

Rainier Brings ADI’s Key Messages to Top-Ranked Trade Media Coverage

► Challenge: Convey key messages to engineers



There was never any question that Analog Devices (ADI) customer Fishman Transducers had a cool story to tell. The Fishman team employed an ADI Blackfin digital signal processor (DSP) to re-image the psychoacoustic characteristics of acoustic guitars, applying complex algorithms to the vibrational output of piezoelectric bridge pickups.

Many engineers are guitar players, so the story was bound to get trade media attention from that perspective. But for ADI, Rainier’s job was to leverage the cool application to get the client’s key Blackfin messages in front of engineering audiences. Message-rich coverage would point engineers to Blackfin as a good processor choice for their own designs.

► Results: Key messages plus top placement



After placing the story online with EDN and DesignNews during the week of CES, Rainier took aim at EE Times, high-tech’s benchmark news publication. The result of Rainier’s pitch, which included connecting EE Times with Fishman Transducers CEO Larry Fishman for vital third-party affirmation, was a powerful article that cited ADI’s Blackfin as the application’s main technology enabler.

The article persuasively associated the Blackfin brand with “DSP,” and underscored primary Blackfin messages including positioning the device as a “convergent processor,” and emphasizing its low power consumption (“longer battery life than any other commercial DSP”).

The story appeared on the EE Times home page, and quickly skyrocketed to the coveted position of most-popular-story.



Jerry McGuire



TOP STORY



Acoustic guitar subtleties re-created by DSP

Fishman's digital acoustic imaging captures the subtleties of an acoustic guitar in the studio, then harnesses a digital signal processor to re-create that pristine sound on stage or in your home studio.

“This is the kind of surgically precise PR every technology company hopes for from an agency,” said ADI vice-president Jerry McGuire (himself a guitarist). “By getting our key messages in front of design engineers through this kind of media coverage, Rainier helps drive our business objectives – new design wins – in today’s growth markets.”

► **Strategy: Drive news feeds and Web 2.0 engines**



EE Times: Latest News
Acoustic guitar subtleties re-created by DSP

EE Times India

New Products

DSP performs digital acoustic imaging

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DSP redefines acoustic guitar subtleties

Posted : [25 Jan 2008](#)



28 January 2008

Acoustic guitar subtleties re-created by DSP



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Guitar Acoustics Jazzed Up With Digital Signal Processing

A new digital-modeling technique makes acoustic guitars with an inexpensive pickup sound as if they were in the studio in front of an expensive microphone.



Acoustic guitar subtleties re-created by DSP



Elektronik får din skrammelguitar til at lyde som verdens bedste

Tag en billig pickup, plus en DSP-chip fra Analog Devices og en ny algoritme. Så får du din gamle akustiske skrammelguitar til at lyde som verdens bedste studiegitarr.

(Denmark – Ingeniøren – “Engineer”)



Acoustic guitar subtleties re-created by DSP

Posted January 25, 2008 9:51 AM

Acoustic guitar subtleties re-created by DSP

Fishman's digital acoustic imaging captures the subtleties of an acoustic guitar in the studio, then harnesses an Analog Devices digital signal processor to re-create that pristine sound on stage or in your home studio.



NextGenLog
 Next generation electronics, and related technologies, news and interviews

WEDNESDAY, JANUARY 23, 2008

▶ "ALGORITHMS:Acoustic guitar subtleties re-created by DSP"



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news

From CES 2008

DSP Improves Acoustic Guitar Sound Quality

Sound image algorithm helps guitarists in real time
 Charles J. Murray, Senior Technical Editor -- Design News, January 8, 2008

Engineers at the Analog Devices, Inc. booth here at the 2008 Consumer Electronics Show demonstrated yesterday how digital signal processor (DSP) technology helped create a better acoustic guitar.

Using a Blackfin DSP, Fishman Transducers, Inc. found a way to amplify acoustic guitars without compromising their sound quality.



The magazine of record for the embedded computing industry

Acoustic Guitar Subtleties Re-created By Dsp



Fishman's digital acoustic imaging captures the subtleties of an acoustic guitar in the studio, then harnesses an Analog Devices digital signal processor to re-create that pristine sound on stage or in your home studio.



Imaging a sound - real fun with DSP

<http://www.dftdigest.com/miscellaneous/imaging-a-sound-real-fun-with-dsp/>

Not too long ago I blogged an article about the Gibson Les Paul Robot Guitar - now here's an article over at EE Times about another great use for digital signal processing - acoustic imaging. Fishman transducers has been making pickups and preamps for guitars for some time now, but just recently started working with guitar [...]



The People's Guide to: Martin guitars

Guitar Acoustics Jazzed Up With Digital Signal Processing (InformationWeek)

Fishman's digital acoustic imaging captures the subtleties of an acoustic guitar in the studio, then harnesses an Analog Devices digital signal processor to re-create that pristine sound on stage or in your home studio. [Read Story](#)



[EE Times: Latest News](#)

Acoustic guitar subtleties re-created by DSP

[R. Colin Johnson](#)

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[EE Times](#)

(01/23/2008 4:14 PM EST)

PORTLAND, Ore. — Guitarists usually associate digital signal processing with electric, rather than acoustic, guitars, especially after early attempts to apply DSPs to acoustic instruments led to modeling effects that kept the guitars from performing as advertised.

Now Fishman Transducers Inc. says it has repurposed the Analog Devices Inc. Blackfin DSP to perform "digital acoustic imaging" instead of modeling, making [acoustic guitars](#) with an inexpensive piezoelectric pickup sound as if they were in a pristine studio in front of an expensive condenser microphone.

"When we first considered digital signal processing for guitars, we were just thinking modeling—making a Gibson sound like a Fender," said Larry Fishman, president of [Fishman Transducers](#) (Wilmington, Mass.). "We tried that, but found that it's much too complicated a problem, with all the subtle complexities. Now what we do instead is make an acoustic guitar sound as good in your home recordings, or live onstage, as it does in a professional studio."

The idea, he said, "is to capture that great studio sound and bring it out to real world of performances."

Fishman's digital acoustic imaging algorithm works by comparing the [sound of a guitar](#) under perfect conditions—in an ultraquiet studio with a variety of expensive condenser microphones placed at various distances in front of it—with the signal you get from a piezoelectric transducer or pickup, which Fishman places under the bridge saddle. The transducer senses the originating excitation of the strings, but is not sensitive to the sound hole resonances. And it doesn't hear the mix of phases in front of the instrument as various frequencies radiate differently off the top, sides and head of the guitar.

Fishman says it can capture and re-create all these subtle frequency and phase differences by running its algorithm on a Blackfin DSP from Analog Devices (Norwood, Mass.), contouring the audio from the raw transducer so that it sounds as if were in the studio.

"First, we take a guitar into the studio and do a two-channel recording—one channel records from what the transducer hears and the other channel records what the microphone hears," said Fishman. "Then we run the algorithm we developed to make a very close comparison of the two signals in the frequency domain, subtract one from the other to get their difference, then convolve the two to get what we call a sound image."

From the sound image, Fishman Transducers creates a custom filter with more than 2,000 frequency taps for the Blackfin DSP. "We not only adjust the amplitude of each frequency, but also make critical-phase adjustments, which is where the magic comes in," Fishman said. "Without that phase information, we would just have a 2,000-band graphic equalizer. But by adjusting the phase information too, we get three-dimensionality in the sound."

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As a result, he said, "when we make a filter from our acoustic image and download it into the Blackfin, then drive that image with the raw guitar signal from the transducer, it is transformed into what the microphone would be hearing in a professional studio."

In practice, Fishman records each instrument with a half-dozen well-known studio-recording microphones, then offers those sounds as selections to the guitar user. Musicians who add Fishman's Aura preamp to their own guitar, as opposed to buying a guitar with a built-in Fishman preamp, can download as many as 16 acoustic images from a Fishman Web site. The site already offers more than 1,000 acoustic images for nearly every acoustic guitar in existence. "We have a continuous flow of instruments coming into our shop from around the world, and we update our list with new acoustic images weekly," said Fishman.

Users can select acoustic images by guitar body type, wood, microphone type and distance between microphone and instrument. "You don't need an exact match always, and there are some surprising combinations that just happen to sound good," Fishman said.

For serious guitarists, the company will create a custom acoustic image for \$250. Musicians ship their guitars to Fishman's studio to get a professionally calibrated acoustic image they can load into their Aura preamp. "This really lets your guitar shine, especially onstage or in home recording situations, where you don't have a pristinely quiet recording environment or a closet with \$250,000 worth of fancy microphones," Fishman said.

A major portion of Fishman Transducers' business is from guitar manufacturers that include a built-in Fishman pickup and preamp inside their acoustic guitars. Guitar makers send finished instruments to Fishman, which calibrates an acoustic image for that particular type of guitar and supplies a custom pickup and preamp to re-create the plush studio sound at the push of a button.

To meet the long-battery-lifetime requirements of in-guitar preamps, Fishman says the company evaluated the available DSPs with energy efficiency as the No. 1 concern. "We ran a competitive evaluation of all the other DSPs, and Blackfin was the clear choice for us, because its greater power efficiency gives us a much longer battery life than we could get with any other commercial DSP processor," said Fishman.

To get that longer battery life, Fishman runs the Blackfin processor at an energy-saving 169 MHz with a supply voltage of just 0.8 V.

"Equally important is that we don't need a separate microcontroller for the user interface," said Fishman. "Previous to Blackfin, we had to use a separate microcontroller to read the knobs and handle the user interface, but it was power-hungry and needed a different supply voltage from the DSP."

At the recent National Association of Music Merchants trade show, Fishman showed a new line of acoustic-effects pedals--reverb, delay and chorus--that use the same printed-circuit board as Aura, but program the Blackfin DSP to perform these more-traditional guitar effects.

BRIAN'S BRAIN

EDN Senior Technical Editor Brian Dipert exposes, analyzes and opines on diverse topics in technology.

Thursday, January 10, 2008

CES 2008: While My Guitar Greatly Adapts*

I attended a *lot* of demos this week at CES, some of them pre-scheduled but most of them impromptu drop-bys due to the mind-boggling logistics that would otherwise be necessary at this mind-bogglingly monstrous conference. Perhaps the coolest demonstration I saw took place at Analog Devices' Las Vegas Convention Center suite, although if you're not a **recording engineer** or a musician you might not fully appreciate the magnitude of what I heard.

Plugging a cable into an acoustic guitar's pickup is a common way of capturing the instrument's sound, either for recording or for live performance amplification purposes. Such an arrangement *does* enable reproduction of a portion of the guitar's resonant characteristics, specifically the **strings and their interaction with the headstock and bridge**. However, the all-important acoustical colorations created by the guitar's *body* are absent from a pickup-based configuration; to capture them, you normally need to rely on a **single- or multi-microphone configuration** placed nearby the instrument...a complicated and expensive approach that also forces the musician and his/her instrument to remain in an unnaturally rigid posture throughout the performance.

That's where Analog Device's customer, Fishman Transducers, comes in. The company's **Aura Acoustic Imaging line**, as the website verbage indicates, "allows acoustic musicians to easily and accurately reproduce the sound of their instrument as miked in a professional studio." Specifically, I heard (and heard about) the **Ellipse Aura**, which you can either purchase pre-installed in your new guitar or later add as an aftermarket upgrade.

Ellipse Aura embeds an **Analog Devices Blackfin processor**, which it uses to process the sound information coming from the pickup in order to add guitar body resonance characteristics, resulting in a much 'fuller' and more realistic sound that greatly impressed me when I auditioned it. You can download image files created from a wide range of popular guitar makes and models....for an additional price (along with the temporary use of your instrument), Fishman will even record your guitar and create a custom image file for it. Blackfin's low power consumption translates to an estimated 30+ hour battery life, and Ellipse Aura also automatically powers down when you unplug the cable from the instrument.

I've talked before about the migration of music creation from **large, expensive studios to home-based setups**, thanks to the increasing capability and decreasing cost of computer software and of computer and peripheral hardware, along with the in-progress implosion of major record labels and the resultant empowerment of the musician or band. Gear like Ellipse Aura is both indicative of and will benefit from these trends. Fishman's employees are also hopeful that, after many years worth of sustaining-to-declining consumer interest in guitar-related equipment, the **Guitar Hero** and **Rock Band** phenomena will cultivate follow-through demand from gamers who subsequently become interested in learning how to play a *real* instrument.

***Sorry, George**. If it's any consolation, you were my favourite Beatle.