. BCI2000 has a feature that can align samples in time (parameter *AlignChannels* in Section *Filtering*), which needs to be turned on (i.e., *AlignChannels* needs to be 1).

An additional feature of the MOBIlab is 2 digital input/output lines. The MOBIlab source module is configured such that channel 9 corresponds to the value of the digital lines, which are configured as input lines.

3 g.MOBIlab Source Module

The BCI2000-compatible Source Module `gMOBIlab.exe` can be used instead of any other source module. In addition to standard parameters (i.e., *SampleBlockSize*, *SamplingRate*, *SoftwareCh*, *TransmitCh*, *TransmitChList*), it only contains one parameter (*COMport*):

COMport Serial port of the attached MOBIlab device, e.g., COM2:

SampleBlockSize Samples per digitized block. A value of 8 corresponds to a BCI2000 system rate of 32 Hz ($\frac{8samples}{256Hz}$).

SamplingRate The sampling rate of the MOBIlab. This value has to be 256.

SoftwareCh The total number of channels. This number can be 1 to 9. If it is set to 9, then channels 1-8 represent 8 analog input channels, and channel 9 represents the values of the two digital lines.

TransmitCh The number of channels that are transmitted to the BCI2000 Signal Processing module. See the BCI2000 Project Outline for further information.

TransmitChList The list of channels that are transmitted to the BCI2000 Signal Processing module. See the BCI2000 Project Outline for further information.