

Information Technology

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University Researchers Make Device That Turns Drivers Into Musicians

By VINCENT KIERNAN

Forget those tedious piano lessons that your mother made you suffer through as a child.

Researchers at the University of Southern California have developed a computerized system that allows the user to play music using a steering wheel and gas and brake pedals.

Essentially, the researchers say, the user "drives" his or her way through the music with the system, known as the Expression Synthesis Project. The device permits people to experience playing music without having to first master an instrument, the researchers say.

The system is programmed to guide the user through Brahms's Hungarian Dance No. 5 in G minor.

Elaine Chew, an assistant professor of industrial and systems engineering at Southern California who heads the project, said the piece was selected because it includes numerous passages in which the music's tempo suddenly speeds up or slows down.

The system uses a copy of the piece in Musical Instrument Digital Interface format, a digital version of the music that can be used by computers.

The researchers constructed a virtual "road" to guide the user through the music. The road is displayed on a computer monitor. The system includes a computer-game steering wheel and a pair of pedals like those in a car. A MIDI synthesizer attached to the computer produces the music.

The researchers plotted the road so that it twists whenever the Brahms piece slows down. In a real car, the driver slows down when going through a sharp turn in the road, so the turn in the virtual road encourages the user to step on the brake, Ms. Chew said. Doing so decreases the tempo and volume of the music.

By contrast, the pedal to the right of the brake acts like a gas pedal; stepping on it speeds up the music and makes it louder.

Extra buttons on the steering wheel act like the pedals on a piano, allowing the user to make the notes more or less crisp.

Despite the presence of the virtual road, the "driver" retains the freedom to slow down or not through its various twists and turns.

That enables the user to experiment with variations in the tempo of the piece, said Ms. Chew, who also is a pianist. And that ability, in turn, lets the user experience the various decisions made by a musical performer, she said.

The system does not allow the user to change which notes are played. Nor does it allow the "car" to leave the road. Users were permitted to do that in early tests of the system, Ms. Chew said, but the lack of limits caused problems: When the virtual car got too far from the road -- that is, the original musical composition -- the tune was no longer recognizable, she said.

The group now is developing artificial-intelligence techniques that could be used to produce virtual roads for other musical compositions.

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