CED eNews
The eNewsletter from Cambridge Electronic Design
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News

Future meetings and events

Australian Neuroscience Society 2012
Jupiters Hotel,
Gold Coast, QLD, Australia
January 29th – February 1st 2012

Biophysical Society 56th Annual Meeting
San Diego Convention Center,
San Diego, CA, USA
February 25th – 29th 2012

Latest versions of Spike2 and Signal

Updates for Spike2 and Signal are available from the CED downloads page, or by clicking on the links in the table below. Demonstration versions of the latest software are also available.

Spike2 downloads	Released	Signal downloads	Released
Spike2 version 7.08	12/11	Signal version 5.04	10/11
Spike2 version 6.16	03/11	Signal version 4.09	08/11
Spike2 demo	10/11	Signal demo	10/11

Scripts Spotlight

Sleep scoring

Studies of circadian activity or sleep in rats, mice or chicks typically involve recordings of EEG and EMG. These signals are then analysed in order to differentiate between three vigilance states: Awake, Non Rapid Eye Movement sleep (NREM) and Rapid Eye Movement sleep (REM). Not so long ago, this scoring was done by visual inspection of the raw traces. However, numerous methods for automating the process have been published and we have implemented one of them (Costa Miserachs et al. 2003) in Spike2. Version 7 users will find `Rat sleep Auto.s2s` in their scripts folder. Users of v5 or v6 click here.

The method depends on measuring smoothed rectified EMG and EEG power bands, specifically, theta:delta ratio (T:D) and then applying various threshold criteria to assign the states. The resulting sleep states are presented in a State channel in 20 second epochs. The methods for measuring levels of theta and delta (digital filtering) and of determining what the thresholds should be, mean that this script is only suitable for offline analysis of data files that contain episodes of all three vigilance states.

However, with the advent of Spike2 v7.07, we can now plot spectral features such as power in an EEG band or the ratio of two bands (e.g. T:D) in Virtual channels. This

makes it practicable to use power in band measurements to assign sleep stages online as well as offline. The new script `OSD.s2s` (Online Sleep Detector) does just that. It allows you to plot power in up to four frequency bands together with T:D ratio as additional channels in the data file. You can also customise the threshold criteria that will be used to define particular sleep stages and mark the stages as they occur. You can even arrange to output a pulse to trigger external equipment when a particular sleep stage is detected. You could use this feature to change the experimental conditions in response to the onset of a given sleep state, for example, turn lights on or off or trigger an activity wheel.

This script is still under development, so any feedback or suggestions for improvements can be sent to geoff@ced.co.uk

Reference
Costa-Miserachs D et al(2003) Automated sleep staging with a standard spreadsheet. J.Neurosci Methods: 130:93-101

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Show me how!

Click on the link above to view a video tutorial showing the Channel draw modes

Q.   Is it possible to show spikes in a WaveMark channel as a Rate histogram?

A.   The `Channel Draw mode` option in the `View` menu gives access to a variety of data display modes, depending on the source channel data type. WaveMark channels have the following Draw modes available:

Rate
Displays a count of events in each time period, as set by the Time Width field, as a Histogram

Mean Frequency
Calculates and displays the mean frequency at each event by counting the number of events in the previous period as set by the Bin size field. Mean Frequency can be calculated in Hz or BPM using the dialog option

Instantaneous Frequency
This is the inverse of the time interval between an event and the previous event on the same channel and can be calculated in Hz or BPM. The result can be displayed as Dots, Lines or a Skyline

Raster
Raster mode shows event positions relative to trigger times on a selected channel and each trigger event is used to set time 0 on the Y-axis. If this draw mode is applied to a marker channel then the events are drawn in the colours set for the individual Marker codes

Dots and Lines
Displays the events as simple time stamps using dots or lines. In dots mode the Marker code is also displayed

Waveform, Cubic Spline and WaveMark
In Waveform mode the spike shape is shown with the data points joined with straight lines. Using Cubic Spline mode joins the data points with smooth curves. WaveMark mode draws the spike shape as a Waveform and also displays the associated marker code
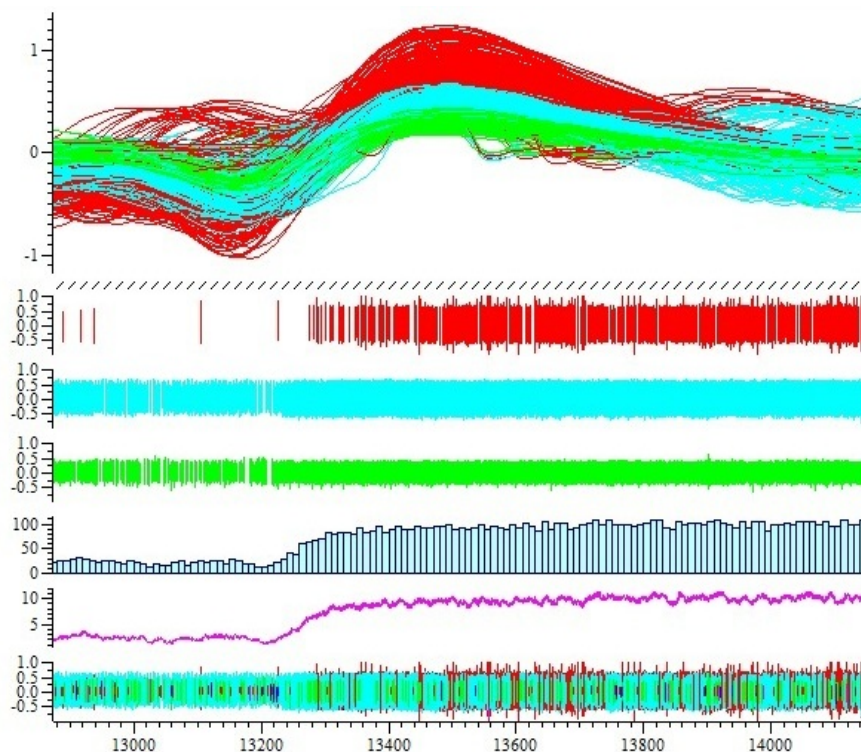
Overdraw WM

The Overdraw WaveMark mode draws all spike data in the time range as superimposed waveforms in a channel area at the top of the data window.

State
This drawing mode displays a coloured state 'bar' for each marker code that spans the time range from the start of the marker up to the next marker in the channel

WaveMark data showing different channel draw modes

Channel draw modes can be applied to channel duplicates allowing you to view data in a variety of display modes in the same data file. The `Analysis` menu `Marker Filter` function can be used to show or hide spike shapes according to their marker code. Any channel draw mode or analysis performed on a channel with a marker filter applied is then only applied to the visible data.

Scripts: Spike2

Q.   Is there any way to define a series of TextMarks in advance of a recording? I am applying different doses of a drug during the course of an experiment and would like to be able to add the appropriate marker from a selection dialog.

A.   The script, `DoseMarks.s2s`, can be used to set the text and code for up to 10 TextMarks. The user can then add TextMark data to the file at any time by clicking the button in the toolbar and selecting the required TextMark code from the dialog. You can use the Marker Filter to show/hide any combination of TextMark codes and double click on the TextMark channel to display a list of the channel contents.

Q.   Is it possible to show the data from all frames overlayed?

A.   Signal can overdraw frames and subsets of frames from a data file in the
       current frame to allow visual comparison of recorded data. The `Overdraw
       settings` option available from the `View` menu (or using the `Ctrl+Shift+D`
       keyboard shortcut) opens a dialog that sets the frames to include in the list and
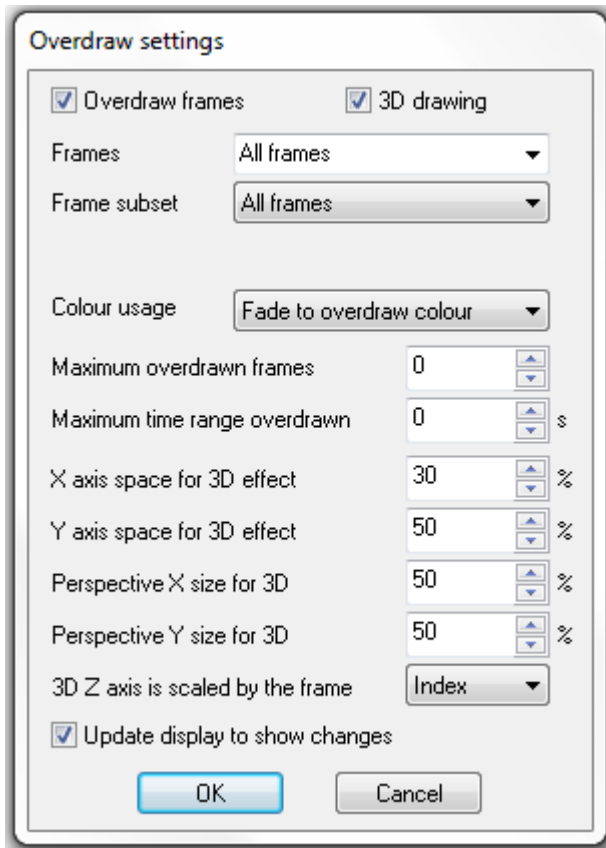
       the manner in which overdrawn frames are displayed.

                                      Overdraw settings dialog

       Overdrawn data can be displayed on the same time axis as the current frame
       or using a 3D 'waterfall' display mode. If 3D drawing is selected the user can
       adjust the X and Y settings used for the data display.

Scripts: Signal

Q.   I use Signal for TMS recordings and would find it very useful if I could set it to
       automatically flag the presence of MEP's using the PC's audio output while I
       am positioning the coil on the subject.

A.   The script, `MEPCheck.sgs`, will monitor incoming data and emit an audio 'Yes'
       confirmation of MEP data detected on a selected channel using a threshold
       crossing defined by the user. This script makes use of the Windows Text to
       Speech function for the audio and also displays a text confirmation of detected
       events in a text window.

Did you know...?

You can use the keyboard shortcuts `Ctrl+0` to `Ctrl+9` to fetch or create vertical cursors and `Alt+1` to `Alt+9` to do the same for horizontal cursors. Vertical cursor 0 is the iterative cursor for search modes and is always available in the file but is made visible by the `Ctrl+0` shortcut.

Recent Questions

Q.   I have very large data files that take a long time to display when I open them or change axis settings in Spike2. Is there any way to stop drawing of all data in the file?

A.   You can break out of a long drawing or calculation operation using the `Ctrl+Break` keyboard shortcut. This is very useful if you have inadvertently displayed or analysed a very large section of data. There is also an option in the `General` tab of the `Edit preferences` dialog to ignore resource file X range settings to give a fast initial display by only showing the first second of data when a large file opens.

User group
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