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## News

Apologies to all subscribers for the late arrival of this edition of the eNewsletter. This is, in part, due to the time spent planning and running our US and UK training days and our presence at a number of international meetings during the past few months. I hope that the newsletter content is worth the wait!

The current version of Spike2 is **5.06**, which is available from [www.ced.co.uk/upu.shtml](http://www.ced.co.uk/upu.shtml) for registered v5 users. This revision includes support for multiple monitors, additional width parameters for Active Cursor peak, trough and threshold searches, new output sequencer commands, a new interactive measurement feature and much more flexible use of resource files. A full list of new features is available from the updates section of the website.

Version **5.07** is in the works and will include virtual channels. These allow you to generate waveforms that are algebraic functions of existing channels (for example differences, products and ratios). It will also include a change to the `EventToWaveform()` script command to allow additional smoothing functions and user-supplied asymmetric functions.

A demonstration version of the current software is also available from [www.ced.co.uk/pru.shtml](http://www.ced.co.uk/pru.shtml)

Version **4.19** of Spike2 is downloadable for registered v4 users.

Version **2.15** of Signal is also downloadable for registered v2 users. This revision includes additional Inter-channel arithmetic commands available from the Analysis menu and script language. A full list of new features is available from the updates section of the website.

We ran our annual [UK training days](#) in Cambridge at the end of March and, for the first time this year, additional [US training days](#) in April, just prior to the annual Experimental Biology meeting in Washington DC. Both the UK and US training days were very well attended and we hope that all attendees found the sessions both informative and interesting.

Following feedback from the UK training days, we amended the program of events for the US training days to provide more 'hands on' sessions with a total of eight workshops over the two days. In addition, the Spike2 Analysis module was extended over two sessions to take into account the new and extended analysis features that have been added. We hope that this will give us the opportunity to look at more individual problems and data-specific queries over the course of the sessions. If you have any comments regarding this format, or any feedback relating to the training days then please let us know.

There will also be the usual US training days prior to the Society for Neuroscience annual meeting, probably on the 21<sup>st</sup> and 22<sup>nd</sup> of October. Full details will be available nearer the time.

## Meetings

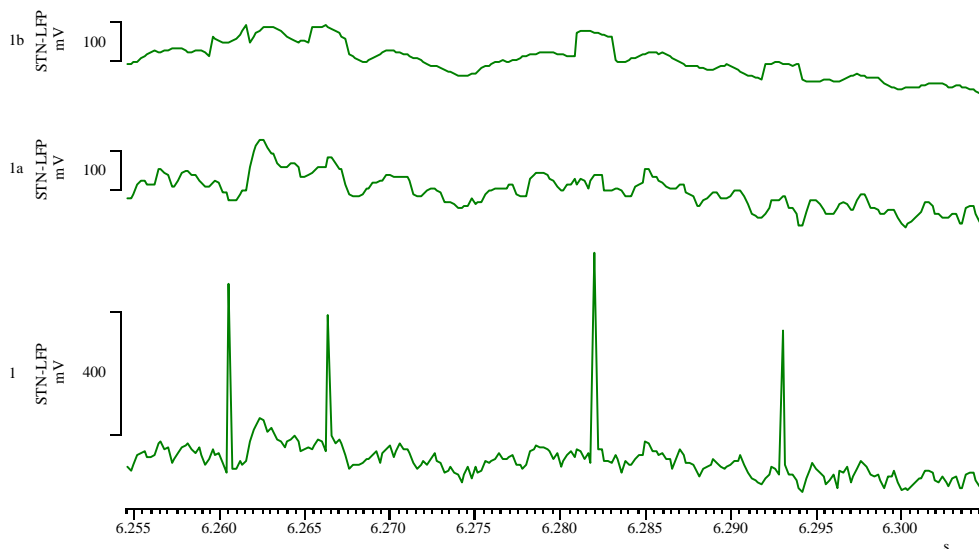
We will be exhibiting at the forthcoming American College of Sports Medicine annual meeting to be held in Indianapolis from 2nd to 4th June. If you are attending the meeting, feel free to stop by our stand at booth no. 711.

We are also exhibiting at the International Society of Electrophysiology and Kinesiology meeting to be held in Boston from 18th to 21st June.

## Spike2

Q. Is there is a function in Spike2 that allows smoothing of waveforms based on a median value? This procedure is sometimes used for intra-cellular recordings to remove spike artifacts from action potentials and we want to use it to exclude artifacts due to field potentials.

A. In previous versions of Spike2, a script was needed to implement a Median Filter. Now it is available in version 5.06 as a new Channel Process command from the Analysis menu. The Channel Process options in Spike2 include a number of operations that can be applied dynamically to waveform or RealWave channels in a data file. The original data is not changed in any way, but the channel data in the view is displayed as if modified by any processes applied. It is possible to apply more than one Channel Process to a data channel, for example rectification followed by smoothing.



*Raw data (1) sampled at 5kHz with a duplicate channel (1a) showing the effects of the Median filter with a Time constant of 0.2ms. Channel 1b is a second duplicate showing the effects of a Smooth applied with a time constant of 1ms.*


The Median filter process takes a time period in seconds,  $p$ , as an argument. The output at time  $t$  is the median value of the input data points from time  $t-p$  to  $t+p$  seconds. The median is the middle point after the data has been sorted into numerical order. This can be more effective at preserving the signal of interest than the Smooth Channel Process command if your data has occasional points with large errors. In the example above, the smooth process was applied and the time constant changed until it had a significant effect on the occasional spikes. As you can see, at a time constant of 1ms there are still traces of the spikes and the original data has been modified considerably when compared to the median filtered channel.

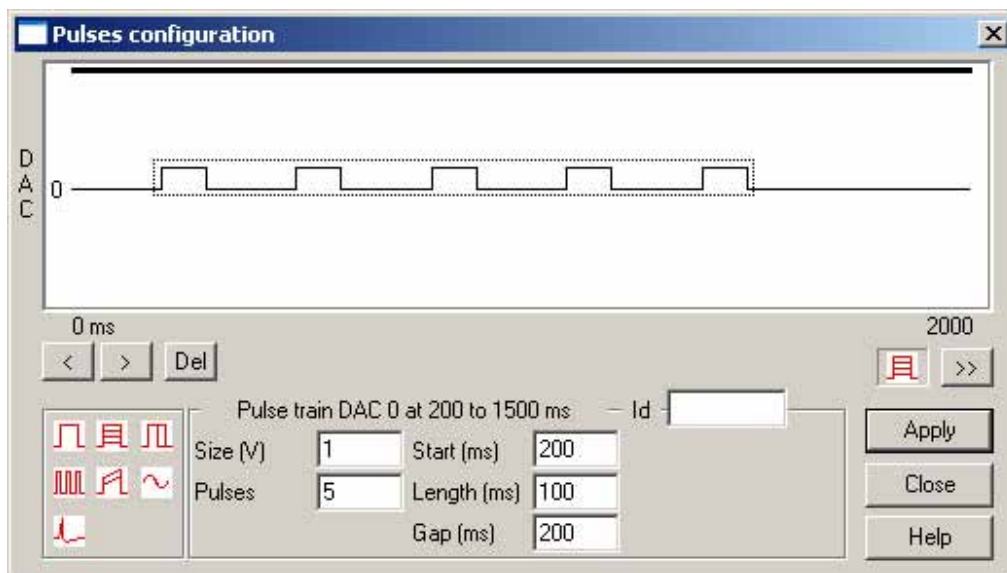
The Median filter is slower if  $p$  spans a large number of data points; you should set the time period to the smallest value that removes the outlying points.

## SIGNAL

Q. I am using Signal to record evoked response data, and generating the stimulus control using the DAC 0 output. I would like to be able to manually adjust the pulse interval, duration and amplitude of my pulse train while sampling, depending on various conditions that can differ from trial to trial. Is this possible in Signal without using a script?

A. You can use the Outputs tab in the sampling configuration to set up digital and analog outputs from the 1401 to be used during sampling. The Configure Pulses button at the bottom of the Outputs tab displays the Pulses configuration dialog where you can view and edit the outputs. You can output square waves, pulse trains, ramps, sine waves and previously stored waveforms. Many of the pulse parameters can be set to change by fixed amounts on each repeat, allowing you to generate, for example, a pulse that changes amplitude or duration on each repeat.


The pulses configuration dialog can be accessed during sampling, allowing you to adjust the settings manually while recording. This is done by clicking on either show pulse controls from the Sampling menu or the  icon in the Signal toolbar.




*The on-line pulse configuration dialog allows you to edit pulse parameters while sampling*

If you have a number of standard settings for your pulses and wish to change between them quickly during sampling, another option worth considering is the use of multiple states. If the multiple frame states box is checked in the general tab of the sampling configuration dialog, you can set a number of extra states representing the number of possible pulse sets required from the states tab. When you then call the pulses configuration dialog, sets of pulses can be constructed independently for each extra state.

When you then start sampling, the states bar will appear, allowing you to manually select which state and therefore which set of pulse parameters you wish to use at any time. The states can also be set to cycle, either numerically, randomly or to a pre-determined protocol. One advantage of this approach is that recorded data frames are flagged with the number of the state used, allowing selection of frames with specific stimulus parameters to be easily identified for analysis purposes.

**Scripts: Spike2**  (Right mouse click icon and save embedded script file to disk)

- Q. I am looking for a script that will give text output of raster data from a Spike2 result file.
- A. The attached script, `RasterDump.s2s` prints raster data from a Spike2 result file into a new text document. When the script is run, the user is prompted to open a Spike2 result file that must include a raster type channel. The user is prompted to select the required raster channel and the raster data is then written to a text file to be viewed or saved.

**Scripts: Signal**  (Right mouse click icon and save embedded script file to disk)

- Q. I am a new Signal user and am interested in learning the script language to automate some of my repetitive analysis on off-line data files. Do you have example scripts that will give me the body of code to open and display a data file, for example, but allow me to enter my own analysis routines in the script?
- A. We have a number of 'skeleton' scripts that are examples of various methods, many of which are available in the Signal program scripts folder. The attached script `RepSkel.sgs` allows the user to repetitively select data files and then perform analysis. Currently it tags frames in a data file according to the maximum amplitude, but this can easily be changed by editing the `DoFile%` function in the script.

### Did you know...?

We are often asked how the name 1401 first originated. The 14<sup>th</sup> year of CED was the first year of design and manufacture of the 1401 unit. That is, 14 years into the life of the company. We are now up to 3101 for the in-house unit numbers (year 31), but as 1401 is the name associated with our hardware, we retain this number as an effective trademark.

### Recent questions

- Q. I am using a 1401 to record EMG data. I would like to be able to hear the EMG pulse during recording, is there any way to do this?
- A. One suggested way to get audio output of the EMG would be to feed the amplified EMG signal to the Line-in input on your PC. The Line-in could then be routed to the speakers to give volume control of the EMG signal. However, this routing is achieved through the Windows software and so is OS dependent.

### User Group

You can now find our eNewsletters archived on our website at [www.ced.co.uk/nwu.shtml](http://www.ced.co.uk/nwu.shtml)

If you have any comments about the newsletter format and content, or wish to un-subscribe from the mailing list for this newsletter, please notify [sales@ced.co.uk](mailto:sales@ced.co.uk).