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pg. 9

A Body of Musical Talents

By Robert Cooke

With a bundle of electrodes, a high-powered computer and a music synthesizer, scientists have designed a system that can use the human body's organs as a trembling, twitching symphony orchestra.

By hooking up different parts of the body to the computerized system, an entirely new kind of music — metabolic music — becomes possible.

Physiologist Hugh S. Lusted and graduate student R. Benjamin Knapp, both at the Stanford University School of Medicine, reported on their device yesterday at a meeting in Honolulu of the Acoustical Society of America.

What they described is a new type of electronic instrument that makes music directly from the normal electric signals found within the human body. By controlling the signals, the music can be played.

Scalp electrodes, for example, read the brain's electrical activity, a computer then picks out patterns and commands a synthesizer to squeal and squall in response. Similarly, electrodes hooked up near the heart, or on the eyelids or kneecaps, convert nerve impulses into synthesized sounds.

In their report to the acoustical society, they wrote that their system, called Biomuse, "allows a musician to use his or her 'inner machinery' to generate sounds" through the synthesizer. As a result, signals from the heartbeat or brain waves, for example, could be used to complement music made by traditional means.

They also think dancers could be wired to create music directly from the movement of their muscles, producing sounds to go along with the dance.

"We also envision a use for this device in a different sphere: In order to return the pleasure of playing music to paralysis victims," they wrote. "Since the device can use any available nerve or muscle electricity as a control signal, a disabled person can learn to make music, even using eyelids."

Lusted said during a telephone interview that the prototype Biomuse system was put to use last summer, "but it was sort of primitive. It sounded neat, but it was hard to use."

A professional musician who tried the prototype — John Chowning, head of Stanford's Center for Computer Research in Music and Acoustics — said he "found that with some ease and some rapidity I could learn to control certain dimensions" of the sound produced, such as loudness, pitch and timbre.

Lusted said that although he and Knapp developed the Biomuse system on their own time, they've applied for a patent assigned to Stanford University, and "we're working on licensing the technology."

Although he has been thinking of creating such a music system for years, Lusted said, it was only recently that enough computing power became available at low enough cost to make it possible.

"We'd eventually like to write a program for the MacIntosh in which an icon {human-like figure} comes up on the screen, and you point to where you're going to have an electrode. You then program the sound you want, such as a flute, from your head," Lusted explained.

"You could get, say, a flute from your head, a piano from your arm, and a leg muscle could do a trombone. There are hundreds of sounds you can make."