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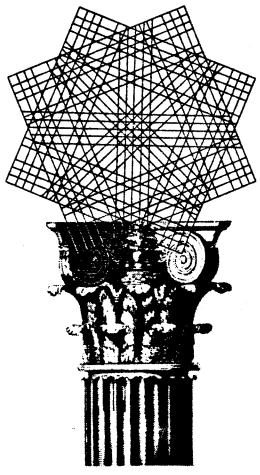

Most of us take computers for granted — they enable us to run our businesses better, they get us information faster, they help us balance our checkbooks. What is often overlooked is the powerful impact these machines are having on our quality of life. The *Computerworld* Smithsonian Awards honor those applications that improve the world in which we live. The following are seven of this year's award-winning organizations whose technological innovations have that human touch.

High-tech heroes

MIT's Vercoe: *Exploring how music works and how humans process information*

Mitch Miller could play along with a computer if his show ran today, thanks to work in progress at MIT's Media Laboratory.

Barry L. Vercoe, professor of Media, Arts and Sciences at the Media Lab, has spent the last 16 years working on his Synthetic Performer, a hardware and software system that can accompany an instrumental soloist or singer. "I wanted to create something that could actually process audio in real time," Vercoe says.

But his vision for the Synthetic Performer is not solely one of a practice partner for musicians. Vercoe, who does some composing ("This has to be done from the musician's perspective," he says. "Amateurs don't know what they are doing."), is interested in revealing new knowledge about how music works and how humans process information.

"When my two children were learning how to play, I asked myself, 'What went on between them?' We now know something about that," Vercoe says.

Finding his pitch

Vercoe's system consists of Unix-based software that can track pitch and timing and match notes as they compare to a score that has been keyed in or played in through a digital keyboard interface. The system then gathers data on pacing by comparing its musical score with how a live musician plays that score.

The primary hardware consists of either Digital Equipment Corp. or Silicon Graphics, Inc. workstations that are attached to solenoid pianos for accompanying the performer.

However, "the published score [is only] a guide to what the performer might really do," Vercoe says. In live performance, there might be quite a difference between the score and actual playing or singing, as is the case with "a romantic piece with a lot of tempo rubato," he adds.

To ensure that the Synthetic Performer can keep up, "listening" software keeps statistics on the specific note timing displacements. After four to five rehearsals, the system "remembers" the human performer's style and tempo and adapts to changes in real time.

Respect from peers

Vercoe's accomplishment is highly regarded by colleagues.

"At first I thought it was impossible," says John R. Pierce, a retired Jet Propulsion Laboratories technologist and professor who is currently working on projects with the Center for Computer Research in Music and Acoustics at Stanford University. "I'm amazed at what he's accomplished."

Vercoe's Synthetic Performer may well be headed for commercial use in the next several years; Japanese companies are eyeing his work closely with the idea of creating automatic *karaoke* machines. — *Michael Fitzgerald*