Implement digital filters with LabVIEW

Senior Technical Editor - February 23, 2005

Austin, Texas---Are you a National Instruments LabVIEW user? If so, you'll be interested in NI's new LabVIEW Digital Filter Design Toolkit Version 7.5. Selling for less than $1000, NI's v7.5 kit includes tools for modeling and creating software-based digital filters, as well as LabVIEW FPGA and C code generation for chip-level implementation.

Using the toolkit, you can use LabVIEW's popular graphical development environment to ensure a seamless digital filter design process---from conception to completion. You can also use the toolkit to demonstrate filter design concepts.

One Tool Fits All

Typically, to design a digital filter, you'd rely on a variety of software tools for iterative design, optimization, and final implementation. But, using the Digital Filter Design Toolkit (based on NI's LabVIEW Express technology), you can use a single software tool throughout the filter design process to interactively design custom floating-point or fixed-point filters. You can use these filters for noise reduction, signal extraction, anti-aliasing, and re-sampling, to name a few applications.

NI's new toolkit also includes four new Express VIs (virtual instruments) for interactive configuration. It also offers a range of standard digital filter design algorithms for fine-tuning specifications.

Because the Filters VIs in the LabVIEW Development System are coefficients-oriented, and the Digital Filter Design Toolkit VIs are object-oriented, you must use the toolkit's Utilities VIs to convert filters you design in the LabVIEW Development System to filters you can use with the Digital Filter Design Toolkit.

Likewise, you can use the Utilities VIs to retrieve filter information from filters you design with the filter design toolkit that you can use to filter signals with the Filters VIs in LabVIEW Development System.

Example VIs
If you don't happen to have lots of signal processing experience, you can access nearly 80 example VIs to help you get started. The toolkit also features state-of-the-art algorithms, such as the Remez exchange method, and the least Pth norm method.

"You can use the filter toolkit to readily develop custom digital filters," asserts NI senior product manager Darcy Dement. "You can generate ANSI C code for deployment on DSP chips, or LabVIEW FPGA code for implementation on NI FPGAs, including PXI and PCI plug-in devices, and NI's CompactRIO (reconfigurable I/O) embedded systems.

Dement explains that the Digital Filter Design Toolkit lets you design linear shift invariant (LSI) filter types, including FIR (finite impulse response) and IIR (infinite impulse response) types. "You can complete an optimal design using these comprehensive tools during exploration, optimization, analysis, and implementation," she emphasizes.

**Well-Known Filters**

Dement also points to the software's ability to work with most well-known and special-purpose design options, such as Kaiser window, Dolph-Chebyshev, windowed, Max flat, narrowband (interpolated FIR), elliptic, Chebyshev, inverse Chebyshev, Butterworth, Bessel, notch peak, comb, half-band multi-rate, single-stage multi-rate, n-stage multi-rate, Nyquist multi-rate, and root-raised/raised cosine multi-rate types.

In a demo at eeProductCenter, she fed a pre-recorded audio file into a small amplifier. The music file included an annoying high-amplitude tone. To show the effectiveness of the filtering, Dement described a deep notch filter in an FPGA, and then routed the audio through the filter. Voila! The tone was eliminated, and there was no noticeable degradation of the reproduced music.

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For lots more info, visit NI's toolkit [Web pages](#).

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