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News

The latest version of Spike2 is **5.08**, which is available from www.ced.co.uk/upu.shtml for registered v5 users. This revision includes the new output sequencer instructions DIV and RECIP that implement variable division and reciprocals, creation of virtual channels by interpolating RealMark data and a new script command to support Text To Speech conversion (TTS) for systems with TTS support installed.

A full list of new features is available from the updates section of the website.

A demonstration version of the current software is also available from www.ced.co.uk/s2demu.shtml

Version **4.21** of Spike2 is downloadable for registered v4 users.

Version **3** of Signal is now available. This version implements many new features including single channel patch clamp analysis and expands on existing features with new improved curve fitting and enhanced auto-average measurements. See the Signal feature in this newsletter for an overview of single channel patch clamp analysis features.

A demonstration version of Signal version 3 is also available from www.ced.co.uk/sigdemu.shtml

Version **2.15** of Signal is downloadable for registered v2 users.

Our pre-Neuroscience training days this year will take place on Thursday 21st and Friday 22nd of October at the US Grant Hotel, San Diego. Following feedback from our recent UK and US training days, the program of events has been revised to provide more 'Workshop' sessions which will allow us to focus more on individual problems or queries. Users are encouraged to bring examples of their own data to the Workshop sessions. Full details of the training day sessions and a booking form are available at www.ced.co.uk/nw9y.htm. Please feel free to contact us with any suggestions or comments about the revised timetable, or stop by our stand at booth no. 2021 during the SFN meeting.

We will also be exhibiting at the American Heart Association Scientific Sessions 2004 meeting in New Orleans from Sunday 7th to Tuesday 9th of November. If you are attending the meeting, feel free to stop by our stand at booth no. 3347.

Spike2

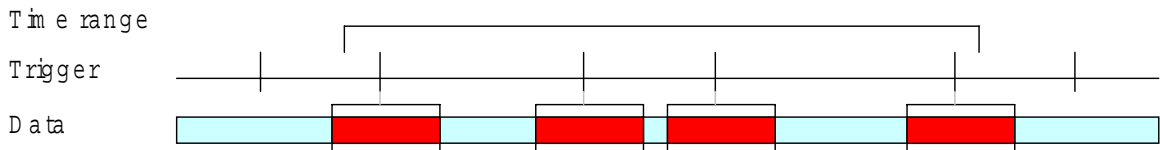
Q. How does the Gated process setting work for result views? Is this not the same as selecting a trigger channel for results such as waveform averages?

A. The Gated by events process setting allows you to include all data in a channel within a certain time range of markers or events on a second channel. For example, you might use a marker channel to indicate the onset of delivery of a specific type of stimulus, and record each instance of this stimulus type as an event channel. You may then want to analyse all data that was included

within a certain time range of the stimulus onset, and use the stimulus event times as your trigger channel for the analysis. You can do this by using Gated analysis in Spike2.

Result views are generated using data within a defined time range. This could be set to include all data in the file, user entered values such as 0 to 100 seconds, areas defined by vertical Cursors or sections of data that lie within a user-defined time of particular events.

When applying analysis functions that use channels as triggers, you set the time range for the process, and the channel to use as the trigger. Any triggers that fall in this time range are used to accumulate sweeps for the analysis; if you set the trigger to Manual, the start time for the process is used as the trigger for a single sweep of data. For non-triggered analysis (power spectra, measurements) the time range simply sets the range of data to analyse.



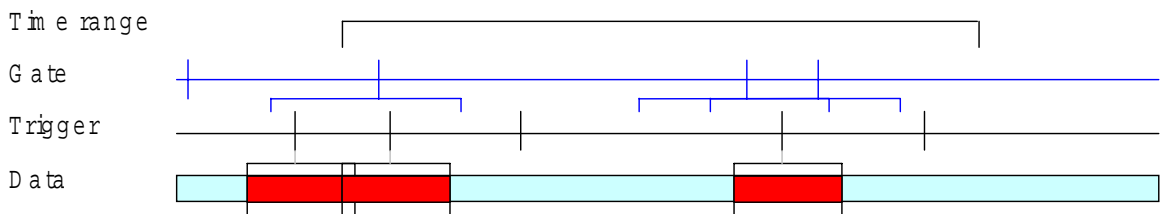
Process using triggered analysis. Only triggers in the time range are included



Process with non-triggered analysis. All data in the time range is included in the analysis

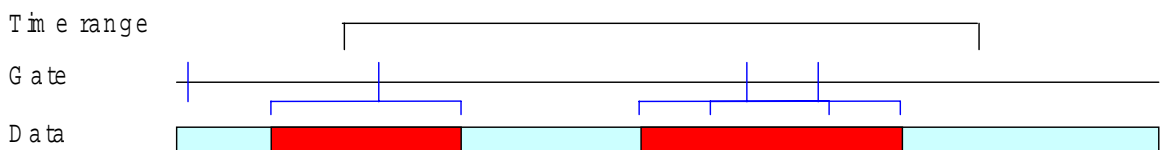
If you select the Gated by events radio button in the Process dialog you can choose an event, marker, or marker-derived channel to define the gate times. If you select a marker channel, you can optionally specify a marker code to use as the gate times, so that only data in the time range of gates that match the code will be analysed.

The Sweep length and Pre-event time fields define the length of time to process from each gate event and how far before each gate event to start processing. If more than one gate event occurs within the sweep length, the sweeps are merged and the data is processed once, not for each overlapped gate event.



Gated process with triggered analysis. Only triggers that fall within the Gate areas are included

If you use Gated processing with analysis functions that use event channels as triggers, only triggers that fall within each gate sweep length are used to include data for analysis, and only gate events that fall within the selected time range are added to the result. Triggers that lie within more than one gate sweep length are used once, not once per gate. Gated processing with non-triggered analysis uses all data that falls within the sweep length of the gate events.



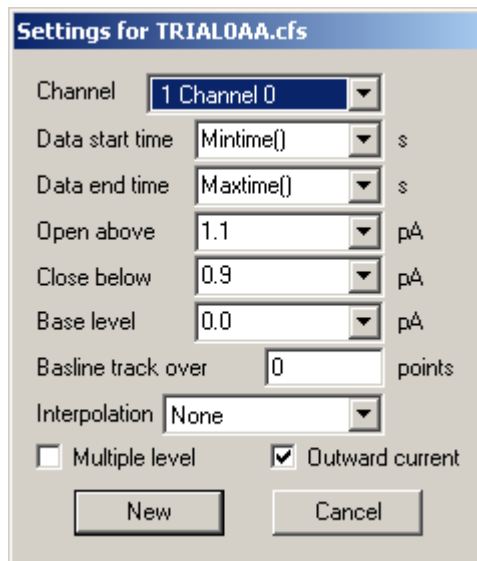
Gated processing with non-triggered analysis. All data within the gate areas is included

Signal

Q. How do I use the single channel patch clamp analysis features in Signal version 3?

A. There are a number of features for Single channel patch clamp data analysis available in Signal version 3, including idealized trace formation and generation of dwell time and amplitude histograms. An idealized trace is formed by converting the raw data trace into a series of open/closed times. Each time has an amplitude, duration and a set of 'flags' to identify it.

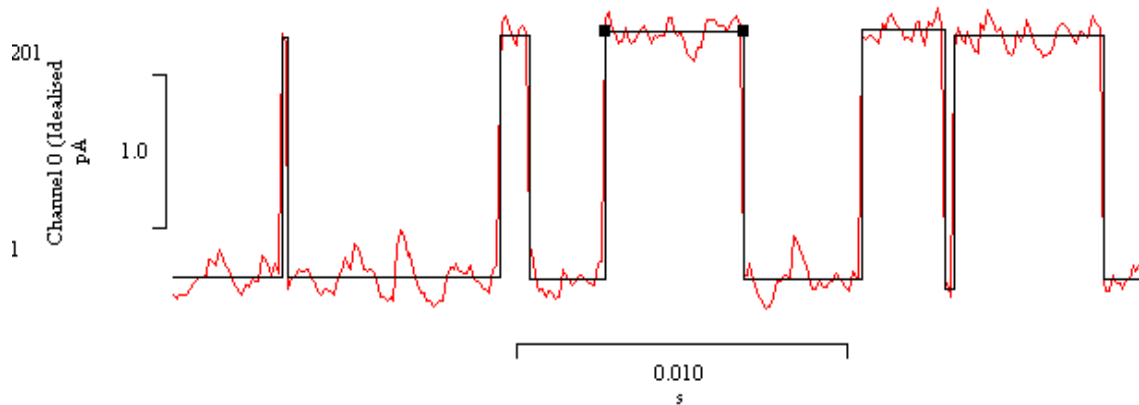
To create a new idealised trace from the Analysis menu, Open/Closed times command, set the channel to be fitted and the time range for the idealised trace in the dialog. If you are analyzing voltage activated channels you would set the time range to match the start and end time of the given stimulus, the first open/closed time found in the idealised trace is flagged as the first latency.



The next two fields are used to set the thresholds for detecting openings in the ion channel. These are labelled Open above and Close below for outward current measurements, and Open below and Close above for inward current measurements. Outward current means that an opening of the channel produces a more positive current i.e. an upward direction in the time view, and inward current would produce a more negative current. You select outward or inward current using the checkbox in the lower right-hand area of the dialog.

The Base level and Baseline track settings are used for Multiple level analysis. Sometimes the 'patch' of membrane being recorded will contain more than one ion channel, giving multiple current values if the channels are open at the same time. If this is the case you can select Multiple level from the checkbox in the bottom left-hand corner of the dialog. The thresholds for multiple levels are calculated by averaging the two thresholds set by the Open/Close amplitude settings, and then doubling the difference between this value and the Base level.

Each time in the idealised trace starts at the first data point after the threshold crossing. The amplitude is the mean value of the data points within the open/closed period. You can select Linear from the Interpolation field in the dialog to calculate the assumed start of the open/closed times.



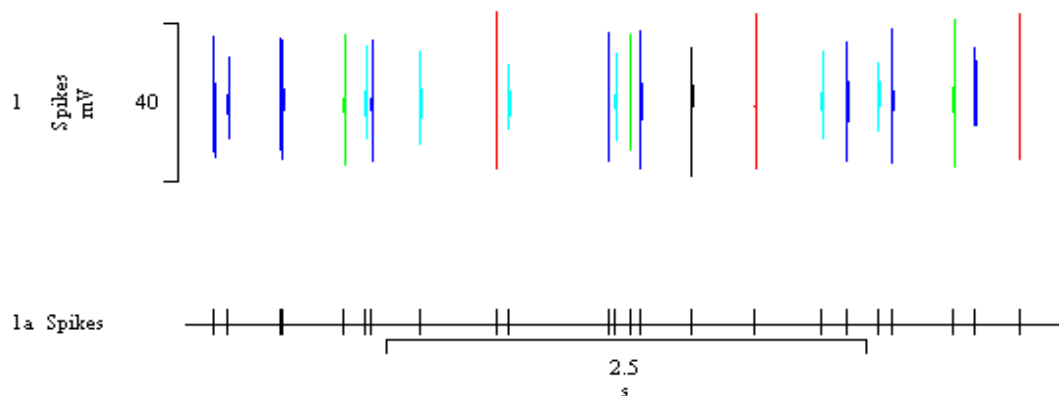
Idealised trace generated and overdrawn on raw patch clamp data

Press New to open the standard process dialog, and select the frames to be used for the idealised trace generation. The first idealised trace for the data is generated in channel 201, and automatically overdrawn on the raw data trace. You can view and edit details of the events that form the idealised trace by right-clicking on the trace and selecting Show event details from the Edit menu pull-down. You can also click and drag the selected level on the trace to adjust amplitude and dwell times.

Once an idealised trace has been applied to the data, you can create Open/Closed time histograms and Amplitude histograms of the open/closed time durations. The settings for both Open/Closed time and amplitude histograms allow you to include or exclude data based on the associated 'flags'.

Scripts: Spike2

- Q. I would like to be able to play a series of spike times (recorded as TTL events) from a pre-recorded data file as a stimulus during sampling. Is there an easy way to do this using the output sequencer?



Templated spike data drawn as events in duplicate channel 1a

- A. The Spike2 output sequencer now supports a user defined table of 32-bit values that can be used to transfer large quantities of information rapidly between a script and a sequence. The attached script, `PlayTrainTable.s2s` and sequence, `PlayTrain.pls` is an example of using the table



to output a series of pre-recorded events during sampling. Before using the script, load the sequence file into the sampling configuration. Then, simply open a new data file ready for sampling and run the script. It will prompt the user to open a data file containing an appropriate channel and select a time range of events to write to the sequencer table. During sampling, pressing key 'a' on the sequence toolbar will play the copied data out of Digital Output 0 on the Micro1401 and Power1401. The 1401*plus* does not support the sequencer table.

Scripts: Signal

Q. Is there any way to output a series of arbitrary waveforms during a single sampling sweep?

A. In Signal version 3, you can directly access the text sequencer that underlies the graphical interface. You can generate text sequences that restart at the beginning of each sampled sweep, (much like the sequences generated by the pulse outputs graphical interface) and you can also generate free-running sweeps that are independent of the sampled frame, providing greater flexibility.

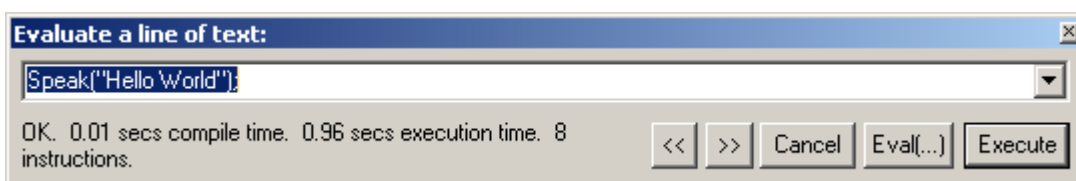
By linking a script with a sequence file, you can write new values to the sequencer on-line during individual sweeps. The attached example script (`arbWave.sgs`) and sequence (`arbWaveSeq.pls`) generate different arbitrary waveforms which are exchanged between the DAC outputs during the sampled sweep. For this example, set output type to Sequence in the Outputs page of the sampling configuration, and then browse to the attached sequence file, `arbWaveSeq.pls`. Set a sweep length of 10 seconds in the General tab of the sampling configuration, and then connect DAC 0 to ADC 0 and DAC 1 to ADC 1 on your 1401. Open a new data file ready for sampling and then run the script. You should see the generated waveforms play out of each DAC in turn.



Did you know...?

The new `Speak()` script command allows users of systems with text to speech (TTS) support to output speech from text strings. You use the Speech applet in the control panel to setup voices and route the sound output. To use TTS, you need a suitable sound card and the Microsoft SAPI software support. Windows XP has this software included with the operating system; TTS support is currently available as a download for other versions of Windows from www.microsoft.com/speech/download/sdk51/.

Once you have setup voices and sound output in the Speech applet, try the following code in the Evaluate.. window in the latest versions of Spike2 or Signal, and then press the Execute button in the window:



Recent questions

Q. I would like to be able to amalgamate a series of 10 experiments into a single data file for analysis and display of all files simultaneously. Each data file contains one waveform channel, sampled at the same rate and for the same period of time. Ideally, each file from the experiment series should occupy a single, separate channel in the new file.

A. You can use the `ChanSave()` script command to copy data from source channels in a time view to disk-based or memory buffer channels in any time view, with an optional time shift. If the destination channel already exists, `ChanSave()` adds data to it, otherwise it creates a disk-based channel to match the source channel. The source data must be compatible with the destination. Waveform and RealWave channels are compatible with each other, and conversion between them uses the scale and offset values of the source channel. If the source and destination sample

rates do not match, the data is interpolated using cubic splines. This also applies for non-matching WaveMark data.

The `ChanSave()` command has many applications, in the example script, `ChanAmalg.s2s`, we simply create a new file holding data from two files selected by the user.



User Group

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