Speeding Up Product Development with Audio Weaver

An Interview With Dan Harris, Chief Technology Integrator for Sennheiser
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The word is starting to get out about Audio Weaver®, the technology from DSP Concepts that makes developing DSP-based audio products faster and easier. One of the first engineers to gain a great deal of experience with Audio Weaver is Dan Harris, Chief Technology Integrator for Sennheiser Technology & Innovation, a San Francisco-based lab that specializes in development of digital audio technologies for the German company known for making some of the world's finest headphones and microphones.

In this interview, Dan discusses his work at Sennheiser, and how Audio Weaver has helped his team achieve better results, faster.

Please tell us a little bit about what you do.
A few years ago, Sennheiser realized they needed to bring digital audio signal processing into their core competency, so they started Sennheiser Technology & Innovation in the Bay Area to do DSP algorithm research. My responsibility is to take those algorithms and the other research we do here, and support moving them into products.

What initially attracted you to Audio Weaver?
We realized there was a big gap between the algorithms we came up with, and what the product engineers in Germany were able to implement in a shippable way. Often the algorithms we developed couldn't be implemented, or were difficult to implement, on the platforms that the hardware engineers were using. So we realized we needed some software tools that would facilitate cross-platform development. We looked at what was available, and considered developing something ourselves, and decided Audio Weaver would be the best solution.

What are you using Audio Weaver for now?
We're just now about to come out with our first products that were developed using Audio Weaver. I can't go into detail about what they are because they haven't been announced yet, although I can tell you they're consumer products. We used Audio Weaver to deploy the same algorithms across three different DSP platforms.

What are the advantages that Audio Weaver delivers for your operations?
I think the modular aspect of it has sped up product development, and made product development easier for teams who don't have DSP implementation expertise. We have guys implementing this who have never written DSP code, and with Audio Weaver they don't have to. It allows us to develop DSP-based products without adding DSP programmers to the staff. Audio Weaver makes it possible for audio products to be developed by acoustics guys or audio

engineers who are comfortable with Matlab but don't know how to implement, say, a digital filter in DSP.

Do you find Audio Weaver gives you all the functions you need?
That's another advantage. If you're using modules to program a DSP, you could have 10,000 modules available in the software and still not have the one you want. Audio Weaver lets us develop custom modules. If you're a DSP guy and they don't have the module you want, you can write the C code to build the module yourself. We knew that no one would have all the modules we would want.

Do you mostly use the standard processing modules DSP Concepts provides, or modules you've developed?
It's a combination. We use a lot of the modules they provide, but we usually have to develop a couple more. Usually there's a module that provides the function we need but doesn't do exactly what we want, so we build one of our own. Or sometimes we realize that rather than combining a lot of modules to achieve a certain function, it's more efficient to create a custom module.

How difficult is it to create custom modules?
Creating the custom modules is pretty simple. The workflow is a little more complicated than just writing in C, because you have the link to Matlab, but I was able to make my first custom modules in a matter of days.

Have you found that Audio Weaver supports all the DSPs your hardware engineers want to use?
That's another key point. They support certain target processors, but if we want to use a DSP they don't support, we can modify Audio Weaver ourselves to support it, or pay DSP Concepts to do it for us.

Does Audio Weaver work well with the other product development software you're using?
Yes. Its integration into Matlab was a big selling feature for us. Algorithm developers like to work in Matlab, while DSP guys like to work in C, so having that link was really important.

How are the two software packages integrated?
Matlab is great for getting math done really quickly when you're doing algorithm development, but usually you have to rewrite the algorithm in C or C++ to get it onto a DSP. The vast majority of companies start in Matlab then port the algorithm to whatever processor they're working with. You still have to do that with Audio Weaver, but the cool thing about Audio Weaver is that it provides a framework so you can test against what you have in Matlab to make sure you have same results.

You mentioned that you've used Audio Weaver on three DSP platforms so far. How well have the algorithms you've developed translated from chip to chip?
There's always a certain amount of work involved to implement and refine your algorithms for the target hardware, but with Audio Weaver that effort is greatly reduced. Our office implements algorithms in Audio Weaver and passes them off to the product development team. If they're using a DSP platform supported by Audio Weaver, most of the work is eliminated. Even in a worst-case scenario, where the DSP platform that the product development team is using isn't

supported by Audio Weaver, Audio Weaver has a nice test framework all set up for you to make the porting process easier.

Sennheiser specializes in headphones and microphones, so we imagine most of the DSPs you're using are fairly low-powered chips. Do you think Audio Weaver would work as well for high-powered DSP applications, such as A/V receivers?
If I was working on A/V receivers I would be pushing hard for this. A/V receivers have so many codecs to support, and with Audio Weaver they can easily get the modules. Even if it's a brand-new codec or technology and DSP Concepts hasn't created a module for it yet, it's easier to implement it in Audio Weaver than to build it from scratch.

Have you found the product support for Audio Weaver adequate to meet your needs?
Definitely. We're one of DSP Concepts' most challenging customers because we want very tight control over everything we do. We don't just slap our name on things. We want to tinker around with every single nut and bolt. We're always pulling the source code apart -- we're an annoying customer that way! But DSP Concepts has been incredibly helpful and supportive with addressing the challenges we've run up against.