Sound Around Town

Creating interactive music using GPS, MIDI, and singing suitcases.

By Bean

The term *interactive* has been used to describe many forms of new media. However, I admit that last September I was caught off guard at the 1998 Ars Electronica festival by an "interactive" set of luggage that appeared to have a life—and sound—of its own. (For more on Ars Electronica, see "Performing Musician: URLS, Mines, and Ars" in the March 1999 issue of **EM**.)

Each suitcase had a distinct "voice," which changed as the luggage was wheeled through the streets of Linz, Austria. The movement of the pieces of luggage, as well as their proximity to specific landmarks and to each other, determined the sounds that they emitted. Only through active involvement did participants begin to understand the relationship between their physical gestures and the music produced by their singing Samsonites.

IAIN MOTT

The sound-mapping project in action during the 1998 Ars Electronica festival in Linz, Austria. Each suitcase responds to its position relative to urban landmarks, as well as to other sound-mapping suitcases.

MAPPING GESTURES

Iain Mott, Jim Sosnin, and Marc Raszewski collaborated on this unusual installation, which they called *sound mapping*. The idea emerged from the trio's desire to create music by using the interaction between people and their environment.

To that end, four portable suitcases were equipped with piezoelectric gyroscopes and custom-built odometers to sense the movements of participants. The suitcases' locations were tracked using the satellite-based Global Positioning System (GPS). In order to translate gestures into sound, each suitcase was further outfitted with an FM transmitter, a Shure wireless receiver, a power amp, and a 12-volt battery. Sony car speakers were set into the front of each suitcase for audio output.

Sosnin programmed the custom Peripheral Interface Controller microcontrollers, which convert four channels of suitcase-motion data into a MIDI stream inside a large "hub" case (see **Fig. 1**). Once the data is received by the

DIFFERENTIAL SOLUTIONS

Providing the sound-mapping experience to people in other countries has proven slightly problematic because of the differences among the countries' Differential GPS systems (DGPS). The differential system enables users to gain a high degree of positional accuracy—within a margin of up to one meter.

"The big antenna on the hub case picks up the standard (and free) GPS signal and is connected to the basic GPS unit," Mott explains. "The smaller differential antenna and the differential receiver get the error-correction message over FM, which is sent from a nearby base station. Put simply, GPS receivers obtain their location by measuring the distance to a number of satellites in direct view. These measurements, however, are not all that accurate due to variable atmospheric conditions and *selective availability*, which is the deliberate degradation of the signal by the U.S. military. Differential error correction remedies these problems."

Sound mapping uses an inexpensive FM system made by Differential Corrections, Inc., that works in various areas, including Australia, North America, and the United Kingdom. However, with upcoming shows this year in Italy, Japan, and New Zealand, Mott may have to rent a costly satellite DGPS system because FM services are unavailable in those countries.

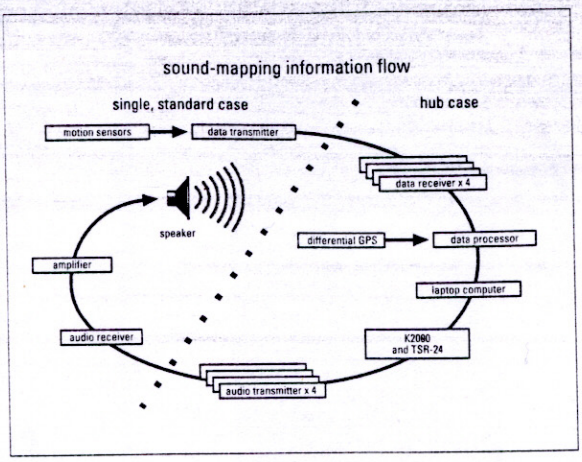

FIG. 2: Algorithms in Opcode's *Max*, running on a laptop computer in the hub case, determine changes in timbre, pitch, and rhythm based on speed and positional data from the suitcases.

Another problem is isolating the GPS unit and its aerial from the audio transmitters, which can jam the satellite signal. This was finally accomplished by shielding the audio and data leads, extending the GPS aerial, and reducing the power of the audio transmitters.

TRUE CONFESSIONS

Mott's interest lies in exploring the relationship of music to the act of making music and to the performance space. He hopes to increase the extent of physical audience interaction, as well as make it easier for the public to engage with sound directly.

"Musicians intuitively understand the relationship between music and their own bodies," Mott says, "even if they don't acknowledge it. Real music is something that is produced by their entire being: their mind, their hearing and sight, their touch, their physicality, and their cooperation with others. Physical engagement is essential to music, and perhaps to all art, and it is something that the consumer society generally denies the public."

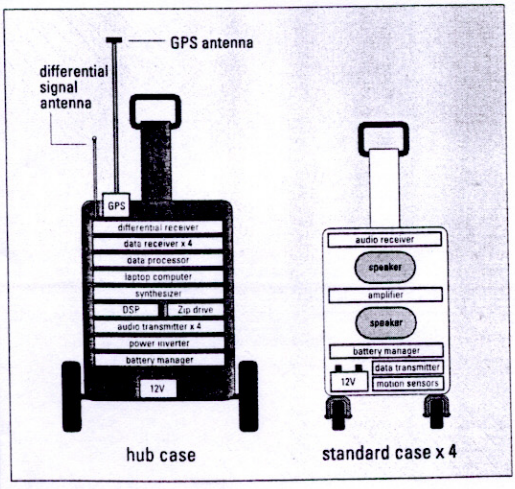

FIG. 1: The sound-mapping hub case contains the processing muscle needed to follow and interpret the positions of the four standard cases. Each standard case transmits movement information and receives and broadcasts the sound sent by the hub case.

Bean's *music-making methods include sneaking into schools around the Bay Area with her group, RhythMix. More information on the sound-mapping project is online at members.tripod.com/~soundart.*