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Taking sound to a new level

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PARIS: The music of my teenage years came to me mostly via AM radio. When I listen to music now, it is delivered in digital format over headphones. Compared to the tinny, static-filled radio of my youth, how could I ever want better sound than that?

It may be surprising to hear, but experts are already working on the next generation of audio. In start-up companies and research labs around the world, the reproduction of music is undergoing a fundamental transformation.

In a lab outside of Paris, for instance, researchers are working on how to recreate accurately what sound engineers intended when they were in the studio mixing musical recordings.

But the goal of the project is to reproduce that fidelity over the kinds of simple headphones that we carry around with us, not over the thousands of euros' worth of equalizers and speakers necessary in a home stereo or cinema setup.

Brian F.G. Katz, a researcher at the Centre National de la Recherche Scientifique, said his work was based on the principle that our perception of sound is individual, determined by the size and shape of our ears and skulls - a difference lost on today's headphones.

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He is working with a Paris-based company, Arkamys, on a three-year effort to bring three-dimensional sound to ear buds. It is something that Arkamys is pitching as "listening with your own ears" - as opposed to listening to music over headphones that are best suited to someone else's ears.

In a commercial sense, the idea would work like this: You use your mobile phone to take several photos of the side of your head and your ears. You send the photos over the cell network to a service that analyzes them against a collection of three-dimensional images of ears.

The service matches your ears to the closest model, and then sends back to your phone customized software that changes the music you listen to in such a way that it accurately recreates the artists' intention.

In time, according to Philippe Tour, chief executive of Arkamys, the software would be integrated directly into mobile devices by the manufacturer, with which Arkamys is currently working, without requiring users to change or modify their headphones in any way.

Katz is presenting a study this summer that proves what we have all suspected: that there are vast differences among various kinds of headphones, from ear buds to in-ear, cheap to expensive, closed to open.

"What you find is, yes, there is quite a difference among them," Katz said, "because the physical response of the headphone and the physics of how they function is not the same. But it also shows that if you do sufficient equalization, you can make ear bud headphones have the same 3-D quality as an expensive headphone.

"I'm not saying they have the same fidelity, but you can get rid of the defaults in terms of spacial sound," Katz said. "There's going to be a limit to what physically that little speaker can do."

The benefits of improving headphone sound can extend to non-entertainment uses as well. Three-dimensional sound in headphones can be used as navigational aids for the blind, enabling mobile phones with GPS and 3-D sound to work as a guidance system.

Another non-music application is to add verisimilitude to teleconferencing with mobile phones. "In a room, the human brain is designed to separate voices - you never have problems figuring out who is talking when you're sitting at the same table," Katz said. "On a phone, all voices sound like they are coming from the same place." With 3-D sound, you can recreate the whole physical layout of the meeting in front of you while you are sitting on a park bench, he said.

Today, military research is pouring a lot of money into figuring out the best uses of 3-D sound for defense purposes. The Arkamys-CNRS effort is to bring that multimillion-euro research down to a commercial, mass-market use.
