CED eNews

The eNewsletter from Cambridge Electronic Design

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Foreword from our new Sales Engineer

I joined the CED team in early January and will be taking on the responsibility for sales and customer support in the North of the UK.

I have a scientific background beginning with a Medical Science degree from the University of Birmingham followed by working for 14 years within the Life Sciences industry. I initially started my career as a Research and Development Scientist for a rapid diagnostics company until transitioning into Technical and Customer Support eight years ago. I have always believed that providing the highest level of customer service and maintaining excellent working relationships with customers is vital in any business and was pleased to discover that this is an ethos also intrinsic to CED.

I have been happy to find the CED team friendly, approachable and helpful, with many of them spending numerous patient hours answering my countless questions!

I have been impressed by CED's commitment to providing their customers with the highest quality products as well as reliable, helpful advice. I am also amazed by the level and range of expertise and knowledge contained within the team, their 'nothing is too much trouble' attitude and the effort and time which is devoted to providing customers with tailor-made solutions.

I am looking forward to learning more about the CED products and excited to have the opportunity to meet some of our customers in the coming months.

*Nicole Prentice
Sales Engineer
nicole@ced.co.uk*

European Training Days: Thursday 4th and Friday 5th April 2013

Join us for two days of training in Cambridge and learn how to use Spike2 and Signal for your research needs. These sessions are suitable for both existing and prospective users.

Attendance is limited so please register early to reserve your place on the appropriate course.

Future meetings and events

CED European Training Days 2013
St Johns Innovation Centre,
Cambridge, UK
April 4th - 5th 2013

BNA 2013 Festival of Neuroscience
The Barbican Centre,
London, UK
April 7th - 10th 2013

Experimental Biology 2013
Boston Convention & Exposition Center,
Boston, MA, USA
April 20th - 24th 2013

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 7.11	02/13	Signal version 5.08	11/12
Spike2 version 6.17	10/12	Signal version 4.10	10/12
Spike2 demo	07/12	Signal demo	06/12

Scripts Spotlight

The output sequencer in both Spike2 and Signal is used to generate digital and waveform outputs during sampling. These can be used to trigger and control a wide range of devices such as electrical and magnetic stimulators, motors or visual stimulus generators. Often the researcher needs to be able to set or change these stimulus parameters 'on-the-fly' during a recording and, while it is possible to load in replacement sequencer files during sampling, it can be much more convenient to use a script that, for example, allows the user to set various stimulus parameters with a dialog. The script can then pass these new values to the sequencer to update the experiment protocol in real time.

As easy as this sounds, many script writers come unstuck when it comes to re-calculating user entered values as appropriate sequencer values. The sequencer uses a 'low-level' programming language and expects DAC values to be expressed as 32-bit numbers. For example, if a user has requested a DAC output of 3V in a dialog, this will need converting to a 32-bit number for use by the DAC command in the sequencer.

Luckily there is a script available to make these calculations as stress-free as possible. `Seqlib.s2s` is stored in the `include` folder of your Spike2 and Signal installation and contains a library of functions to help with the calculation of sequencer variables. These include a function to convert user entered units into 32-bit numbers for use by

the DAC output commands. This script is intended for use as an include file so you can simply enter `#include <seqlib.s2s>` at the top of your own script.

Show me How!
Click here to view a video tutorial on using digital filters

Q.   I have some noise in my data that I would like to reduce if possible. I see that Spike2 includes digital filters, but I am not sure of the difference between the two types of FIR and IIR filters.

A.   From the *Analysis* menu – *Digital filters* option you can select between two basic types of filter, IIR (Infinite impulse response) and FIR (Finite impulse response).

FIR filters
FIR filters are created by defining an arrangement of bands for passing and stopping frequency ranges. They are unconditionally stable and, because they calculate the filtered output based on the data both before and after the current data point, they do not introduce any phase delay into the resulting signal.

The disadvantages of FIR filters lie in the fact that they are poor at generating narrow notch or band pass filters. Also, due to the fact that they use both past and future data to calculate the output, they introduce ringing effects both before and after any transitions in the data.
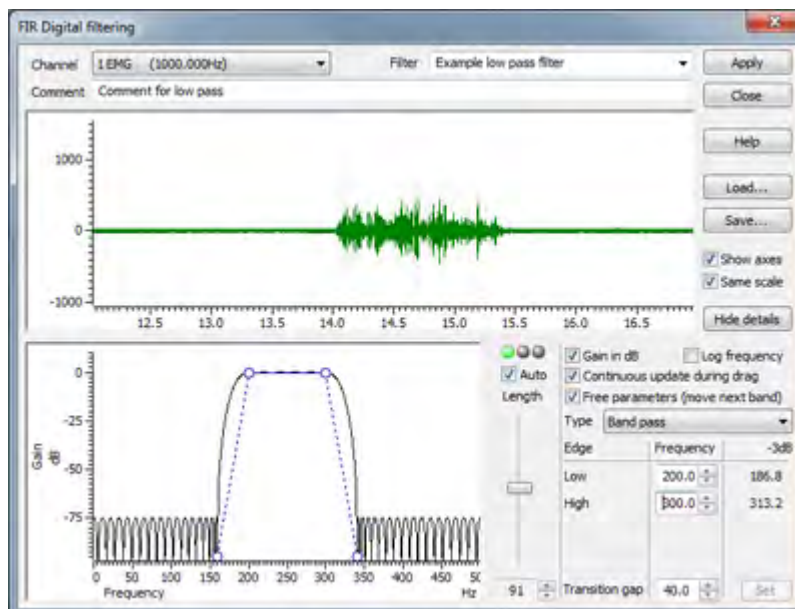
*Setting pass and stop bands using the FIR digital filter dialog*

IIR filters
IIR filters are modelled on standard analogue Butterworth, Bessel, Chebyshev, and resonator filters, mapped into digital form. They are able to generate much steeper edges and narrower notches than FIR filters for the same computational effort and they are causal, meaning that they only use the data

before the current point to calculate the output, so do not generate the pre-ringing effects due to transients that you see when using FIR filters.

However IIR filters also have their drawbacks; because they are causal, they impose a phase delay on the output waveform which shifts the position of peaks and troughs. IIR filters are also prone to stability problems as the filter order increases or when a filter feature becomes very narrow compared to the sample rate of the selected data.
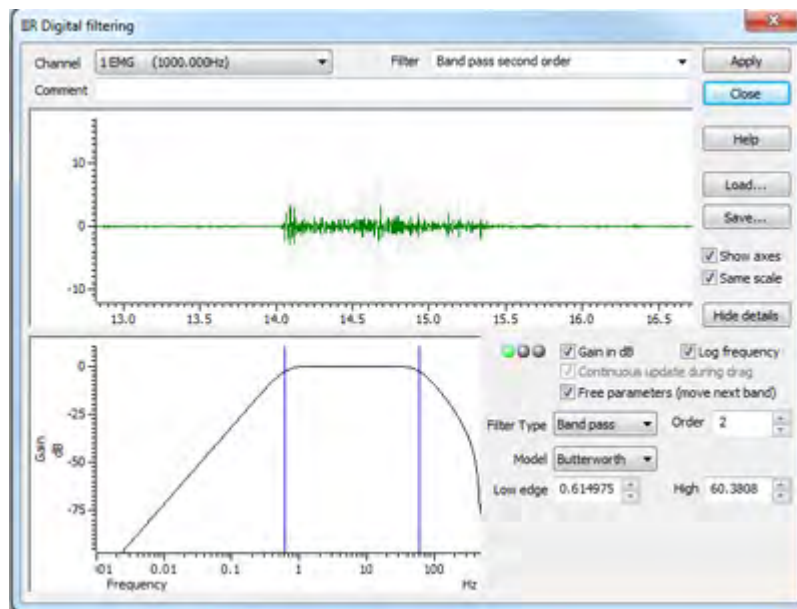
IIR filter design dialog

So, which type of filter should you use? Unless one of the disadvantages of the FIR filter is a problem, you will likely have fewer unexpected effects with an FIR filter. However, there are circumstances in which only an IIR filter will do the job, for example, if you need a high Q notch filter or resonator or are interested in small changes just before a large discontinuity, only the IIR filter will be useful.

Further information of digital filters and their effects can be found in the Spike2 on-line help.

Scripts: Spike2

Q.   I am recording multiple channels of blood pressure data and was hoping for a script that would calculate various parameters such as systolic, diastolic and mean blood pressure automatically.

A.   The downloadable script package HRBP_4, contains a suite of scripts for recording and analysing multi-channel blood pressure and related physiological recordings. It records up to four separate blood pressure traces alongside optional sympathetic nerve activity, ECG, EMG or EEG channels and generates derived traces for pulse, systolic and diastolic blood pressure. Other optional measurements include mean blood pressure, heart rate, pulse interval and respiratory rate. Analysis and generation of the above measurements is also available off-line for pre-recorded data files.

Full documentation is included in the .zip file download.

Q. How can I set-up telegraph scaling in Signal? I'm using a Warner PC-501A amplifier.

A. Signal can configure up to four ports whose scaling during sampling depends on voltage values received via telegraph outputs. The telegraph controls dialog, which is available from the Port setup tab of the sampling configuration, already includes details of a number of existing amplifiers which can be accessed from the button in the dialog.
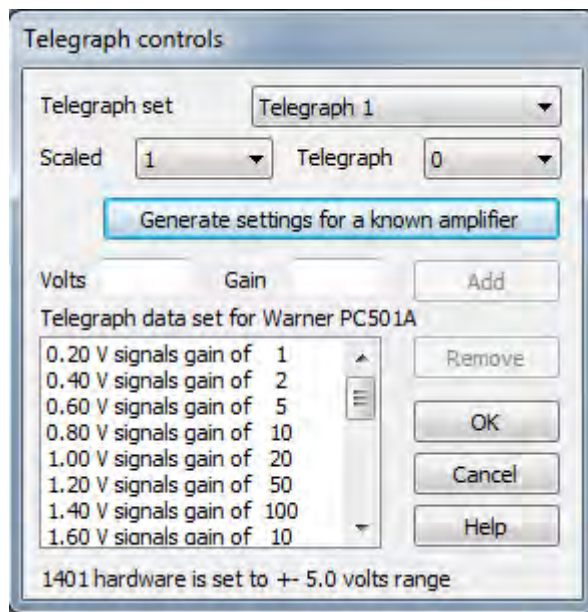
Standard telegraph dialog showing voltage and gain settings for a Warner PC-501A amplifier

In the above example, we can see the settings for the Warner PC-501A. If your amplifier is not in the list, then please contact us and we will try to add it.

In this situation, as long as you have the details of the voltage outputs and gain settings of your amplifier to hand, you can use the `Volts` and `Gain` controls in the telegraph inputs dialog to directly enter a voltage value and corresponding gain and `Add` it to a manual list of telegraph settings.

Scripts: Signal

Right-click the script icon and save to disk

Q. Is there a way to set the y range in Signal so that it autoscales on every sweep? Optimise sets it according to one sweep but I want to maintain the optimise setting across successive ones.

A. The script, `OptimiseFrames.sgs`, will automatically optimise the data at the end of a sampled sweep and optionally produce a different 'beep' tone for each sampled state when Multiple states mode is enabled. You should first run the script and then open a new data file for sampling. The script creates a toolbar from which you can enable and disable the automatic optimisation and beeps.

Did you know...?

You can set individual channel background colours in Spike2 and Signal data files, as well as specific view colours for data and XY views. You can also set independent background colours for result windows, the cluster background and WaveMark dialogs in Spike2.

Recent Questions

Q.   I'm using Spike2 and what I would like to do is log the status of all 16 digital inputs on my 1401 (i.e. I need to log when any of the lines go from 1 to 0 as well as vice versa). I have set up 8 level event channels in my sampling configuration to detect the first 8 digital bits, but how can I access the other 8?

A.   The Spike2 output sequencer can poll the lower 8 digital inputs and generate a marker code showing which of the inputs are active and inactive whenever a change occurs. The attached example sequencer, `GetLowDigin.pls` does this by monitoring the lower 8 digital inputs using the DIBEQ command and then generating a marker code in the built-in marker channel (channel 32), which needs to be enabled in your sampling configuration.

User group
Try the CED Forums bulletin board for software and hardware support

If you have any comments about the newsletter format and content, or wish to unsubscribe from the mailing list for this newsletter, please notify sales@ced.co.uk.

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Right-click the sequencer icon and save to disk