

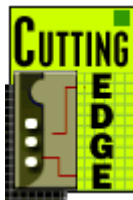
Flat Speaker, Full Sound

'Chaotic Vibrations' Could Change the Shape of Audio

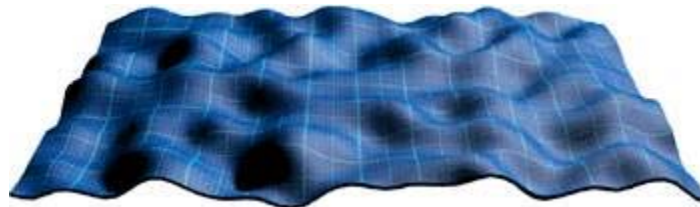
By [Michael J. Martinez](#)



In the early 1990s, the British Defense Ministry authorized the use of lighter, stiffer materials in the cockpits of fighter jets. Little did the ministry know that new audio speaker technology would be the result.



British fighter pilots had complained about increased noise in the cockpit. When the ministry's scientists investigated, they discovered that the new materials carried the plane's own vibrations very efficiently — too efficiently for comfort.



NXT technology operates on a principle of complex vibrations across an entire panel rather than the piston-like motion of a diaphragm. (NXT Surface Sound Technology)

A London-based company called NXT took the findings and conducted more research. In late 1997, NXT began licensing technology for flat-panel speakers. While flat speakers have been around for nearly 50 years, NXT's technology is the first to use multiple, chaotic vibrations instead of a pulsating diaphragm to create sound.

The result is an inexpensive, lightweight and flexible speaker that can reproduce high- to mid-range frequencies better than regular speakers. NXT-technology speakers, marketed under the Benwin brand, hit the marketplace in January.

Good Vibrations

Conventional speakers use a pair of magnetic fields to make a membrane, or diaphragm, vibrate as a whole, creating sound vibrations. NXT's speakers, by contrast, use electronic impulses to produce multiple vibrations across a single surface.

When you tap a drum, the sound vibrates across the drumhead, starting at the point he volume is lower. Tap along the edge, and you get a different tone than if you tap the center. That's the basic idea behind NXT's technology, but it goes one step further.

An electronic "exciter" on the back of each speaker sends electronic "taps" along the surface of the panel. By changing and regulating each electronic tap, the exciter creates different volumes and frequencies that vibrate through the panel. The resulting vibrations are heard as sound.

The exciter sends multiple taps along multiple paths — the resulting overlapping sound waves across the panel make it look like a pond in a rainstorm. The vibrating membrane on current NXT speakers is made of a woven paper composite.

“It doesn’t even matter what panel material you use,” says Jon Vizor. “You could even use cardboard. Of course, the better the material, the better the sound.”

Lightweight and Loud

Hong Kong-based Kwong Quest LLC is one of the first companies to produce computer multimedia speakers using the NXT technology. The company’s first speaker system, called the Benwin BW 2000, costs \$99. It comes with two 5-by-5+ inch speakers, which are just a half-inch thick, and a small, conventional subwoofer. The whole set weighs barely a pound.

The presence of the subwoofer illustrates one of the drawbacks to the NXT technology. The smaller a flat-panel speaker is, the harder it is to produce low-frequency sounds.

“These really aren’t designed for the true audiophile,” says Linda Kazares, senior vice president of Kwong Quest. “Our current product lets people have good sound, but more importantly, the speakers take up almost no space.”

Kwong Quest/Benwin plans to introduce more expensive “audiophile” speakers for computer gamers later this year. Audio companies, including JBL, Infinity, Philips and Blaupunkt, are planning high-end stereo and computer speakers using NXT panels.

A New Wall of Sound

NXT has also licensed its technology for use in ceiling tiles, picture frames and other “hidden” applications. Since bigger panels obviate the need for a subwoofer, applications are also being developed for car door panels and cinema screens. The technology is even being used for the new speaker system at the Greenwich station of the London Underground.

Scientists at NXT’s research facility in Cambridge have also come up with another new technology called SoundVu. Released last month, SoundVu uses transparent panels instead of opaque panels to conduct sound. The company has made a laptop with SoundVu — the entire screen is a speaker. Both regular and flat-screen televisions and computer monitors are next, though the technology is still 18 months away.

“The beautiful thing about this technology is that it’s very consistent, and it’s cost-effective,” Vizor says. “The applications are endless.” ■