

Show Report from the Netherlands

A couple of interesting trends were in evidence at this recent Dutch show.

By Jan Didden

The third annual Dutch DIY Audio meet was held this year in early March¹. After a hesitating start in 2004, the Dutch show has quickly established itself as an important event for serious audio amateurs from the Netherlands, Belgium, and Germany. This year's event was attended by about 200 participants, many of them bringing their equipment to show and demo in the available rooms.

It may seem preposterous to compare such an amateur event with the prestigious Audio Engineering Society (AES) conventions, but for me there were two striking similarities. First, apart from the

PHOTOS 2-4: A few of the open-baffle dipole speakers on demo at the show.



actual demos, there was an active schedule of briefings and lectures, with two or three in progress at any one time. Which posed a familiar problem: Which one do you attend, while trying to shoehorn in as much exposure to the interesting ideas and research topics?

Second, many serious amateurs firmly abandoned a focus on the umpteenth current source topology and how to bias a LED, turning instead to a professional systems point of view. That is not to say that current sources and LEDs are not important; I cut my own teeth on those same issues, and it is a step that cannot be skipped. But modern audio technology developments are possible with the increasing availability of mathematical analysis tools and simulators, many of them available as student versions or even for free, such as the powerful free Spice simulator from Linear Technology. The lecturers outlined two developments in DIY audio that rely on modern tools.

BRUTE FORCE?

Mainstream audio systems make increasing use of digital signal processing, and one area that has attracted much DIY



attention is digital filtering and crossover design. Digital crossover design takes the digital signal from the CD/DVD player (S/PDIF) and uses a digital signal processor to divide the signal components into three bands (for a three-way system), sending each band to a dedicated DAC, each feeding a dedicated power amp. The filtering is basically a software-driven process and can be changed and tuned *ad infinitum* with little more than a PC. Two general classes of filters are the Infinite Impulse Response (IIR) and the Finite Impulse Response (FIR) filters².

I am not a digital filter expert, but my understanding is that the IIR lets you implement analog filter characteristics in the digital domain. That is, using a digital processor, you do some math on the data, then send it to a DAC and out comes the signal as if it has been going through, say, a 24dB/octave Butterworth filter. But all this is done in the digital domain and can even be changed on-the-fly.

FIR filters are even more powerful in that they can arbitrarily and independently set bandwidth, slope, delay, impulse response, and so on. Thus, you can



PHOTO 1: Audio amateurs trying to absorb the fine points of digital filtering.

have a 24dB/octave low-pass filter with zero phase shift and constant delay. The advantages are obvious.

Response deviations or differences in group delay between individual drivers can easily be compensated. Room resonances can also be compensated for. Disadvantages of analog filters, such as unavoidable phase shifts, delay variations, and non-symmetrical impulse responses, can completely be avoided (if you use FIR filters). With the continuing fall in price of integrated processors, digital implementations are coming within the reach of audio amateurs.

There were two interesting lectures at the DDIY 2006 on digital crossover filtering. Simon-Thijs de Feber selected the AL3101 processor after looking at several candidates, and has all but finished a modular three-way crossover based on IIR in an AL3101 DSP feeding into a trio of AD1854 DACs. Gerard Jansen took the other route, and has built an FIR implementation on the EMU10K1 processor on a Soundblaster Live! card. The software used to program the EMU DSP is called BruteFir, runs under Linux, and is essentially free!

WHICH POLE?

The second interesting topic, which generated much interest at the DDIY 2006, was dipole speakers, which feature no real enclosure but just a baffle with the drivers, so these radiate not only to the front but also to the rear. Hans Laros presented an in-depth design process using (again) analysis tools such as MathCAD, LspCAD Pro, and others. Many actual designs were demonstrated, and invariably what caught people's attention was the total absence of "enclosure sound."

Attention in dipole speakers has fluctuated in past years, but one obvious disadvantage was that at certain frequencies, there would be an acoustic short between the rear- and front waves, leading to a response dip. The resulting on-axis frequency response thus resembled a comb filter. However, with active compensation and using high-excursion drivers, excellent results can be obtained, as has been demonstrated by Siegfried Linkwitz of Linkwitz-Riley filter fame.

At the show, we were able to compare dipole speakers with an expensive closed

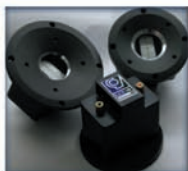
box, and the differences were glaring and not at all subtle, with the dipole having very low coloration and strong articulation, especially in the low-frequency range. This is a development to be watched.

IN CLOSING

As noted, today's audio DIY is really state-of-the-art, with amateurs having the advantages of low-cost advanced tools and parts, without the constraints of having to produce a competitor in today's cutthroat market. I will surely be present again at DDIY 2007; maybe I can even demo something of my own. You see, I have this advanced current source to bias this LED... *aX*

REFERENCES/FOOTNOTES

1. Normally DDIY is held in early April, but because the organizer and his wife were expecting a baby, the event was moved forward to avoid interfering with Mother Nature herself. We welcomed Sarah-Ysabel in early April, proving that audio DIYers do have a life!
2. www.dspguide.com/pdfbook.htm.



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Frequency Response: 7K-100KHz (-18dB/oct crossover inside)
Crossover Fc: 10KHz/96dB/2.83V/1M (300W)
13KHz/92dB/2.83V/1M (300W)
Impedance: 8 ohm / 12 ohm Ribbon Size: 15 x 25 x 0.006mm